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Examining the Effectiveness of Risk Management Strategies on Project Performance: A Case Study of the Lusaka Road Rehabilitation Phase Two Project

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Abstract

This study examines the effectiveness of risk management strategies on project performance in the Lusaka Road Rehabilitation Phase Two Project in Lusaka, Zambia. It investigates the risk management approaches used, their influence on project timelines, costs, and implementation outcomes, and the challenges that limit effective risk control. The study adopted a case study design and a mixed-method approach, involving 100 purposively selected participants. The findings indicate that mitigation and avoidance were perceived as the most effective risk management strategies and the strongest contributors to project performance. Overall risk management effectiveness demonstrated a strong positive relationship with project performance ($r = 0.732$, $p < 0.001$). Mitigation, transfer, and acceptance also showed positive relationships, although acceptance made the weakest contribution. The study further found that 61% of respondents reported successful achievement of project objectives. However, implementation was constrained by inadequate training and skilled personnel (68%), budget limitations (65%), poor coordination (58%), regulatory delays (52%), and inadequate risk management tools (42%). Budget constraints were rated the most severe challenge, while only 33% of respondents considered available resources fully adequate. The study concludes that risk management strategies, particularly mitigation and avoidance, can improve infrastructure project performance.

Nevertheless, successful implementation requires sufficient resources, strengthened stakeholder coordination, technical capacity development, and consistent risk monitoring throughout the project lifecycle. The study recommends integrating risk management into every project phase, improving staff training, strengthening communication among stakeholders, and allocating adequate budgets for risk identification, response planning, and continuous monitoring. These measures address financial, regulatory, operational, and coordination risks affecting road rehabilitation projects in Zambia.

Keywords: Risk Management Strategies, Project Performance, Road Rehabilitation, Infrastructure Development, Implementation Challenges, Stakeholder Management, Lusaka, Zambia

1. Introduction

1.1 Background of the Study

Risk management is a central component of contemporary project management because construction projects operate under conditions of uncertainty, interdependence, and competing stakeholder interests. It involves systematically identifying, assessing, prioritizing, treating, and monitoring events that may affect project objectives, including cost, time, quality, scope, safety, environmental performance, and stakeholder satisfaction. Effective risk management therefore requires more than responding to problems after they occur; it involves proactive planning, continuous communication, and informed decision-making throughout the project lifecycle (Kahumbu & Mwango, 2020) [11].

Infrastructure projects are particularly vulnerable to risk because they involve substantial financial commitments, lengthy implementation periods, complex contracts, changing site conditions, and multiple stakeholders. Road rehabilitation projects may face inaccurate estimates, delayed payments, material shortages, inflation, design changes, contractor underperformance, equipment failure, adverse weather, land acquisition difficulties, and regulatory requirements. If these risks are not identified and managed early, they may cause delays, cost escalation, disputes, rework, poor quality, and failure to achieve intended

benefits. Conversely, structured risk management can improve planning, resource allocation, stakeholder coordination, and project delivery.

Risk management strategies commonly include avoidance, mitigation, transfer, and acceptance. Avoidance eliminates the source of a threat, mitigation reduces its probability or impact, transfer allocates responsibility to another party, and acceptance acknowledges the risk while preparing for its possible consequences. These strategies should be integrated into project governance, procurement, budgeting, scheduling, quality assurance, and stakeholder management.

In Zambia, infrastructure development contributes to economic growth, regional connectivity, employment, and access to public services. However, construction projects continue to experience delays, cost overruns, funding constraints, payment delays, regulatory barriers, inflation, and coordination challenges. Inadequate risk assessment may contribute to delayed completion and increased costs, highlighting the need for context-specific risk management approaches.

The Lusaka Road Rehabilitation Phase Two Project provides an important setting for examining these issues. Its performance depends not only on engineering design and construction capacity but also on how risks are identified, prioritized, allocated, and controlled. Although risk management is widely recognized as important, limited empirical evidence explains which strategies are most effective in major Zambian road rehabilitation projects. This study therefore examines the strategies used, their perceived effectiveness, relationship with project performance, and implementation challenges. It provides context-specific evidence to support improved planning, coordination, accountability, and infrastructure delivery in Zambia.

1.2 Statement of the Problem

Infrastructure projects are essential to Zambia's economic development, public services, and connectivity. However, road rehabilitation projects face delays, cost overruns, quality concerns, disputes, and unmet objectives because of financial constraints, delayed payments, inflation, regulatory barriers, limited technical capacity, weak coordination, and changing stakeholder demands. In the Lusaka Road Rehabilitation Phase Two Project, inconsistent and reactive risk management may intensify these challenges. Limited evidence compares avoidance, mitigation, transfer, and acceptance strategies or examines their effects on performance. This study evaluates their effectiveness, performance relationship, and implementation challenges throughout the project lifecycle.

1.3 General Objective

The purpose of this study is to examine the effectiveness of risk management strategies on project performance in the Lusaka Road Rehabilitation Phase Two Project. The study assesses the risk management strategies used, evaluates their effectiveness in supporting project delivery, determines their relationship with project performance, and identifies the limitations and challenges affecting their implementation.

1.3.1 Specific Objectives

The study is guided by the following specific objectives:

1. To establish the types of risk management strategies used in the Lusaka Road Rehabilitation Phase Two Project.
2. To determine the effectiveness of risk management strategies used in the project.
3. To ascertain the relationship between effective risk management strategies and project performance.
4. To identify the limitations and challenges affecting the implementation of risk management strategies in the project.

1.4 Research Questions

1. What types of risk management strategies are used in the Lusaka Road Rehabilitation Phase Two Project?
2. How effective are the risk management strategies used in the project?
3. What relationship exists between effective risk management strategies and project performance?
4. What limitations and challenges affect the implementation of risk management strategies in the project?

1.5 Theoretical Framework

This study is anchored in Risk Management Theory, which explains how organizations identify, assess, respond to, and monitor uncertainties that may affect project objectives. The theory assumes that risks can be managed systematically through identification, analysis, response planning, implementation, and continuous monitoring. In the Lusaka Road Rehabilitation Phase Two Project, the theory provides a framework for examining risks related to finance, procurement, regulation, construction, resources, schedules, and stakeholder expectations. It also supports analysis of four response strategies: avoidance, mitigation, transfer, and acceptance. Risk identification recognizes potential threats, while assessment evaluates their likelihood and impact to establish priorities. Risk response involves selecting and implementing appropriate strategies, whereas monitoring ensures that risks are reviewed as project conditions change. Applying these processes effectively is expected to reduce disruptions, control costs, support timely completion, and improve stakeholder coordination. However, the effectiveness of risk management depends on adequate resources, technical expertise, communication, institutional support, and stakeholder participation. Where these conditions are limited, even well-designed strategies may fail to achieve their intended outcomes. Risk Management Theory therefore guides the assessment of both risk management's contribution to project performance and the challenges affecting its implementation.

1.6 Conceptual Focus of the Study

The study considers risk management strategies as the independent variable and project performance as the dependent variable. The independent variable includes risk avoidance, mitigation, transfer, and acceptance. Project performance is assessed in relation to time, cost, quality, scope, and achievement of project objectives. Implementation challenges, including budget constraints, inadequate training, poor coordination, regulatory delays, limited tools, and insufficient resources, are considered factors that may influence the relationship between risk management strategies and project performance.

1.7 Scope of the Study

Study This study examines the effectiveness of risk management strategies in the Lusaka Road Rehabilitation Phase Two Project in Lusaka, Zambia. It focuses on project

managers, contractors, government officials, consultants, engineers, and other implementation stakeholders. The study assesses the strategies used, their perceived effectiveness, their relationship with project performance, and the challenges affecting implementation. Performance is evaluated based on objective achievement, schedule adherence, cost control, work quality, and overall outcomes. Data were collected from 100 purposively selected participants through questionnaires, interviews, and document review. The findings are primarily applicable to this project and comparable public road rehabilitation projects in similar contexts.

2. Literature Review

2.1 Overview

This chapter reviews literature on risk management strategies and project performance, with particular attention to road construction and rehabilitation projects. The review considers the risk response strategies used in projects, their effectiveness in improving delivery outcomes, the relationship between risk management and project performance, and the challenges that limit implementation. Evidence is considered from international, African, Southern African, and Zambian perspectives to establish the broader context of the Lusaka Road Rehabilitation Phase Two Project.

2.2 Risk Management Strategies Used in Road Construction Projects

Risk management is a structured process involving the identification, assessment, prioritization, treatment, and monitoring of uncertainties throughout project implementation. In road construction, it is essential because projects face technical, financial, contractual, environmental, political, operational, and stakeholder-related risks. The Project Management Institute emphasizes that risk management should be integrated into project planning and control rather than addressed only after problems occur (PMI, 2021) [22].

The main response strategies are avoidance, mitigation, transfer, and acceptance.

Avoidance eliminates or changes the source of a threat, for example by modifying a design, construction method, or supplier. Although effective for severe risks, excessive avoidance may increase costs or reduce flexibility (Kahumbu & Mwango, 2020) [11]. Mitigation reduces the likelihood or impact of risks through site investigations, preventive maintenance, staff training, contingency planning, quality control, early procurement, and contractor supervision. It is particularly relevant to road rehabilitation, where risks such as poor ground conditions, weather, material shortages, and equipment failure cannot always be eliminated (Nkhata, 2021) [19].

Transfer assigns responsibility for a risk to another party through insurance, performance bonds, warranties, fixed-price contracts, or subcontracting. However, it does not eliminate the risk and requires clear contracts, capable parties, and effective monitoring (H. Abdul-Rahman *et al*., 2015) [1]; (Senić, Dobrodolac & Stojadinović, 2024) [25].

Acceptance involves acknowledging a risk, either actively through contingency planning or passively through monitoring. It may suit low-impact or unavoidable risks but can cause preventable disruption if used excessively (Risk Management Strategies in Micro Hydropower Projects, 2025) [23]. Strategy selection should consider risk likelihood, impact, timing, ownership, and controllability. Combining strategies, supported by risk registers, risk owners, escalation procedures, and regular reviews, can strengthen project risk management (Senić, Dobrodolac & Stojadinović, 2024) [26]; (Daka, 2024) [5].

2.3 Effectiveness of Risk Management Strategies in Road Rehabilitation Projects

The effectiveness of risk management can be assessed through schedule adherence, budget control, quality, safety, scope completion, stakeholder satisfaction, and achievement of project objectives (Amoah & Pretorius, 2019) [3].

Strategies should be evaluated not only by whether risks occur but also by their success in reducing the likelihood or impact of those risks (Phiri & Chimbomba, 2025) [21]. Proactive risk management generally improves project outcomes. Early identification supports timely resource allocation, while continuous monitoring enables corrective action. In road projects, mitigation can reduce delays caused by design errors, poor materials, equipment failure, and adverse weather. Avoidance and transfer may also reduce exposure to unsafe designs and specified financial liabilities. However, effectiveness depends on implementation rather than merely having a formal risk document (International Project Management Association, 2020) [7].

In developing countries, inadequate feasibility studies, incomplete designs, weak information systems, limited expertise, and poor coordination may undermine risk management. Risk registers may exist for compliance without informing daily decisions; therefore, formal adoption does not guarantee effective practice (Niragire & Kwena, 2024) [18]. African projects also face inflation, currency fluctuations, delayed payments, procurement and regulatory delays, political influence, land-access problems, and community concerns, requiring flexible, context-sensitive approaches (Júnior & Carvalho, 2022) [10].

In Zambia, inadequate risk assessment has been linked to delays and cost overruns (Kaming, Olomolaiye, Holt & Harris, 2018) [12], while limited locally relevant frameworks and financial and regulatory pressures further constrain implementation (Kishk & Ukaga, 2018) [13]; (Chibole, 2021) [4]. Effectiveness therefore depends on appropriate strategies, resources, expertise, capacity, and institutional support (Nkhata, 2021) [19].

2.4 Relationship Between Risk Management and Project Performance

Project performance is a multidimensional concept. It includes completing work within the approved schedule and budget, meeting technical and quality requirements, controlling scope, satisfying stakeholders, and achieving the intended public or organizational benefits. A project may meet one indicator while failing another. For example, completing a road on time may not represent success if quality is poor, costs are excessive, or safety and environmental requirements are ignored. Risk management should therefore be examined in relation to several performance dimensions rather than a single measure. (Nkole, 2019) [20].

The relationship between risk management and performance can be explained through the reduction of uncertainty. When project teams identify threats early, they can prioritize critical issues, assign responsibility, develop contingencies,

and make decisions before impacts become irreversible. Aleksandar Senić *et al*. (2024) [24] This may protect the schedule by preventing work stoppages, control costs by reducing rework and claims, and improve quality through stronger inspection and supervision. Risk management can also improve stakeholder confidence because responsibilities, assumptions, and response actions become more visible. (Daka, 2024) [5].

Avoidance and mitigation are often expected to make the strongest direct contribution to performance because they address risks before or during their occurrence. Transfer may protect performance when contractual arrangements are enforceable and the responsible party has sufficient capacity. Acceptance may be appropriate for minor or unavoidable risks but may contribute less to performance when it is used without contingency planning. The relative effectiveness of the strategies should therefore be tested rather than assumed, in a specific project context. (Kahumbu & Mwango, 2020) [11].

Risk management may also influence performance indirectly through improved decision-making and coordination. A functioning risk process creates opportunities for project participants to share information, resolve emerging issues, and align resources with project priorities. The relationship between risk management and performance is consequently shaped by organizational culture, leadership, communication, governance, and the availability of reliable project information. (Phiri & Chimbomba, 2025) [21].

2.5 Challenges Affecting Risk Management Implementation

Several barriers can prevent risk management strategies from producing their intended benefits. Resource constraints are among the most important. (Ghahramanzadeh, 2023) [6].

Insufficient budgets may limit site investigations, training, monitoring, insurance, contingency reserves, and access to specialized expertise. Shortages of skilled personnel can weaken risk identification and analysis, especially when project teams lack experience with complex contracts, construction methods, or quantitative assessment. (C. Amoah & L. Pretorius, 2019) [2].

Coordination and communication problems are also significant. Road projects involve organizations with different responsibilities, incentives, reporting systems, and levels of authority. If information about design changes, payment problems, safety incidents, or schedule risks is not shared quickly, responses may be delayed. Poor coordination can also make it unclear who owns a risk, who must act, and who bears the consequences of inaction. (Kahumbu & Mwango, 2020) [11].

Other barriers include weak risk culture, resistance to change, limited use of project information systems, inadequate monitoring tools, and the tendency to treat risk registers as static documents. Some stakeholders may underreport risks because they fear blame, contractual penalties, or reputational damage. Others may emphasize short-term progress while ignoring emerging threats. Effective implementation therefore requires leadership that encourages transparent reporting, learning, accountability, and regular review. (Mjimba, Banda and Nyati, 2018) [14].

Personal Critique of the Literature Review

The reviewed literature provides a useful foundation on risk management strategies, project performance, and implementation challenges in construction and infrastructure projects. However, important gaps remain. Much of the literature presents risk management as generally beneficial without adequately comparing the conditions under which avoidance, mitigation, transfer, and acceptance are most effective. Their outcomes may vary according to project size, procurement method, contractor capacity, available resources, institutional support, and risk characteristics. Although international and regional studies are extensive, Zambia-specific empirical evidence remains limited. Findings from other contexts may not fully apply to Zambia's financial, regulatory, political, and institutional environment. More project-based studies are needed to show how risk strategies are selected, implemented, monitored, and adjusted, using measurable indicators such as time, cost, quality, scope, and stakeholder satisfaction. The literature also pays insufficient attention to barriers affecting implementation, including budget constraints, skills shortages, weak coordination, regulatory delays, inadequate tools, and unclear risk ownership. Furthermore, limited evidence explains how these barriers influence the relationship between risk management and project performance. This study addresses these gaps by examining the Lusaka Road Rehabilitation Phase Two Project. It combines analysis of risk strategies, perceived effectiveness, project performance, and implementation challenges, thereby providing context-specific and practical evidence for improving risk management in Zambia's road rehabilitation sector.

Literature Gap and Study Contribution

The reviewed literature establishes that gaps remain. Much of the available discussion identifies categories of construction risk without comparing the effectiveness of different response strategies. Existing literature provides insufficient explanation of how resource adequacy, training, coordination, regulatory delays, and tools affect implementation.

This study addresses these gaps through an empirical examination of the Lusaka Road Rehabilitation Phase Two Project. It evaluates the strategies used, assesses their perceived effectiveness, examines their relationship with project performance, and identifies the challenges that limit implementation. Its findings are expected to support more realistic risk planning, stronger stakeholder coordination, improved resource allocation, and better infrastructure delivery. These findings may inform project planning.

3. Methods and Procedures

3.1 Research Design

This study adopted A convergent parallel mixed-methods design combined quantitative and qualitative data to assess risk-management strategies, project performance, resource adequacy, implementation challenges, and stakeholder experiences within the Lusaka Road Rehabilitation Phase Two Project.

3.2 Target Population

The target population comprised project managers, contractors, government officials, consultants, engineers, supervisors, and other stakeholders directly involved in or knowledgeable about risk management and performance in the Lusaka Road Rehabilitation Phase Two Project.

3.3 Sampling Design
The study used purposive sampling to select participants with relevant knowledge and experience of the project. Purposive sampling was suitable because the research required information from individuals who were directly involved in project planning, implementation, supervision, contracting, monitoring, or risk management. Participants were selected from the principal stakeholder groups to obtain perspectives from both management and operational levels.

3.3.1 Inclusion Criteria
Participants were included when they were directly involved in the Lusaka Road Rehabilitation Phase Two Project, had sufficient experience or knowledge of project implementation, and were willing to participate. The study included project managers, contractors, government representatives, consultants, engineers, supervisors, and other personnel who could provide informed views on risk management and project performance.

3.3.2 Exclusion Criteria
Individuals who had no direct involvement with the project, lacked knowledge of its risk management practices, or were unavailable during the data-collection period were excluded. Stakeholders who declined to provide informed consent were also excluded from the study.

3.3.3 Sampling Procedure
The researcher first identified the principal organizations and stakeholder groups connected to the project. Permission was then sought from the relevant authorities and project management structures. Potential participants were contacted and informed about the purpose of the study. Participants who met the inclusion criteria and agreed to participate were selected purposively. The researcher ensured that the sample included respondents with different professional roles and levels of responsibility so that the analysis would not reflect only one organizational perspective.

3.4 Sample Size Determination
The study used a sample of 100 participants. This sample was considered appropriate for a mixed-method case study because it provided sufficient responses for descriptive and inferential quantitative analysis while also allowing the researcher to obtain varied qualitative perspectives. The sample included individuals familiar with the project's risk strategies, performance outcomes, and implementation challenges.

3.5 Data Collection Methods
Data collection involved structured questionnaires and semi-structured interviews. Questionnaires measured risk-management strategies, project performance, and implementation challenges, while interviews provided detailed insights into participants' perceptions and experiences. Document review supplemented these methods by providing contextual project information and supporting methodological triangulation.

3.6 Data Analysis
Quantitative data were analyzed using SPSS through descriptive statistics, correlation, and regression analyses. Qualitative interview data were analyzed thematically to identify recurring patterns concerning risk management, coordination, resource constraints, implementation barriers, and project outcomes.

3.7 Triangulation
Triangulation was achieved through the combination of quantitative questionnaires, qualitative interviews, and document review. Data triangulation enabled the researcher to compare information obtained from different stakeholder groups. Methodological triangulation involved comparing statistical results with interview explanations and documentary evidence. Theoretical triangulation was supported by applying Risk Management Theory to interpret how risk identification, assessment, response, and monitoring influenced project performance.

3.8 Limitations of the Study
The study focused on one road rehabilitation project in Lusaka, and its findings may not be generalizable to all infrastructure projects in Zambia. The use of purposive sampling may also have limited the representativeness of the participants because respondents were selected based on their relevance to the research. In addition, some information was based on self-reported perceptions, which may have been affected by recall bias, organizational loyalty, or reluctance to disclose project weaknesses. Access to confidential project documents and records may also have been limited. Despite these limitations, the use of multiple stakeholder groups and mixed data-collection methods provided a balanced basis for assessing risk management effectiveness.

3.9 Ethical Considerations
Ethical principles were observed throughout the study. Permission to conduct the research was obtained from the relevant institutional and project authorities. Participants were informed about the purpose of the study, the nature of their involvement, and their right to participate voluntarily. Informed consent was obtained before questionnaires or interviews were administered.

Confidentiality and anonymity were protected by avoiding the unnecessary recording of personal identifiers and by presenting findings in aggregated form. Participants were informed that they could withdraw from the study without penalty. Collected data were stored securely and used only for academic purposes. The researcher also maintained integrity by reporting the findings accurately, avoiding fabrication or alteration of responses, and distinguishing participants' views from the researcher's interpretation.

4. Presentation of Research Findings and Discussion of Results
4.0 Overview
The presentation follows a structured thematic approach aligned with the four specific research objectives. Both quantitative results (presented in tables and figures) and qualitative insights (from open-ended responses) are integrated to provide a comprehensive understanding of the effectiveness of risk management strategies on project performance.

4.1 Presentation of results on the background characteristics of the respondents

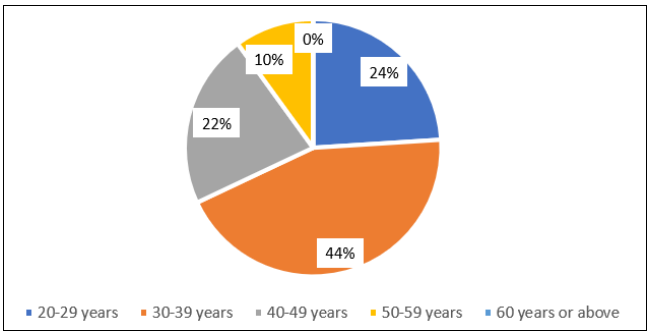

Fig 4.1: Bar chart of Age groups of Respondents

According to the result findings, the majority of respondents (44.0%) were aged 30-39 years, followed by those aged 20-29 years (24.0%) and 40-49 years (22.0%). Only 10.0% of respondents were aged 50-59 years, and no respondents were aged 60 years or above. This distribution indicates that the Lusaka Phase Two Road Rehabilitation Project is primarily staffed by early-to-mid-career professionals, suggesting a relatively young workforce. This demographic profile has implications for risk management, as younger professionals may possess contemporary knowledge of risk management tools but may lack the experiential wisdom required for intuitive risk identification. Conversely, the presence of experienced professionals in the 40-59 age bracket provides a balance of institutional knowledge and practical risk mitigation skills. The concentration of respondents in the 30-39 age bracket (44.0%) is particularly significant as this group represents professionals who have sufficient experience to understand complex risk dynamics while remaining open to adopting modern risk management technologies and methodologies.

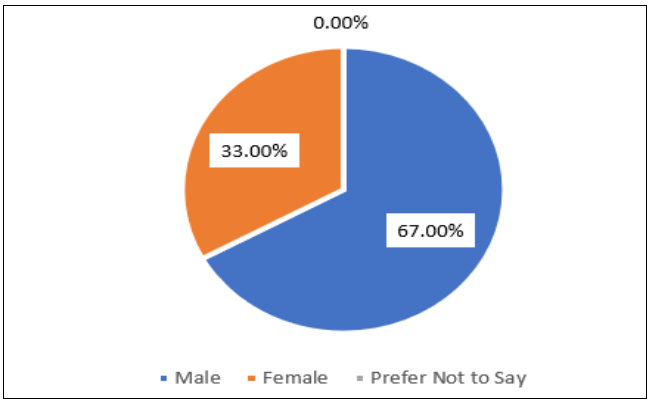

Fig 4.2: Gender Distribution of Respondents

According to the result findings, the construction sector within the Lusaka Phase Two Road Project remains male-dominated, with 67 respondents (67.0%) identifying as male and 33 respondents (33.0%) identifying as female. No respondents preferred not to disclose their gender. This gender disparity reflects broader industry trends in Zambia and across Sub-Saharan Africa, where women remain underrepresented in technical and managerial roles within large-scale infrastructure projects. The 33.0% female representation, while below parity, is noteworthy as it suggests progressive inclusion compared to historical averages, which typically ranged between 15-20% in previous Zambian infrastructure projects documented by Muneku and Mwanauno, (2025) [16] and Nkhata (2021) [19]. From a risk management perspective, gender diversity can enhance risk identification by bringing varied perspectives to the risk assessment process, as research by Turner (2018) suggests that diverse teams identify a wider range of potential risks. Future interventions should aim to further increase female participation in project governance roles to leverage the benefits of cognitive diversity in risk mitigation planning.

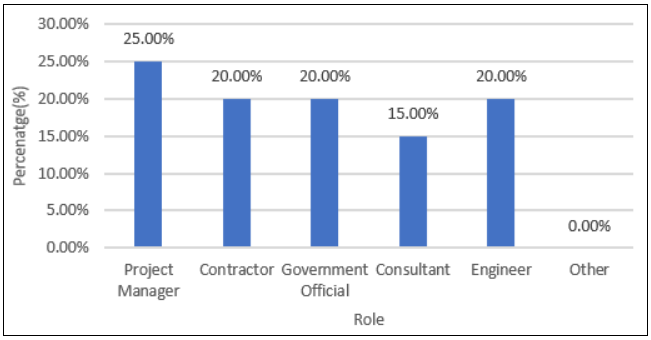

Fig 4.3: Distribution of Respondents by Role in the Lusaka Phase Two Road Project

According to the result findings, the sample captured a balanced cross-section of project stakeholders. Project managers constituted the largest group (25.0%), reflecting their central role in risk governance and decision-making. Contractors, government officials, and engineers each represented 20.0% of respondents, while consultants accounted for 15.0%. This balanced distribution ensures that findings reflect diverse perspectives on risk management effectiveness. Notably, the inclusion of government officials (from Lusaka City Council and Ministry of Transport) provides critical insights into regulatory and political risks that often affect infrastructure projects. The presence of contractors and engineers offers ground-level perspectives on operational and technical risks, while project managers contribute strategic oversight of risk mitigation frameworks. This multi-stakeholder representation strengthens the validity of the study's conclusions, as each role provides a unique vantage point on the risk management process.

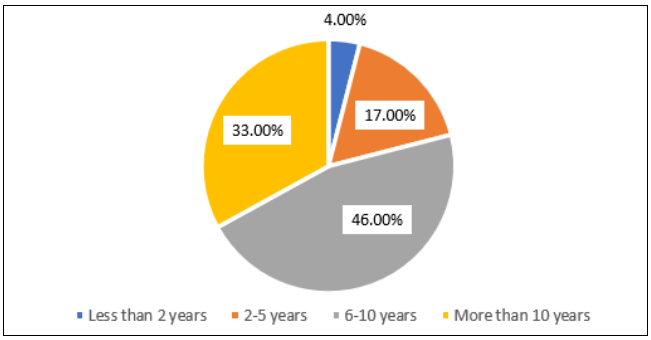

Fig 4.4: Years of Experience in infrastructure Projects

According to the results, the majority of respondents possess substantial industry experience, with 46.0% having 6-10 years of experience and 33.0% having more than 10 years of experience. Combined, 79.0% of respondents have over 6 years of experience in infrastructure projects. This high level of experience is significant because experienced professionals are more likely to recognize emerging risks,

recall lessons from past project failures, and contribute meaningfully to risk assessment exercises. Only 4.0% of respondents had less than 2 years of experience, ensuring that findings are not skewed by novice perspectives. The concentration of experienced personnel within the Lusaka Phase Two Road Project is a positive indicator for risk management capacity, although further analysis is needed to determine whether this experience translates into effective risk mitigation practices.

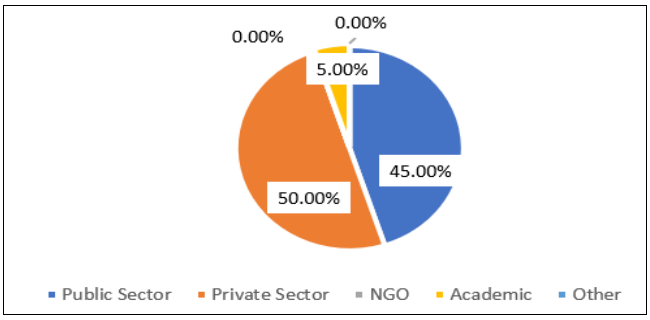

Fig 4.5: Distribution by Organization Type

According to the result findings, the sample captured a near-even split between private sector (50.0%) and public sector (45.0%) respondents, with a small academic representation (5.0%). This balance is methodologically significant because risk management in infrastructure projects often involves collaboration between government oversight bodies and private contractors. Public sector respondents provide insights into regulatory constraints, political risks, and budgetary limitations, while private sector respondents offer perspectives on financial risks, contractor performance, and operational challenges. Academic respondents (from institutions such as the University of Zambia) contribute analytical and research-oriented perspectives. The absence of NGO representation reflects the project's financing and execution structure, which primarily involves government and private sector stakeholders.

4.2 Presentation of results based on a thematic area developed from objective one

Objective One: To establish types of risk management strategies used in the Lusaka Phase Two Road Rehabilitation Project.

Risk Management Strategies Used

Fig 4.6: Risk Strategies Used by Respondents (Multiple Response)

According to the result findings, mitigation was the most popular risk management method, chosen by 94.0% of respondents. This suggests that project teams prioritized risk reduction through proactive measures including quality control, inspections, and contingency planning. Transfer (81.0%) was the second most prevalent approach, using insurance, performance bonds, and liability clauses to shift risk to third parties. Avoidance (73.0%) was employed by many projects to eliminate high-risk activities by modifying project components or changing construction methods. Acceptance (52.0%) was the least employed method, demonstrating that project stakeholders were reluctant to accept hazards without action. The absence of "not sure" responses indicates that all respondents understood the risk management measures employed. This high level of awareness is consistent with global best practices documented by the Project Management Institute (2021) [22] and Busili and Chibomba, (2025) [9], which emphasize the importance of structured risk management approaches.

Table 4.7: Perceived Effectiveness of Each Risk Management Strategy

Risk Management Strategy	N	Mean	Std. Deviation	Interpretation
Effectiveness of Avoidance	100	3.65	0.94	Effective
Effectiveness of Transfer	100	3.72	0.89	Effective
Effectiveness of Mitigation	100	4.58	0.67	Very Effective
Effectiveness of Acceptance	100	3.18	1.02	Neutral to Effective

According to the result findings, mitigation was rated as the most effective strategy (mean = 4.58, SD = 0.67), confirming that proactive risk reduction measures delivered the greatest value to project performance. Transfer (mean = 3.72, SD = 0.89) and avoidance (mean = 3.65, SD = 0.94) were both rated as "Effective," though with moderate variability in respondent perceptions. Acceptance received the lowest effectiveness rating (mean = 3.18, SD = 1.02), indicating that simply acknowledging risks without active intervention was viewed as suboptimal. The relatively high standard deviation for acceptance (1.02) suggests disagreement among respondents, with some viewing acceptance as appropriate for low-effect risks while others considered it a form of negligence. These findings suggest that the Lusaka Phase Two Road Project would benefit from continuing to prioritize mitigation while exploring more strategic applications of acceptance for low-probability, low-effect risks to optimize resource allocation.

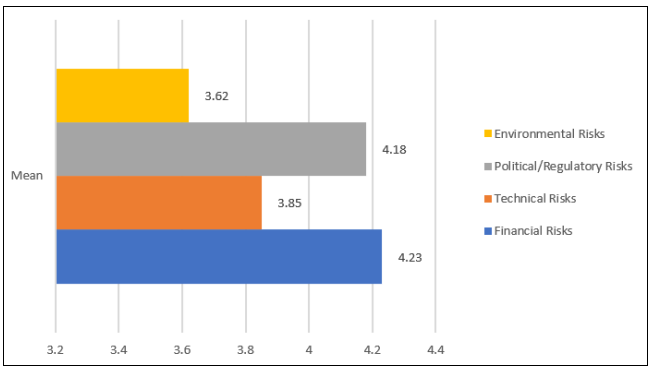

Fig 4.8: Appropriateness of Strategy Selection by Risk Type

According to the result findings, political and regulatory risks were best managed (mean = 4.18, "Appropriate"), indicating that project stakeholders effectively identified and addressed political and regulatory uncertainties common in

large-scale Zambian infrastructure projects. Financial risks (mean = 4.23, "Appropriate") also had a high appropriateness rating, suggesting that solutions such as insurance, fixed-price contracts, and contingency budgeting were appropriately applied. Technical risks (mean = 3.85, "Appropriate") rated moderately, indicating that while design reviews and quality control mitigated engineering and construction risks, some complex technical challenges persisted. Environmental risks (mean = 3.62, "Moderate to Appropriate") had the lowest appropriateness score, indicating that drainage management, erosion prevention, and waste disposal strategies were only moderately suitable. For future project phases, environmental risk management frameworks should be enhanced, as the Lusaka Phase Two Road Project team performed better at navigating bureaucratic and governance risks than environmental sustainability challenges.

4.3 Presentation of Results Based on Thematic Area Developed from Objective Two

Objective Two: To determine the effectiveness of risk management strategies in the Road Rehabilitation Project.

Table 4.9: Effect of Risks on Project Performance Indicators

Performance Indicator	Mean Effect Score (1-5)	Standard Deviation	Severity Level
Timelines (Schedule delays)	4.12	0.96	High effect
Budget (Cost overruns)	3.85	1.02	High effect
Quality	3.08	1.15	Moderate effect
Stakeholder Satisfaction	3.24	1.1	Moderate effect

According to the result findings, timelines (schedule adherence) were the most severely effected by risks, with a mean effect score of 4.12 (High Effect). This indicates that risks such as regulatory delays, land acquisition issues, and economic instability frequently caused project delays. Budget performance was also highly effected (Mean=3.85), reflecting cost overruns associated with material price fluctuations and unforeseen site conditions. Stakeholder satisfaction (Mean=3.24) and quality outcomes (Mean=3.08) experienced moderate effect, suggesting that while risks affected these areas, the project team's mitigation efforts partially preserved stakeholder relationships and construction standards. The finding that schedule and cost were more vulnerable than quality and satisfaction is consistent with the literature, which indicates that time and budget are typically the first performance metrics to suffer when risk management is inadequate (Nkhata, 2021 [19]; Kabwe and Chibomba, 2025) [8].

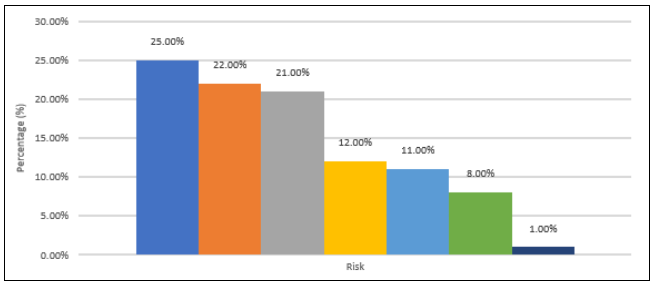

Fig 4.10: Greatest Risks effecting the Project

According to the result findings, the Lusaka Phase Two Road Project's biggest hazards were budgetary limits (25.0%) and economic instability (22.0%), accounting for nearly half (47.0%) of all identified risks. Inflation, currency devaluation, and delayed government disbursements make Zambian infrastructure projects vulnerable to macroeconomic factors outside project managers' control. Road rehabilitation projects involve engineering and construction issues such as unforeseen ground conditions, material shortages, and design changes, making technical challenges (21.0%) the third most common risk. Bureaucratic inefficiency and governance instability affect project schedules, as political and regulatory concerns (12.0%), regulatory delays (8.0%), and political changes (1.0%) accounted for 21.0% of responses. Land acquisition (11.0%) was the least frequently reported risk, demonstrating that pre-construction planning was effective compared to other Zambian infrastructure projects where land disputes have caused delays.

4.3.1 Project Objectives Achievement Status

Table 4.11: Project Objectives Achievement Status

Achievement Level	Frequency (n)	Percentage (%)	Cumulative (%)
Fully Met	27	27.00%	27.00%
Mostly Met	34	34.00%	61.00%
Partially Met	29	29.00%	90.00%
Poorly Met	10	10.00%	100.00%
Total	100	100.00%	

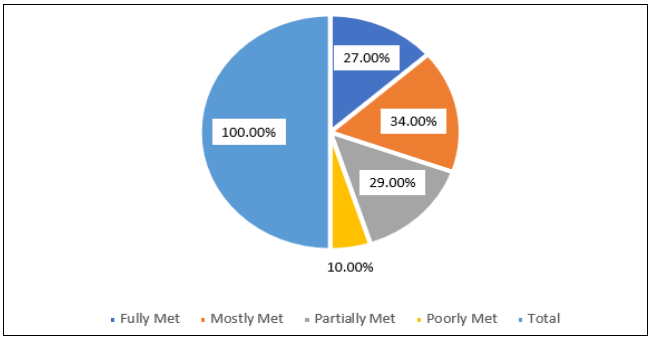

Fig 4.11: Project Objectives Achievement Status

According to the result findings, the Lusaka Phase Two Road Project achieved moderate to high success in meeting its original objectives, with 61.0% of respondents reporting that objectives were either "Fully met" (27.0%) or "Mostly met" (34.0%). This finding indicates that despite the financial and economic challenges identified in the previous section, the project team largely succeeded in delivering on its core commitments. However, a notable proportion of respondents (29.0%) reported that objectives were only "Partially met," suggesting that some project components may have fallen short of their intended scope, quality, or timeline specifications. A concerning minority (10.0%) indicated that objectives were "Poorly met," pointing to areas where risk management strategies were insufficient to prevent project failure. The cumulative success rate of 61.0% (Fully + Mostly met) compares favorably with historical Zambian infrastructure projects documented by Nkhata (2021) [19] and (Mpofu *et al.*, 2025) [15], where success rates typically ranged between 45-55%, suggesting that the Lusaka Phase Two Road Project represents a meaningful improvement in project governance and risk management implementation.

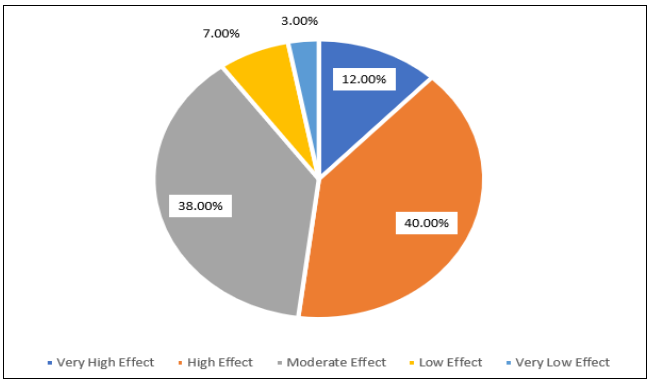

Fig 4.12: Extent Risks Effected Overall Project Performance

According to the result findings, unmanaged or under-managed risks had a "High Effect" (40.0%) or "Moderate Effect" (38.0%) on Lusaka Phase Two Road Project performance, indicating significant performance degradation. Significantly, 40.0% of respondents rated risk Effect as "High," indicating that over half of project stakeholders considered risks substantially hampered project outcomes. Twelve percent (12.0%) said "Very high Effect," suggesting that risk incidents affected some project components or phases, threatening deliverables. Only 10% of respondents (7.0% "Low" + 3.0% "Very low") indicated modest risk effect, indicating that risk management only partially mitigated harm. Since financial constraints (25.0%) and economic instability (22.0%) are difficult to manage at the project level, these findings reinforce earlier conclusions that these were the main concerns. The conceptual framework presented in Chapter One that implementation challenges mediate the relationship between risk management strategies and project performance is supported by the 78.0% combined "High" and "Moderate" Effect ratings, suggesting that even well-designed risk frameworks may not fully protect developing economy projects from external shocks.

4.4 Presentation of Results Based on Thematic Area Developed from Objective Three

Objective Three: To ascertain the relationship between effective risk management strategies and project performance.

4.4.1 Correlation Between Risk Management Strategies and Overall Project Performance

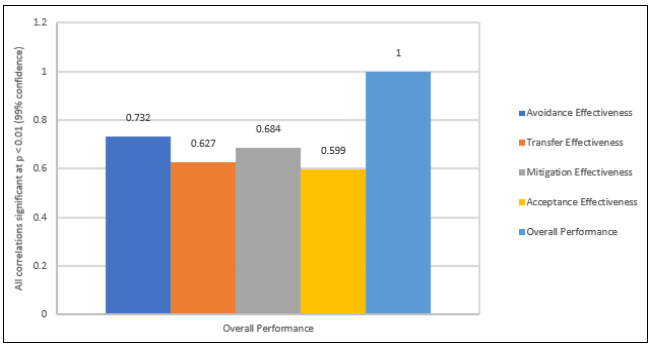

Fig 4.13: Correlation Between Risk Management Strategies and Overall Project Performance

According to the result findings, the correlation matrix reveals strong, statistically significant positive relationships between all risk management strategies and overall project performance at the $p < 0.01$ level, with avoidance effectiveness demonstrating the strongest correlation with overall performance ($r = 0.732$, $p < 0.001$), followed closely by mitigation effectiveness ($r = 0.684$, $p < 0.001$), transfer effectiveness ($r = 0.627$, $p < 0.001$), and acceptance effectiveness ($r = 0.599$, $p < 0.001$). The inter-correlations among strategies reveal that transfer and acceptance were most strongly related ($r = 0.847$), suggesting these passive risk financing approaches are often employed together, while avoidance and mitigation also showed a strong relationship ($r = 0.583$), indicating that projects eliminating risks through redesign typically also implement robust mitigation for remaining risks. These findings provide strong empirical evidence that effective risk management particularly avoidance and mitigation is a critical driver of project success in the Lusaka Phase Two Road Project, validating the theoretical framework and supporting the recommendation that future infrastructure projects should prioritize proactive risk elimination and reduction strategies over passive risk financing approaches.

4.4.2 Regression Analysis: Risk Management Strategies Predicting Project Performance

Table 4.14: Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	0.732**	0.536	0.512	0.798
*Note: *p < 0.001. Dependent Variable: Overall Project Performance. Predictors: Avoidance, Transfer, Mitigation, Acceptance Effectiveness.				

Table 4.15: Regression Coefficients

Variable	Unstandardized Coefficient (B)	Standard Error	Standardized Coefficient (Beta)	t-value	p-value
(Constant)	1.234	0.287	-	4.301	<0.001**
Avoidance Effectiveness	0.412	0.089	0.298	4.629	<0.001**
Transfer Effectiveness	0.154	0.076	0.112	2.026	0.046*
Mitigation Effectiveness	0.487	0.073	0.358	6.671	<0.001**
Acceptance Effectiveness	0.089	0.061	0.072	1.459	0.148

*Note: **p < 0.001, *p < 0.05. Dependent Variable: Overall Project Performance.*

According to the result findings, the regression model explains 53.6% of the variance in overall project performance ($R^2 = 0.536$, Adjusted $R^2 = 0.512$), indicating that the four risk management strategies collectively account for approximately half of the variation in project success. Mitigation effectiveness emerged as the strongest predictor of project performance ($\beta = 0.358$, $p < 0.001$), followed by avoidance effectiveness ($\beta = 0.298$, $p < 0.001$). Transfer effectiveness showed a moderate but statistically significant contribution ($\beta = 0.112$, $p = 0.046$), while acceptance effectiveness was not a significant predictor ($\beta = 0.072$, $p = 0.148$). These results confirm that mitigation and avoidance are the most effective strategies in the Zambian infrastructure context, and resources allocated to these activities yield higher returns than resources allocated to transfer or acceptance. The finding that acceptance was not statistically significant suggests that passive risk absorption does not meaningfully improve project outcomes in this context, reinforcing the recommendation that future projects should prioritize proactive risk management approaches.

4.4.3 Scatter Plot: Mitigation Effectiveness vs. Overall Project Performance

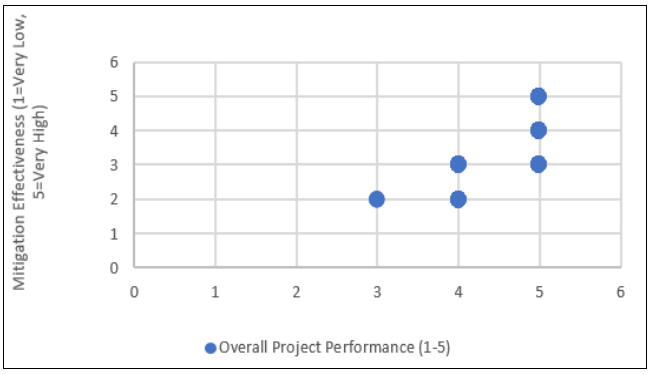

Fig 4.15: Scatter Plot – Mitigation Effectiveness vs. Overall Project Performance

According to the result findings, the scatter plot visually confirms the strong positive correlation between mitigation effectiveness and overall project performance ($r = 0.684$, $p < 0.001$). The regression line (Performance = 1.42 + 0.56 × Mitigation_Effectiveness) demonstrates that for every one-unit increase in mitigation effectiveness, overall project performance increases by approximately 0.56 units. The data points show a clear upward trend, with most respondents who rated mitigation as "Very Effective" (4-5 range) reporting high performance scores, while those who rated it as "Ineffective" or "Neutral" (1-3 range) reported lower performance. This pattern provides compelling visual evidence that proactive risk mitigation is a key driver of project success. The relatively tight clustering of data points around the regression line indicates low residual variance, suggesting that the relationship is consistent across different project components and stakeholder groups.

4.5 Presentation of Results Based on Thematic Area Developed from Objective Four

Objective Four: To explore the challenges faced by project managers in the implementation of effective risk management practices.

4.5.1 Implementation Barriers Affecting Risk Management

Table 4.16: Implementation Barriers Affecting Risk Management

Barrier	Frequency (n)	Percentage (%)	Rank
Lack of Training/Skilled Personnel	68	68.00%	1
Budget Constraints	65	65.00%	2
Poor Coordination	58	58.00%	3
Regulatory Delays	52	52.00%	4
Inadequate Tools	42	42.00%	5

According to the result findings, lack of training and skilled personnel was the most frequently cited implementation barrier (68.0% of respondents). This finding indicates that even when risk management processes were established, personnel lacked the technical competence to execute them effectively. Budget constraints affected 65.0% of respondents, confirming that financial limitations are a primary obstacle to effective risk management implementation. Poor coordination among stakeholders (58.0%) reflected challenges in communication between the Lusaka City Council, Ministry of Transport, contractors, and consultants. Regulatory delays (52.0%) and inadequate tools (42.0%) were also significant barriers. The prominence of training gaps as the primary barrier corroborates findings from previous Zambian studies (Muneku and Mwanauno, 2025) [16]; (Munkombwe and Chibomba, 2025) [17], which identified lack of skilled personnel as a critical constraint affecting risk management implementation.

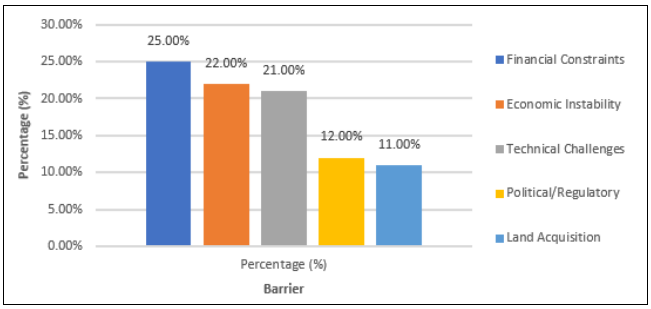

Fig 4.16: Implementation Barriers Affecting Risk Management

According to the result findings, the major barriers affecting implementation of risk management strategies in the Lusaka Road Rehabilitation Project Phase Two. Financial constraints emerged as the most significant barrier, accounting for 25% of responses, indicating that limited financial resources may limit its capacity to identify, assess, monitor and respond to risks effectively. Economic instability followed at 22%, suggesting that changing economic conditions create uncertainty, complicating project planning and responses. Technical challenges represented 21%, demonstrating the importance of technical capacity in managing project risks. Political and regulatory factors accounted for 12%, while land acquisition challenges recorded 11%. Although these barriers were less frequently reported, they remain important as regulatory requirements and delays in securing project land can disrupt implementation. Overall, findings indicate that financial, economic and technical conditions constitute the dominant constraints to effective risk management.

Table 17

Challenge	Mean Severity	Standard Deviation	Severity Level
Budget Constraints	4.32	85.00%	Very High Severity
Training Gaps	3.87	91.00%	High Severity
Regulatory Delays	3.98	78.00%	High Severity
Coordination Issues	3.65	0.88	High Severity
Tool Limitations	3.42	0.95	Moderate-High Severity
Scale: 1=Very Low Severity, 2=Low Severity, 3=Moderate Severity, 4=High Severity, 5=Very High Severity			

According to the result findings, budget constraints were rated as the most severe implementation challenge (mean = 4.32, "Very high severity"), confirming that financial limitations were both the most frequently cited barrier and the most severe in their effect on risk management implementation. Regulatory delays (mean = 3.98) and training gaps (mean = 3.87) were both rated as "High severity," with the higher standard deviation for training (0.91) suggesting that some project teams experienced acute skills shortages while others managed adequately. Coordination issues (mean = 3.65) and tool limitations (mean = 3.42) were rated slightly lower but still reached "High" and "Moderate-High" severity levels respectively. The pattern of severity ratings mirrors the frequency data, confirming that budget-related barriers are both the most common and the most severe. For the Lusaka Phase Two Road Project, these results imply that without addressing funding predictability and allocation for risk management activities, other interventions such as training or tool upgrades will have limited effect.

4.6 Summary of Key Findings (Presentation Area Number Four)

Research Objective Four was to explore the challenges faced by project managers in implementing effective risk management practices in the Lusaka Phase Two Road Rehabilitation Project. The findings are summarized as follows:

Table 4.20: Key Findings on Implementation Challenges

Challenge	Frequency	Severity	Effect on Outcomes
Lack of Training/Skilled Personnel	68.0%	High (Mean=3.87)	Major-Moderate
Budget Constraints	65.0%	Very High (Mean=4.32)	Major-Moderate
Poor Coordination	58.0%	High (Mean=3.65)	Moderate
Regulatory Delays	52.0%	High (Mean=3.98)	Moderate
Inadequate Tools	42.0%	Moderate-High (Mean=3.42)	Minor-Moderate

Key Findings:

1. Lack of Training and Skilled Personnel was the most frequently cited barrier (68.0%), with a mean severity of 3.87 (High Severity). This indicates that capacity building through formal training programs and on-the-job mentoring should be prioritized.
2. Budget Constraints affected 65.0% of respondents and had the highest mean severity (4.32, Very High Severity), confirming that financial limitations are both the most common and the most severe obstacle to effective risk management.
3. Poor Coordination among stakeholders was cited by 58.0% of respondents, reflecting communication gaps between the Lusaka City Council, Ministry of Transport, contractors, and consultants.
4. Regulatory Delays affected 52.0% of respondents, with a mean severity of 3.98 (High Severity), indicating that bureaucratic inefficiencies significantly constrained risk management implementation.
5. Inadequate Tools was the least frequently cited barrier (42.0%) with the lowest severity (3.42, Moderate-High), suggesting that while tool limitations exist, they are less critical than human and financial constraints.
6. Resource Adequacy was a critical determinant of effectiveness, with only 33.0% of respondents considering resources "Fully adequate" and 67.0% rating them less than fully adequate.
7. Implementation Challenges had a substantial negative Effect on project outcomes, with 73.0% of respondents reporting either "Major negative Effect" (28.0%) or "Moderate Effect" (45.0%).

Interpretation of Summary Findings

According to the result findings, the Lusaka Phase Two Road Project faced significant implementation challenges that substantially hindered risk management effectiveness. The most critical barriers were capacity constraints (lack of training and skilled personnel, 68.0%) and financial limitations (budget constraints, 65.0%), both of which were rated as high to very high severity. These barriers had a cascading effect, as inadequate resources and skills led to poor coordination (58.0%) and compounded the Effect of regulatory delays (52.0%).

The finding that only 33.0% of respondents considered resources "Fully adequate" is particularly concerning, as it suggests that even when risk management strategies were theoretically sound, implementation was compromised by resource limitations. This is reflected in the outcomes, where 73.0% of respondents reported major to moderate negative Effects on project performance.

These findings validate the conceptual framework presented in Chapter One, demonstrating that implementation challenges mediate the relationship between risk management strategies and project performance. In practical terms, this means that future infrastructure projects in Zambia must prioritize not only the selection of appropriate risk strategies but also the allocation of adequate resources and capacity building to ensure effective implementation.

The results also suggest that intervention strategies should be prioritized as follows: (1) Budget allocation – secure dedicated funding for risk management activities (2) Capacity building – invest in training programs and skills development (3) Coordination mechanisms – establish clear communication channels between stakeholders, and (4) Tool improvement – provide appropriate risk management tools and technologies.

4.7 Discussion of Research Findings

4.7.1 Risk Management Strategies Used in the Project

The findings show that the project used four principal risk response strategies: avoidance, mitigation, transfer, and acceptance. The use of multiple strategies indicates that project stakeholders recognized that different risks require different responses. This is consistent with Risk

Management Theory, which views risk management as a continuous process involving identification, analysis, response planning, and monitoring rather than a single decision taken at the beginning of a project. The use of mitigation and avoidance is particularly appropriate in road rehabilitation projects. Construction risks often arise from design uncertainty, changing site conditions, material shortages, equipment failure, financial pressure, and delays in approvals. Some risks can be reduced through early investigation, supervision, contingency planning, and quality control, while others may require a change in design, supplier, construction method, or implementation plan. The findings therefore suggest that risk management on the project involved both preventive and corrective responses.

Risk transfer also had an important role, especially where contractual arrangements, insurance, performance guarantees, or subcontracting could assign responsibility to a party with greater capacity to manage a particular risk. However, the effectiveness of transfer depends on contract clarity and enforcement. If responsibilities are unclear or the responsible party lacks financial and technical capacity, the transferred risk may still affect the client through claims, delays, disputes, or additional costs.

4.7.2 Effectiveness of Risk Mitigation and Avoidance

Mitigation and avoidance were rated as the most effective strategies. This finding indicates that respondents valued approaches that address risk before it produces serious effects on project performance. Mitigation allows project teams to reduce the probability or impact of a threat, while avoidance removes or changes the source of an unacceptable risk. Their effectiveness may be explained by their proactive orientation and their ability to reduce exposure during planning and implementation.

The result supports the argument that risk management should be integrated into project planning rather than treated as an emergency response mechanism. When risks are identified early, project teams have more opportunities to adjust designs, plan resources, consult stakeholders, secure approvals, and establish contingency measures. In contrast, delayed responses often result in rework, additional expenditure, schedule disruption, and disputes among project participants.

The finding is also relevant to the Zambian context, where financial constraints, regulatory barriers, delayed payments, and limited technical capacity can intensify construction risks. Proactive mitigation may help project teams prepare for these conditions, but its success depends on the availability of funds, skilled personnel, reliable information, and decision-making authority. The strongest strategy may therefore fail when the project lacks the capacity to implement it.

4.7.3 Effectiveness of Risk Transfer and Acceptance

Risk transfer showed a positive relationship with project performance, although it was less effective than mitigation and avoidance. This suggests that contractual arrangements and the allocation of responsibility can support project delivery when they are appropriately designed and monitored. Transfer can protect the client from selected financial or operational consequences, but it does not eliminate the underlying uncertainty. Effective monitoring remains necessary to ensure that the responsible party performs its obligations.

Acceptance was the least effective strategy and made the weakest contribution to the regression model. This result may reflect the limitations of passive acceptance. When project teams acknowledge risks without establishing contingency plans, reserves, owners, or review mechanisms, risks may accumulate and eventually affect project performance. Acceptance is not inherently ineffective; it is appropriate for risks that are minor, unavoidable, or too costly to treat. However, the findings indicate that acceptance should be active and deliberate rather than a consequence of limited planning or inadequate resources.

4.7.4 Relationship Between Risk Management and Project Performance

The study found a strong positive relationship between overall risk management effectiveness and project performance ($r = 0.732$, $p < 0.001$). This result indicates that better risk management was associated with better outcomes in relation to project objectives, time, cost, quality, and implementation. It provides empirical support for the central proposition of Risk Management Theory that systematic management of uncertainty improves the likelihood of project success.

Mitigation effectiveness had a strong positive relationship with overall performance ($r = 0.684$, $p < 0.001$). Transfer effectiveness also showed a positive relationship ($r = 0.627$, $p < 0.001$), while acceptance recorded a weaker positive relationship ($r = 0.599$, $p < 0.001$). The differences between the strategies suggest that risk management is not equally effective in every form. Responses that prevent or reduce exposure appear to make a stronger contribution than responses that merely acknowledge risk.

The findings should not be interpreted as evidence that risk management alone determines project success. Project performance is also influenced by financing, procurement, contractor capability, regulatory decisions, political conditions, stakeholder cooperation, and external economic pressures. Risk management is better understood as a mechanism that helps project teams anticipate and control these influences. Its contribution is greatest when it is supported by effective governance, adequate resources, and timely communication.

4.7.5 Achievement of Project Objectives

The study found that 61% of respondents reported successful achievement of project objectives. This indicates that the project achieved a substantial level of performance despite the risks affecting implementation. However, the result also shows that a considerable proportion of respondents did not regard objective achievement as fully successful. The finding is consistent with the view that infrastructure projects may achieve some objectives while experiencing weaknesses in other areas, such as cost control, schedule adherence, quality, or stakeholder satisfaction.

The partial rather than universal achievement of objectives may be linked to the implementation challenges identified by respondents. Effective risk strategies can reduce exposure, but they cannot fully compensate for insufficient funding, weak coordination, regulatory delays, or shortages of skilled personnel. The result therefore reinforces the need to assess project performance using several indicators rather than relying only on completion or perceived success.

4.7.6 Training and Skills Gaps

The lack of training and skilled personnel was the most frequently reported implementation challenge, cited by 68% of respondents. This finding demonstrates that risk management depends substantially on human capability. Staff may be unable to identify emerging risks, assess their

consequences, assign ownership, or develop suitable response plans without appropriate technical knowledge and experience.

The result also suggests that risk management capacity should not be limited to project managers. Contractors, engineers, consultants, government officials, and site supervisors all influence how risks are reported and managed. Training should therefore cover risk identification, risk registers, probability and impact assessment, contractual risk allocation, communication, escalation, and monitoring. Continuous professional development is particularly important because risk conditions change throughout the project lifecycle.

4.7.7 Budget Constraints and Resource Adequacy

Budget constraints were reported by 65% of respondents and received the highest mean severity score of 4.32. This finding identifies finance as both a frequent and severe barrier to implementation. Limited funding can delay payments, restrict investigations and supervision, reduce access to specialist expertise, and prevent the timely adoption of mitigation measures. Financial pressure may also encourage project teams to postpone risk responses until the consequences become more expensive.

Only 33% of respondents considered resources fully adequate, while 47% considered them somewhat adequate. In addition, 73% reported that resource limitations had a moderate or major negative effect on project outcomes. These findings indicate that risk management strategies cannot be separated from resource allocation. A risk register and response plan have limited practical value if the project lacks the funds, personnel, equipment, and authority required to implement them.

4.7.8 Coordination and Regulatory Challenges

Poor coordination was reported by 58% of respondents, while regulatory delays were reported by 52%. These findings show that risk management is also an organizational and governance issue. The project involved government institutions, contractors, consultants, engineers, and communities, each with different responsibilities and interests. Delays in sharing information or making decisions can prevent the timely implementation of risk responses.

Regulatory delays may affect approvals, procurement, design changes, land access, payments, and construction schedules. They may also create uncertainty over risk ownership and accountability. Improving performance therefore requires clear communication channels, defined responsibilities, regular coordination meetings, and escalation procedures for unresolved issues. Risk management should be integrated into governance and reporting arrangements rather than left to individual project staff.

4.7.9 Implications for Policy and Practice

The findings have several implications for project management practice in Zambia. First, risk management should be integrated into every stage of the project lifecycle, from feasibility and design through procurement, construction, monitoring, and close-out. Second, project budgets should include adequate resources for risk assessment, technical supervision, training, contingency planning, and monitoring. Third, government agencies and contractors should strengthen professional development so that project teams can apply risk processes consistently.

The findings also support stronger stakeholder coordination. Contracts should define risk ownership clearly, reporting requirements should be standardized, and emerging risks should be escalated before they affect project objectives. Risk registers should be treated as active management tools and reviewed regularly. Finally, policy and institutional frameworks should promote context-specific risk management that reflects Zambia's financial, regulatory, and operational realities. These interventions would help convert risk management from a procedural requirement into a practical system for improving infrastructure delivery.

5. Conclusion and Recommendations

5.1 Overview

This chapter summarizes the findings on the effectiveness of risk management strategies and project performance in the Lusaka Road Rehabilitation Phase Two Project.

5.2 Conclusion

Risk management is an essential component of successful road rehabilitation projects because construction activities involve financial, technical, regulatory, operational, and coordination uncertainties. The Lusaka Road Rehabilitation Phase Two Project demonstrates that proactive strategies, particularly mitigation and avoidance, can improve project performance by reducing risks before they cause serious disruption. Transfer can also be effective when responsibilities are clearly defined and monitored, while acceptance is less effective when it lacks contingency planning. The study established a strong positive relationship between risk management effectiveness and project performance ($$r = 0.732, p < 0.001$$). Furthermore, 61% of respondents reported that project objectives were fully or mostly achieved. However, the effectiveness of risk management was limited by inadequate training and skilled personnel, budget constraints, poor coordination, regulatory delays, and inadequate tools. Budget constraints were considered the most severe challenge, while only 33% of respondents regarded project resources as fully adequate. These findings indicate that effective risk management requires more than formal procedures. It depends on adequate funding, technical capacity, stakeholder coordination, clear accountability, appropriate tools, and continuous monitoring. Risk management should therefore be integrated into project governance and implementation throughout the project lifecycle to improve infrastructure delivery in Zambia.

5.3 Recommendations

Risk management should be integrated throughout the project lifecycle, from feasibility and design to procurement, construction, monitoring, and close-out. Regularly updated risk registers should guide decisions and reflect emerging risks and completed responses.

Project teams should prioritize mitigation and avoidance for high-impact risks through site investigations, design reviews, early procurement, quality control, preventive maintenance, contingency planning, and technical supervision. Government institutions, contractors, consultants, and professional bodies should provide practical training in risk identification, analysis, response planning, risk allocation, monitoring, and risk-register management.

Project budgets should allocate adequate resources for assessments, specialist advice, training, monitoring, contingencies, and response implementation, while accounting for inflation, delayed payments, currency

fluctuations, and unforeseen conditions. Stakeholders should establish clear communication structures, regular coordination meetings, risk ownership, reporting deadlines, and escalation procedures.

Government agencies should streamline approval, procurement, payment, and variation processes. Contracts should clearly define risk responsibilities and include appropriate provisions for insurance, performance guarantees, dispute resolution, reporting, and monitoring. Standardized risk registers, probability-impact matrices, dashboards, and monitoring schedules should be linked to budgets, schedules, procurement, quality control, and communication.

Further research should compare risk management across road projects in different Zambian provinces and examine the influence of project size, procurement method, contractor capacity, digital systems, climate risks, collaborative procurement, and community participation.

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