

## Examining Effectiveness of Risk Management Processes in Project Management: A Case Study of Lusaka Phase III Road Expansion Projects

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**APA Citation and Referencing:** Julio, Z., & Chibomba, K. (2026). Examining Effectiveness of Risk Management Processes in Project Management: A Case Study of Lusaka Phase III Road Expansion Projects. *JENER Journal of Empirical and Non-Empirical Research*, 2(1), 376-388

ARTICLE INFORMATION	ABSTRACT
<p><b>Article history:</b>            Published on 27<sup>th</sup> Jan, 2026</p> <p><b>Keywords:</b>            Project            Risk            Project Management            Risk Mitigation            Construction</p>	<p>This This study examined the effectiveness of project risk management processes in Zambia's Phase III Road Expansion Project in Lusaka. Risk management was an essential component of project management, as it addressed uncertainties that could result in cost overruns, project delays, and compromised quality standards. Despite the recognized importance of risk management, many infrastructure projects in Zambia continued to experience inefficiencies and setbacks due to poor implementation of risk mitigation strategies, limited institutional capacity, and weak coordination among stakeholders. The persistence of these challenges highlighted the problem of inadequate and inconsistent application of structured risk management frameworks in road expansion projects. Many public infrastructure projects suffered from financial losses, extended completion time-lines, and declining stakeholder confidence due to the absence of standardized procedures and proactive measures for identifying and mitigating risks. The main purpose of this study was to assess how effectively risk management processes were being implemented, identify the types of risk mitigation measures currently used, and determine the major challenges encountered during implementation. A purposive research design was adopted, combining quantitative and qualitative approaches. Data were collected through structured questionnaires distributed to project managers, engineers, and supervisors involved in the Lusaka Phase III Road Expansion Project, and analyzed using descriptive statistics. The findings revealed that contingency planning was the most commonly applied risk mitigation measure (42%), followed by technical training (20%), risk transfer (16%), use of a risk register (12%), and public consultation (10%). Furthermore, 64% of respondents indicated that these risk mitigation measures were very effective in achieving project objectives, while 60% believed they effectively controlled project costs and budget overruns. Major challenges identified included budget constraints (28%), inflationary pressures (24%), limited resources (22%), and regulatory hurdles (14%). Additionally, 40% of respondents cited stakeholder conflicts as a major hindrance, and 36% highlighted technical difficulties as another key constraint. The study concluded that risk management processes in Zambia's road expansion projects were generally effective but constrained by financial, technical, and institutional limitations. It recommended the strengthening of institutional frameworks, stakeholder coordination, and sustainable project risk management practices. .</p>

### 1. Introduction

Project risk is understood as the magnitude of potential loss or failure that can influence project outcomes either positively or negatively (Wang, Zeng & Tu, 2017). Projects across different industries are increasingly exposed to uncertainties such as financial instability, resource constraints, and technical failures, which can result in significant deviations from planned objectives. According to Baharuddin and Yusof (2018), effective risk management plays a crucial role in supporting sound decision-making and ensuring that project activities remain aligned with strategic goals. Risk management encompasses the systematic process of identifying, assessing, and mitigating risks to enhance the likelihood of achieving desired project outcomes (PMI, 2021). Studies by the McKinsey Global Institute (2020) and Filippetto et al. (2021) reveal that globally, nearly half of major projects exceed

budget and schedule, demonstrating the persistent need for stronger risk mitigation measures. Frameworks such as ISO 31000 and the Project Management Body of Knowledge (PMBOK, 2019) have been developed to standardize risk management practices and promote consistency across all stages of the project lifecycle.

Mostly African countries continue to face challenges in adopting and institutionalizing robust risk management systems. Rapid urbanization, economic volatility, and weak governance structures contribute to increased exposure to project risks (Dobie, 2020). Risk management processes in developing countries more especially in Africa are often reactive rather than proactive, leading to delayed project delivery, inflated costs, and compromised quality (Chapman, 2019). Studies by Chileshe and Kikwasi (2014) on construction projects in Southern and Eastern Africa show that most organizations rely on qualitative techniques such as expert judgment instead of quantitative tools that offer measurable accuracy. The limited integration of international standards such as ISO 31000 and PMBOK in project management frameworks has further constrained progress in managing large-scale infrastructure and road expansion projects.

In Zambia, the concept and practice of project risk management are gaining attention across public and private sectors, though implementation remains inconsistent. The Zambian construction industry, in particular, continues to face challenges related to project delays, cost overruns, and quality control failures due to inadequate risk planning and mitigation (Chileshe & Kikwasi, 2014). Despite government efforts through the Ministry of Finance and National Planning to mainstream risk management practices in public investment projects, compliance and enforcement remain limited (Ministry of Finance, 2020). The country's infrastructure and road expansion projects often encounter uncertainties arising from fluctuating economic conditions, resource shortages, inflation, and poor coordination among stakeholders. A lack of standardized frameworks, coupled with insufficient training and resource allocation, has limited the adoption of comprehensive risk mitigation strategies. Multinational firms in sectors such as mining have made notable progress by integrating structured risk management systems, but most local firms still depend on informal and reactive approaches.

The overall effectiveness of risk management in Zambia is therefore mixed. While some projects have benefited from structured and proactive risk mitigation, many others continue to suffer from inefficiencies linked to limited skills, inadequate planning, and the absence of systematic frameworks (UNCTAD, 2022). Addressing these weaknesses is essential for improving project performance and ensuring sustainable development outcomes. Given the strategic importance of road expansion projects to Zambia's economic growth, this study aims to examine the effectiveness of risk management processes in Zambia's road construction and expansion projects.

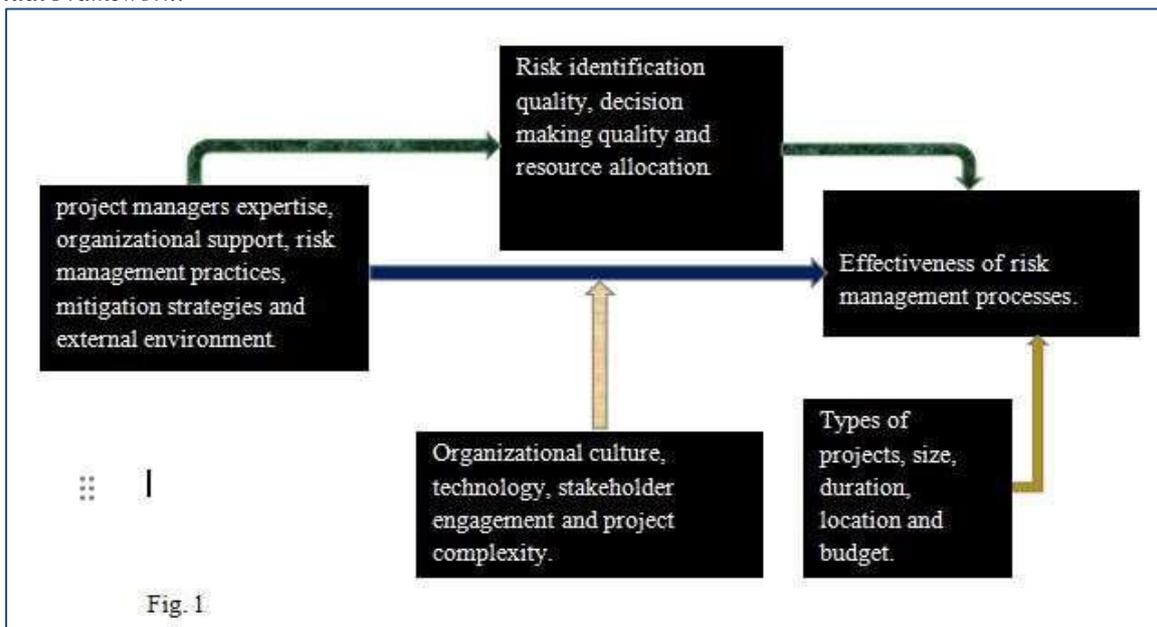
1.2.1 General Objective

To examining the effectiveness of risk management processes in project management in road expansion project in Zambia.

1.2.2 Specific objectives of the study

- To establish the types of risks mitigation measures employed in road expansion projects.
- To assess the effectiveness of risks mitigation measures in the road expansion projects.
- To establish challenges faced by stakeholders in implementing risk management processes within road expansion projects.

1.3 Conceptual Framework.



Independent variables

Project Manager Expertise: is based on knowledge and Experience in Risk Management Techniques, a project manager with a solid background in risk management can anticipate and address potential risks more effectively. Decision-Making and ProblemSolving Skills: These skills help in making informed decisions quickly, reducing the impact of risks. Leadership and

**Communication Abilities:** Strong leadership ensures the team is aligned and risk management strategies are implemented effectively. By ensuring that a project manager has all these it will direct has an impact on the effectiveness of risk management processes in project management.

**Organizational Support: Availability of Risk Management Tools and Resources:** Tools and resources enhance the capability to manage risks systematically and contribute largely to effectiveness of risk management in projects. Support from Senior Management and Stakeholders, Endorsement from higher management ensures risk management efforts are prioritized and well-resourced hence directly contribute to effectiveness of risk management processes. And **Organizational Policies and Frameworks for Risk Management:** Clear policies provide a structured approach to managing risks.

**External Environment: Economic Stability and Market Conditions:** Economic stability reduces financial risks, whereas volatile conditions increase uncertainties, **Regulatory Compliance and Legal Environment:** Adhering to regulations minimizes legal risks and ensures compliance, **Availability of Skilled Workforce and Materials,** having access to skilled personnel and necessary materials reduces resource-related risks hence affects the effectiveness of risk management processes.

**Risk Management Practices: Systematic Identification, Assessment, and Mitigation of Risks:** A structured approach to managing risks ensures all potential issues are addressed proactively. **Continuous Monitoring and Evaluation of Risks,** Ongoing risk monitoring helps in identifying new risks and assessing the effectiveness of mitigation strategies, **Integration of Risk Management Processes into Project Planning,** incorporating risk management into project planning ensures that risks are considered from the outset.

**Dependent Variable**

**Effectiveness of Risk Management:** This variable is mostly influenced by the independent variables. But despite independent variables there also the moderating variables that affects it but does not affect the independent variables and also the mediating variables. We also have to put into consideration the control variables that are to be held constant as we are study the project.

**Moderating Variables**

These variables influence the strength and direction of the relationship between the independent and dependent variables. the se

**Mediating Variables**

These variables explain the relationship between the independent and dependent variables. And in our case, they are affected by dependent variable and they affect the dependent one.

**Control Variables**

These variables are controlled to isolate the effects of the independent variables on the dependent variable they are to be held constant in this project.

## 2. Literature Review

### 2.1 Types risk mitigations measures in project management in road expansion projects..

"Risk Mitigation Strategies in Road Construction Projects" by Anmol Okate and Vijay Kakade (2020). This article discusses various risk mitigation strategies employed in road construction projects, including financial, environmental, technical, and social measures. Mitigation involves developing strategies to reduce the likelihood and impact of risks. This can include preventative measures, contingency planning, and transfer of risk through insurance or contracts. Effective mitigation plans are essential to maintain project timelines and budgets (Flyvbjerg et al., 2003). The types of risk mitigation measures in road constructions projects may include;

**Financial Risk Mitigation Measures: Budgeting and Cost Control** Establishing a detailed budget and closely monitoring expenditures are fundamental aspects of financial risk mitigation in road construction projects. A study by Smith et al. (2006) argued that "effective cost control mechanisms ensure that project costs remain within the allocated budget, thereby preventing financial overruns and enhancing project success." By implementing stringent budgeting practices and regularly reviewing financial progress, project managers can identify and address potential financial issues before they escalate. Additionally, Jha and Iyer (2006) emphasized that "cost performance is a critical factor in the success of construction projects, and effective budgeting and cost control are essential for maintaining financial stability." **Contingency Planning:** Setting aside a contingency fund to address unexpected expenses is another crucial financial risk mitigation strategy. Tummala and Burchett (1999) emphasized that "contingency funds provide a financial buffer that can absorb the impact of unexpected costs, ensuring that the project can continue without significant disruptions." Moreover, Flyvbjerg et al. (2003) pointed out that "many construction projects face cost overruns due to unforeseen events, and contingency planning is vital for managing these financial risks." **Financial Audits:** Conducting regular financial audits ensures financial transparency and accountability. Research conducted by Zwikael and Sadeh (2007) found that "regular financial audits are essential for maintaining financial integrity and preventing fraudulent activities that could jeopardize the project's financial stability." Furthermore, Lee et al. (2011) suggested that "financial audits play a critical role in identifying discrepancies and ensuring that funds are used appropriately."

**Risk Reduction on Infrastructure Projects in the Zambian Construction Industry through Integrated Risk Management (IRM) Approach** Naloobo Michello's (2015) study assesses the feasibility of reducing risks on infrastructure projects through an Integrated Risk Management (IRM) approach. The IRM approach focuses on incorporating risk management practices into all phases of the project lifecycle, ensuring proactive identification and mitigation of risks. Michello's research highlights that infrastructure projects in Zambia often encounter challenges such as fluctuating economic conditions, political instability, and resource limitations. By adopting the IRM approach, project managers can better anticipate and address potential risks, leading to improved project outcomes. The study concludes that the successful implementation of IRM requires the commitment of all project stakeholders and the integration of risk management practices into the organizational culture.

### 2.2 Effectiveness of Risk Mitigation Measures in Road Expansion Projects.

Studies like those by Sookye and Mohamudally-Booolaky (2019) provide insights into risk management frameworks and best practices. The effectiveness is moderate, with efforts to benchmark against international standards. Numan (2024) reviews strategies for identifying, analyzing, and mitigating project risks using Building Information Modelling (BIM), which can transform risk management across the project lifecycle. Comparative studies across various countries highlight best practices and areas for improvement. Countries like Singapore and Switzerland are often cited as benchmarks due to their comprehensive risk management frameworks and proactive approaches, leading to high effectiveness. The study by Usman et al. (2013) explores disaster risk management and social impact assessment, providing valuable guidelines for improving community disaster resilience.

The research by (Chipozya K. Tembo and Nthatisi Khatleli, 2016) was mainly on economic infrastructure such as; transport infrastructure, telecommunication, sanitation and energy. Other ordinary infrastructures such as schools, hospitals, housing, offices, prisons, service stations are also very important for the development of any nation yet are hardly researched on. Infrastructure development of any magnitude is normally affected by risks (Sharma, 2006). Risks when poorly managed result in claims, disputes, quality shortfalls, cost and time overruns (Alsalman & Sillars, 2013). Construction projects in the Zambian construction industry have exhibited quality shortfalls, time and cost overruns (Auditor general's office, 2009; Auditor Generals' Office, 2013; Kaliba, et al., 2013) and claims are also rampant (Sibanyama, et al., 2012). In addition, there is evidence that on occasion there is mishandling of risk; and these are majorly allocated to the contractor (Sibanyama, et al., 2012) when standard forms of contract clearly state that these should be handled by the client. This shows disparity between regulations and implementation. All these could be minimized by formalized and systematic risk management (Project Management Institute, 2004). Moreover, informal practices of risk management results in poor quality, low productivity and cost overruns (Choudhry, et al., 2014). Nevertheless, Construction organizations in developing countries, approach risk management in construction projects by using practices that are typically inadequate, produce poor results frequently, and limit the realization of desirable project outcome (Serpel, et al., 2015). This sub-topic aims to discover the practices used for risk management in the Zambians building sector with a view of identifying improvement areas so as to enhance the management of risk in the sector.

The use of risk management practices in projects related to successful projects can be seen in studies by Zwikael and Ahn (2011) where they carried out a study in three countries, (New Zealand, Israel, and Japan), with 701 project managers in industrial sectors. The results from their study suggest that risk management, even when carried out in moderate, has a significant relationship with levels of risk and project success.

The study by Christopher Amoah and Prof Leon Pretorius, (2020), showed the importance of the project context, both the industry and the country, to levels of project risk. In support of this approach, Bakker et al. (2012) emphasize the importance of risk identification as the most influential process in terms of numbers as well as in the strength of communications effects, followed by risk reporting, risk registration and risk allocation, risk analysis, and finally risk control.

Besner and Hobbs (2006), in support of the view of Bakker et al., state that sharing information about project risk with project stakeholders, constitutes an important practice for management. For Akintoye and MacLeod (1997) however, this is one of the reasons client companies and project management companies have associated risk managers in their projects. Research done by Akintoye and MacLeod's (1997), in the construction sector, revealed that risk events influenced the project results in terms of schedules, costs, and performance. Thus, they recommend that project activities remain under the attention of risk management and that this must become continuous over the project life cycle.

Risk management is thus an important tool to cope with such substantial risks in projects by: (a) assessing and ascertaining project viability; (b) analyzing and controlling the risks in order to minimize loss; (c) alleviating risks by proper planning; and (d) avoiding dissatisfactory projects and thus enhancing profit margins (Lam et al., 2007). Applying principles of risk management supports the quality improvement and improves cost estimation by identifying and mitigating potential risks before a project begins. Risk management puts processes in place to ensure management receives organized risk information early enough to apply corrective actions that will allow realistic schedule and cost estimates and assure successful completion of the project (Tinnirello, 2000). Risk management principles increase team involvement by providing a mechanism for the reporting of potential problems and increasing the team's stake in the overall success of the project. The embedding of risk is a long-term exercise to ensure that risk consideration is at the heart of the decision-making process (Hodge, 2002). Failure to appreciate risk issues may give rise to serious consequences (Fraser & Henry, 2007).

Elkington & Smallman (2002) have identified that there is a strong link between the amount of risk management undertaken in a project and the level of success of the project - more successful projects use more risk management. Also, the earlier that risk management was used in a project, the more successful it was. It is essential that the risks of a project be assessed at the Project Brief stage. Risks identified here will not only help the production of the necessary project products, but will increase the chance of overall project success. A significant risk that is not identified and mitigated will become a real problem at some point during the project life cycle (Tinnirello, 2000). The Project Manager should establish a control system that will comply with the project success factors as recommended by several researchers (Kerzner, 2001; Maylor, 2003; Rory, 2003; Rezones et al., 2006; among others).

Effective risk management processes are essential for the successful execution of projects in any sector. Globally, organizations employ various best practices to mitigate risks and enhance project outcomes. These practices, grounded in research and proven methodologies, ensure risks are proactively identified, assessed, and managed.

According to them, (Chipozya K. Tembo and Nthatisi Khatleli, 2016), they concluded that, Risk management in the Zambian building sector is not formalized and is unsystematic. The most utilized method is the risk identification while risk analysis and risk monitoring are not sufficiently done. The most utilized methods of responding to risks by contractors are; insurance,

percentages added to rates and on occasion projects are abandoned while the consultants as they play their agency role allocate risk mainly by risk transfer and acceptance. In their consideration for risk allocation, consequences of risk do not rank highly as a decision factor. Various suggestions have been made on how to improve risks management practice such as adoption of a formalized risk management system that is carried out in a systematic manner; use of risk identification methods that enable the identification of consequential risks; use of analysis methods that are less subjective; and lastly improved monitoring and communication on projects so as to enable players make timely and appropriate decisions on risk management. Their research identified the risk management practices as they apply to the building sector and improvements that can be adopted. There is however need to identify practices in other sectors such as roads, mechanical works etc. to be able to realize meaningful risk management in the Zambian construction industry as a whole.

The study by Sumbi Mukumba Shimwambwa, (2020) determined that the use of risk management was low to moderate in the construction industry in Zambia. This was seen in the maturity levels of organization ranging from being naïve to very few organizations being enabled to fully implement risk management in their organization from his study. Goh & Abdul-Rahman (2013) generalizes that only 18% of organizations in Malaysia employ a formal risk management process in their practices. The reason for low use of risk management techniques is less knowledge and awareness among the people (Banaitiene & Banaitis,2012). Hansen-Addy & Fekpe (2015) found intermediate use of risk management in Ghana's construction industry.

### *2.3 Challenges Faced by Stakeholders in Implementing Risk Management Processes in Road Expansion Projects.*

One of the most significant challenges faced by project managers in road expansion projects is the lack of organizational support for risk management. This issue stems from the failure of many organizations to prioritize risk management as a fundamental component of project planning and execution. As Sichone (2020) observed that, "risk monitoring in road construction projects in Zambia was largely ineffective due to inadequate supervision, inexperienced staff, and poor stakeholder engagement." This lack of commitment often leads to insufficient allocation of critical resources, such as funding, time, and personnel, which are essential for effective risk management.

Organizations frequently overlook the importance of embedding a risk management culture within their operations. This cultural gap leads to a reactive rather than proactive approach to risk management, where risks are addressed only after they materialize. Mumba (2011) highlighted that "structured risk management is often neglected, with risks being handled reactively, which undermines the overall success of projects." Without a strong organizational commitment to risk management, project teams are left without the necessary tools, frameworks, and support to identify, assess, and mitigate risks effectively.

Technical challenges represent a significant barrier to the effective implementation of risk management processes in road expansion projects. One prominent issue is the limited access to advanced tools and technologies that can enhance risk identification, analysis, and monitoring. Many project teams continue to rely on outdated or manual methods, which are not only time-consuming but also prone to human error. These limitations can undermine the accuracy and efficiency of risk assessments. As noted by Smith et al. (2020), "traditional risk assessment approaches often fail to address the dynamic and multifaceted nature of risks in infrastructure projects." For instance, reliance on purely qualitative risk assessment techniques, without incorporating quantitative validations, often leads to subjective and inaccurate prioritization of risks.

The absence of modern software tools for risk management further worsens this challenge. Advanced tools such as risk simulation software, data analytics platforms, and predictive modeling systems are not commonly adopted in many projects, particularly in regions with limited technological infrastructure. According to Johnson (2021), "the integration of risk management software into project management practices can improve the precision and efficiency of risk assessments, yet such tools remain underutilized in many developing economies." Without these technologies, project managers are often left with incomplete data, making it difficult to develop comprehensive risk mitigation strategies.

Environmental Uncertainties risks are inherently unpredictable and often present significant challenges to road construction projects. Adverse weather conditions, such as heavy rainfall, storms, or extreme temperatures, can halt construction activities and damage completed work. Additionally, natural disasters such as floods or earthquakes pose risks not only to infrastructure but also to the safety of workers and equipment. Miller (2023) emphasized that "environmental uncertainties require robust contingency planning, which is often neglected due to resource constraints." For instance, road expansion projects in flood-prone areas require specialized drainage systems and construction materials that can withstand water damage. Unfortunately, limited budgets often prevent project teams from investing in such measures.

### *2.4 Establishment of Research Gap*

Taking a closer look at the above studies, none of the authors have conducted research specifically focusing on the challenges and effectiveness of risk management processes within Zambian road expansion projects. Moreover, as shown in the previous studies, there is no well-known evidence of research that has addressed these specific gaps in the Zambian context. The analysis of the literature reveals that while many studies have explored risk management globally, the bulk of this work was carried out in regions such as the United States, other developing African countries (Sichone, 2020; Mumba, 2011; Patel, 2023; Phiri and Mwansa, 2019; Miller, 2023; Lopez, 2023; Green and Baker, 2022). This demonstrates that there are very few, or virtually no, previous studies conducted on risk management processes in Zambian road expansion projects, despite the pressing need to address this critical subject.

## **3. Methodology**

### *3.1 Research Design*

This study adopted a purposive research design. A purposive research design involves selecting specific participants or cases that

are most relevant to the research objectives, allowing for in-depth investigation of particular phenomena (Creswell, 2014). This design enabled the researcher to focus on key stakeholders directly involved in the Phase III Road expansion project in Lusaka, ensuring the collection of detailed and relevant information on the effectiveness of risk management processes. It was appropriate for capturing the current practices, mitigation measures, and challenges experienced by those directly engaged in the project. By using both quantitative and qualitative data within a purposive framework, the study provided a comprehensive understanding of how risk management is implemented and perceived across the selected stakeholder groups.

3.2 Target Population

The target population includes professionals engaged in risk management and project management in Zambia specifically those who participated in Lusaka phase III road expansion project. These include: Project managers in the public and private sectors, contractors and sub-contractors, constructions engineers and government officials.

3.3 Sampling Design

A stratified random sampling design was used to ensure fair representation of diverse sectors involved in project management. Stratification was based on the type of organization (public, private, and non-governmental) and sector (construction). From each stratum, participants were selected randomly to ensure fairness and inclusivity.

Sample Size: A sample of 50 participants was determined based on the Yamane formula for a manageable and representative population size. The sample size was calculated using statistical sampling methods to ensure the representation of key stakeholders. The Yamane formula will be employed to determine the sample size based on the target population.

3.4 Data Collection Method

The data used in this research was collected using Questionnaires. Written Questionnaires was used to enter any responses from all the 100 correspondents. The procedure of data collection involved question and answer sessions with all involved respondents.

3.5 Data Collection Tools

Structured Questionnaires: These includes both closed and open-ended questions designed to capture quantitative and qualitative data. Document Review Checklists: Designed to extract relevant data from existing literature, regulatory frameworks, and policy documents.

3.6 Data Analysis

Data was processed using statistical tool STATA, and Excel respectively. Descriptive statistics like mean, standard deviation, and frequency distribution was employed, alongside inferential statistics for hypothesis testing. And also, Data was analyzed using thematic analysis to identify patterns, themes, and insights related to risk management practices and challenges.

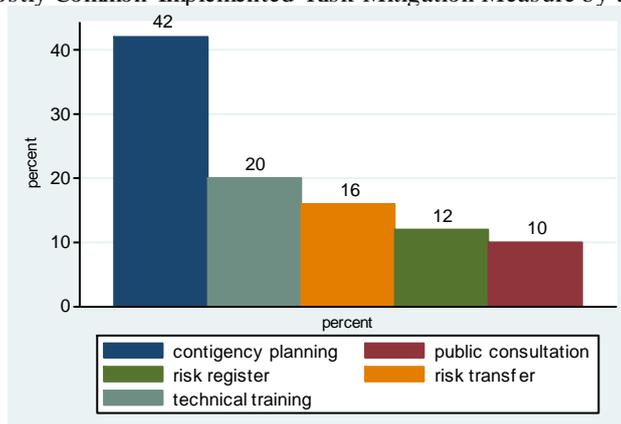
4. Findings

4.1 Characteristics of Respondents (Bio Data)

The demographic profile of the respondents in the Lusaka Phase III Road expansion project reveal a predominantly experienced and professionally active workforce, with 68% aged between 31–40 years and 32% between 25–30 years. The project was male-dominated, with 37 men and 13 women, reflecting broader trends in the construction sector. Most participants came from major contractors, notably AVIC International (40%) and Henan Overseas Engineering Construction Co. Ltd (16%), alongside contributions from Lusaka City Council, NCC, RDA, and ZEMA. Occupations were concentrated in key technical and managerial roles, including project managers (22%), risk compliance officers (22%), and site engineers (20%), supported by inspectors, quality control, environmental, infrastructure, and procurement officers. In terms of experience, the majority had between 4–7 years in their current roles, indicating a workforce well-versed in project execution, risk management, and infrastructure development.

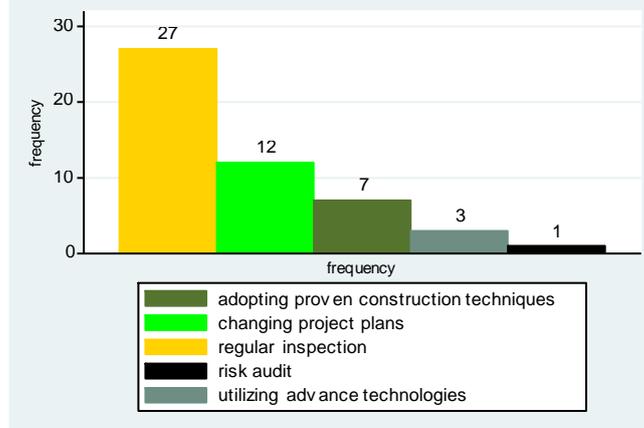
4.2 Types of risk mitigation measure in road expansion projects

Fig 4.1 Mostly Common Implemented Risk Mitigation Measure by the Company



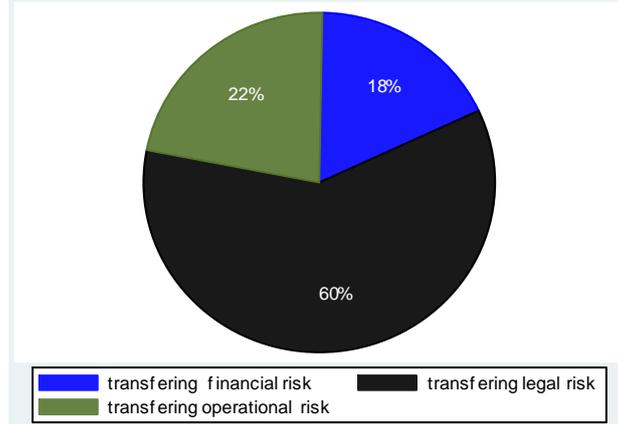
42% of respondents identify contingency planning as the most commonly implemented measure, followed by 20% who cite technical training, 16% risk transfer, 12% use of a risk register, and 10% public consultation. This distribution indicates that contingency planning is the dominant approach used in the Lusaka Phase III Road expansion project, suggesting a proactive strategy to manage unforeseen financial or operational disruptions.

Fig 4.2: Action Taken to Minimize Risk in Projects by Company



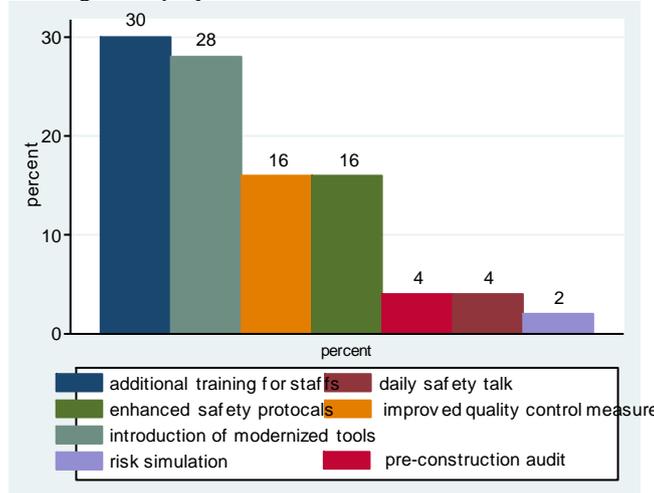
27 respondents cite regular inspection as the primary action taken to minimize risk, followed by 12 who mention changing project plans, 7 adopting proven construction techniques, 3 utilizing advanced techniques, and 1 conducting a risk audit. This pattern indicates that regular inspection is the most widely practiced risk mitigation action in the Lusaka Phase III Road expansion project. It reflects the project's reliance on continuous monitoring to detect and address issues early, which is crucial for maintaining safety, quality, and timeline

Fig 4.3: How Risk Transfer Is Being Used in Construction Projects



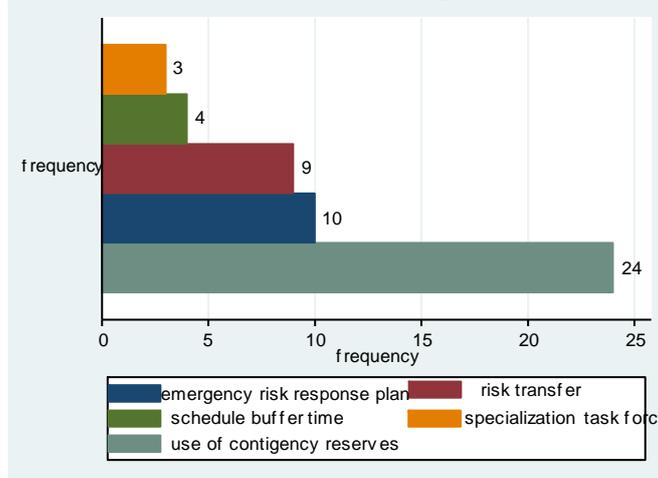
The results shows that 60% of respondents indicated that risk transfer is primarily applied to legal risks, while 22% refer to operational risks and 18% to financial risks. This distribution reveals that companies involved in the Lusaka Phase III Road expansion project predominantly use risk transfer strategies to manage legal liabilities, likely through contracts, insurance, or subcontracting.

Fig 4.4: Strategies Employed to Reduce the Likelihood of Identified Risks



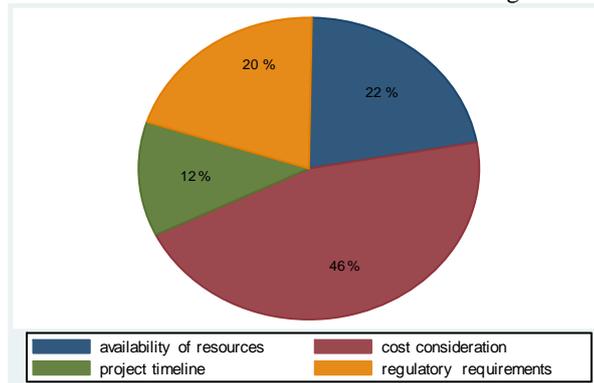
Results shows that 30% of respondents report additional training for staff as the main strategy, followed by 28% who indicate the introduction of modernized tools. Improved quality control measures and enhanced safety protocols each account for 16%, while daily safety talks and pre-construction audits are each mentioned by 4%, and risk simulation by 2%. These results suggest that the Lusaka Phase III Road expansion project places strong emphasis on capacity building and technological advancement as key strategies to minimize risks.

Fig4.5: Strategies Used to Reduce the Impact of Identified Risk



24 respondents cited the use of contingency reserves as the primary strategy used to reduce the impact of identified risk, followed by 10 who identified emergency risk response plans, 9 who mentioned risk transfer, 4 who noted the use of schedule buffer time, and 3 who indicated the deployment of specialized task forces.

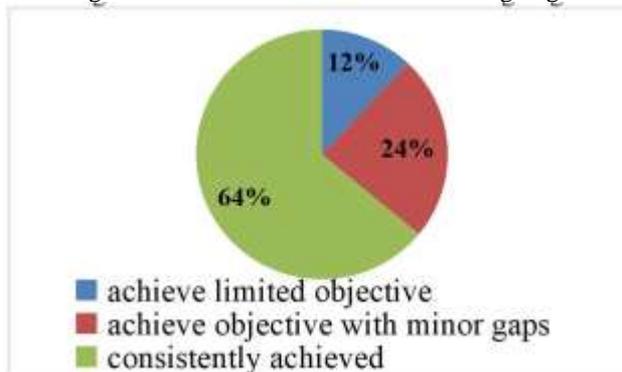
Fig 4.6: Factors That Influences the Selection of Risk Mitigation Measure



46% of respondents cite cost consideration as the primary factor, followed by 22% who indicate the availability of resources, 20% who point to regulatory requirements, and 12% who refer to the project timeline. These findings suggest that in construction project, financial feasibility plays the most decisive role in determining which mitigation strategies are adopted.

4.3 effectiveness of risk management processes in road expansion projects

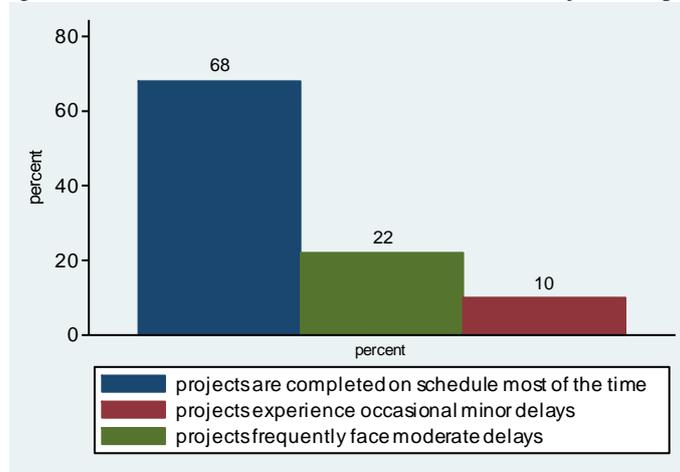
Fig.4.7: How Well Risk Mitigation Measure Has Been in Achieving Organization Project Objectives



Majority of respondents (64%) indicated that risk mitigation measures have consistently enabled their organizations to achieve project objectives. This suggests that the existing mitigation strategies are effective in minimizing project risks and supporting the successful completion of projects. Additionally, 24% of the respondents stated that project objectives were achieved with minor

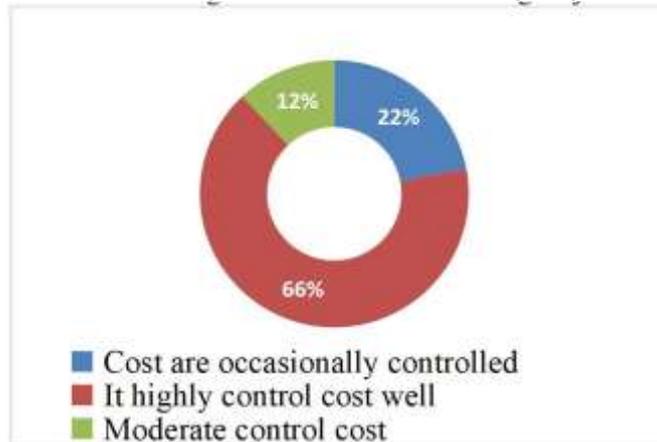
gaps, indicating that while the measures were largely effective, there were some shortcomings that slightly affected performance. Meanwhile, 12% of respondents revealed that project objectives were achieved to a limited extent, implying that in some cases, the risk mitigation strategies were insufficient or not fully implemented.

Fig4.8: How Have Risk Mitigation Measures Influenced The Timeliness Of Project Completion In Your Organization?



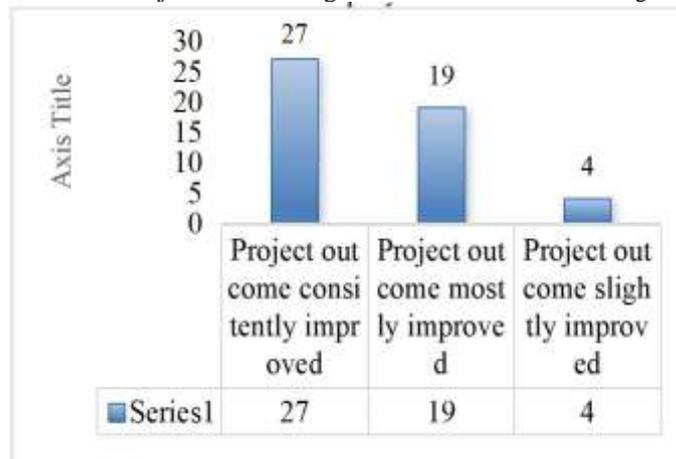
The majority of respondents (68%) indicated that projects are completed on schedule most of the time, suggesting that the risk mitigation measures in place are effective in minimizing disruptions and ensuring timely project delivery. Meanwhile, 10% of respondents reported that projects experience occasional minor delays. However, 22% of respondents stated that projects frequently face moderate delays.

Fig 4.9: How Do You Describe Risk Mitigation Measure in Controlling Project Cost and Budget Overruns?



majority of respondents (66%) indicated that risk mitigation measures highly control project costs, suggesting that effective risk planning and monitoring play a crucial role in maintaining financial discipline and preventing unnecessary expenditure during project execution. Additionally, 22% of respondents stated that project costs are occasionally controlled, implying that while risk mitigation strategies exist, their implementation may be inconsistent across different projects or departments.

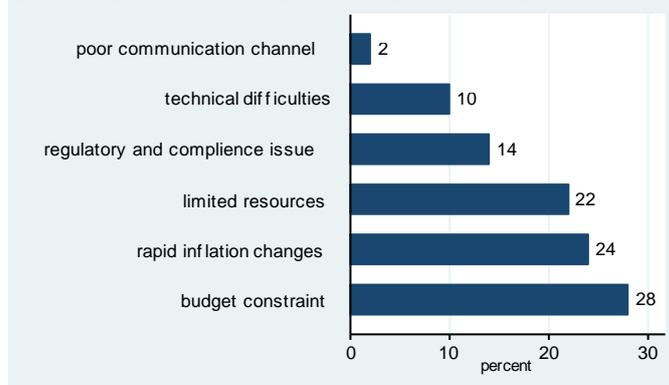
Fig 4.10: How Would You rate the Role of Project Risk Management Processes in Enhancing Project Outcomes in Your Company?



27 respondents (58%) indicated that project outcomes consistently improved as a result of effective risk management practices. This suggests that well-structured risk identification, assessment, and mitigation processes have significantly contributed to achieving project objectives and maintaining performance standards. Additionally, 19 respondents (40%) stated that project outcomes mostly improved, indicating that while risk management has had a positive influence, occasional gaps or implementation inconsistencies may still exist. Only 4 respondents (8%) reported that project outcomes slightly improved.

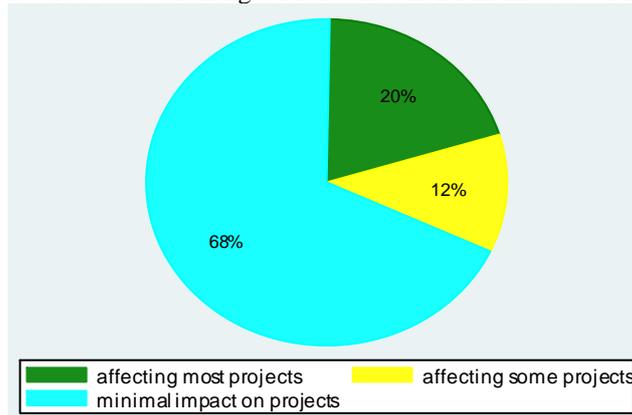
4.4 challenges faced by stakeholders in implementing risk management processes in road expansion projects

Fig 4.11: Primary Challenges Company Face in Implementing Risk Mitigation Measure in Construction Projects



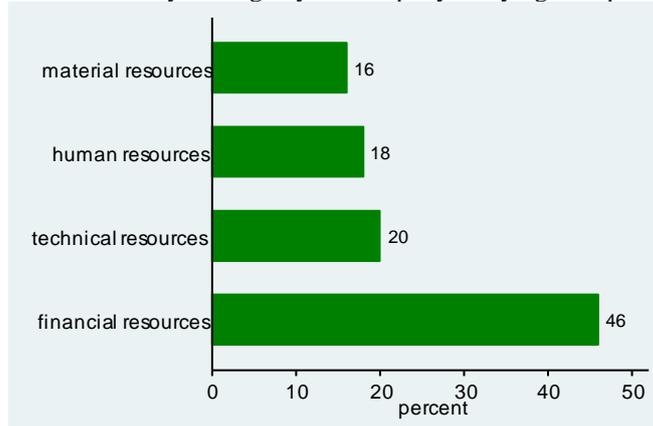
The results on chart reveals that 28% of respondents identified budget constraints as the leading challenge, followed by rapid inflation changes at 24%, limited resources at 22%, regulatory and compliance issues at 14%, technical difficulties at 10%, and poor communication channels at 2%.

Figure 4.12:How Often Do You Face Challenges Mentioned In D1 In Effective Managing Risk In Projects?



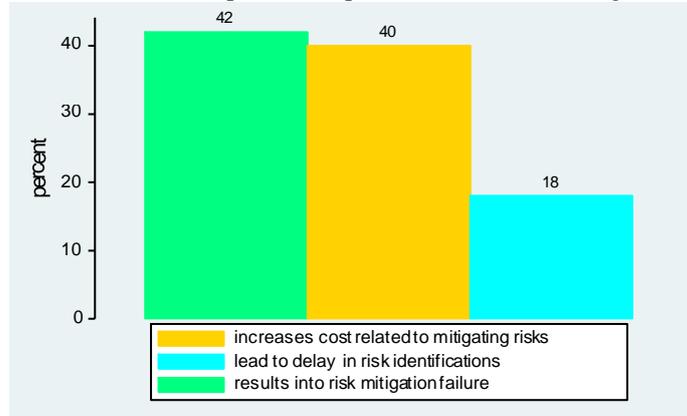
The results show that 20% of the respondents indicated that these challenges affect most of their projects, implying that risk management obstacles such as limited resources, poor communication, or inadequate planning significantly hinder project performance in some organizations. A smaller proportion, 12%, reported that such challenges affect only some projects, suggesting that these issues may arise intermittently depending on project complexity or management effectiveness. The majority, 68%, stated that the challenges have minimal impact on their projects, demonstrating that most organizations have established effective strategies and systems to address or mitigate risk management difficulties.

Figure 4.13: What types of resources are mostly lacking in your company in trying to implement risk management processes?



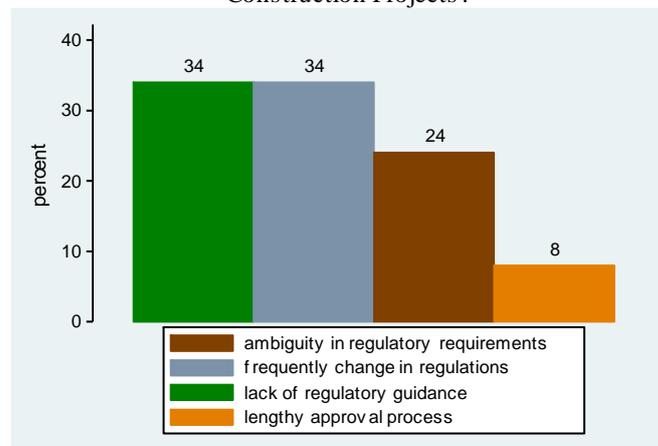
The results reveal that financial resources are the most significant constraint, accounting for 46% of responses, indicating that limited funding hampers the ability to conduct comprehensive risk assessments, procure quality materials, or adopt advanced mitigation tools. Technical resources were cited by 20% of respondents, reflecting challenges related to inadequate technology, expertise, and modern risk analysis systems. Human resources accounted for 18%, suggesting that many organizations face shortages of skilled personnel trained in risk management practices. Material resources were the least mentioned at 16%, implying that while materials may occasionally be insufficient, they are not the primary limitation.

Figure 4.14: How does stakeholder conflict impact the implementation of risk mitigation measures in your projects?



A total of 42% of respondents stated that such conflicts often result in the failure of risk mitigation measures, suggesting that disagreements among key stakeholders hinder coordinated decision-making and weaken the implementation of planned strategies. Additionally, 40% reported that conflicts increase the overall cost of mitigating risks, as disagreements often lead to delays, rework, or the adoption of costlier alternative solutions. Meanwhile, 18% of respondents noted that stakeholder conflicts lead to delays in identifying risks.

Figure 4. 15 What Regulatory And Compliance Challenges Do You Encounter That Hinder Effective Risk Management In Your Construction Projects?



The results indicate that frequent changes in regulations and lack of regulatory guidance are the most significant barriers, each cited by 34% of respondents. 24% of respondents identified ambiguity in regulatory requirements as a challenge, suggesting that unclear or overlapping standards make compliance difficult for project teams. A smaller proportion, 8%, cited lengthy approval processes as an obstacle.

4.5 Discussion of Results

Based on the study findings, contingency planning emerged as the most widely used risk mitigation strategy, adopted by 42% of respondents. Other key strategies included technical training (20%), risk transfer (16%), use of risk registers (12%), and public consultation (10%). The high reliance on contingency planning reflects a proactive approach to uncertainty management, allowing project teams to allocate resources and respond to emerging challenges effectively. Similarly, the prominence of technical training indicates recognition of the importance of capacity building in managing complex engineering risks. These findings align with Miller (2023) and Phiri and Mwansa (2019), who emphasized the significance of preparedness and skill enhancement in ensuring project success.

The study also revealed that 64% of respondents rated risk mitigation strategies as very effective in achieving project objectives, while 60% reported that these measures were effective in reducing cost overruns. On addition, 52% of participants indicated that risk management processes had a very positive impact on overall project outcomes. This demonstrates that structured risk management not only enhances performance but also strengthens stakeholder confidence and project delivery consistency. These results contrast with earlier studies in developing contexts, such as Green and Baker (2022) and Patel (2023), which reported that

risk management processes often yielded limited results due to inconsistent implementation. The observed difference in this study is that it suggests that Zambia is making gradual progress toward institutionalizing risk governance and integrating formalized risk management frameworks within infrastructure projects.

Despite these positive outcomes, the study identified several challenges that hinder effective risk management. Budget constraints (28%), inflationary pressures (24%), limited resources (22%), and regulatory hurdles (14%) were the most cited obstacles. Adding up, 40% of respondents highlighted stakeholder conflict as a major barrier, while 36% pointed to technical difficulties. These findings are consistent with Sichone (2020), who noted that financial limitations significantly affect infrastructure delivery in Zambia, and Mumba (2011), who emphasized coordination challenges among project stakeholders. The persistence of these issues indicates that while organizations are adopting risk management frameworks, structural and financial weaknesses still constrain their full effectiveness.

The findings also make a notable contribution to the literature, particularly in addressing a gap identified in previous studies. Earlier research on risk management has focused primarily on global or regional contexts, with little attention to Zambia's infrastructure sector. By collecting primary data from professionals directly involved in road expansion projects, this study provides empirical evidence specific to the Zambian context, highlighting how local organizations manage risk and what challenges they face. The results therefore contribute to both academic knowledge and practical application, offering guidance for policymakers, contractors, and engineers involved in project delivery.

## 5. Conclusions

The findings revealed that contingency planning, technical training, and risk transfer are the most commonly applied risk mitigation strategies. A majority of respondents rated these measures as very effective in achieving project goals and minimizing disruptions. However, the study also identified several persistent challenges, including limited financial resources, inflationary pressures, and technical difficulties. These obstacles continue to affect the consistent application of risk management frameworks across projects. The results underscore the importance of structured and proactive risk management in enhancing the performance and outcomes of infrastructure projects. They contribute to the field by highlighting context-specific insights from Zambia a setting that has been underrepresented in the literature on project risk management.

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