

**EFFECTIVENESS OF RISK MANAGEMENT STRATEGIES ON MITIGATING
COST OVERRUNS IN INFRASTRUCTURE PROJECTS IN CHEMUSUSU
WATER COMPANY, KENYA**

WILSON CHEPKONGA KIPSEREM




**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF A MASTER DEGREE IN PROJECT
MANAGEMENT AND PLANNING OF
MOUNT KENYA UNIVERSITY**

JUNE 2025

DECLARATION AND APPROVAL

This project is my original work and has not been presented for a degree in any other University or for any other award.

Signature... 

Date.....29/04/2025.....

Wilson Chepkonga Kipserem

MSCPM/2023/54503

Approved by the Universality Supervisor

I confirm that the work reported in this project was carried out by the candidate under my supervision

Signature 

Date30/06/2025.....

Dr. Susan Jepkorir

Lecturer, School of Business

Mount Kenya University

DEDICATION

This research Project is dedicated to my wife Eva and my entire family, thank you very much for your moral support.



ACKNOWLEDGEMENT

I would like to express my deepest gratitude to the Almighty for granting me the strength, wisdom, and resilience throughout this academic journey. My heartfelt appreciation goes to my project supervisor, Dr. Susan Jepkorir, for her invaluable guidance, support, and encouragement, which greatly contributed to the successful completion of this research. I am also thankful to the entire Mount Kenya University staff for their dedication and assistance throughout my studies. Lastly, I extend my sincere thanks to my classmates, whose camaraderie and collaboration provided a motivating and supportive learning environment.



ABSTRACT

Infrastructure projects are essential for driving economic development and improving the quality of life by providing services such as water, energy, and transportation. Despite their importance, cost overruns have remained a persistent challenge in public sector infrastructure projects in Kenya. Approximately 85% of such projects experience cost overruns, with water infrastructure projects managed by entities like Chemususu Water Company being particularly affected. This study evaluated the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects undertaken by Chemususu Water Company. The specific objectives of the study were: to determine the influence of the risk avoidance strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company; to establish the influence of the risk reduction strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company; to examine the influence of the risk transfer strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company; and to assess the influence of the risk retention strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company. The study was guided by Risk Compensation Theory, Resource-Based View Theory, Enterprise Risk Management Theory, and Prospect Theory. A descriptive research design was adopted, targeting key stakeholders involved in infrastructure projects at Chemususu Water Company, including project managers, engineers, procurement officers, financial officers, contractors, and community representatives. Data were collected using closed-ended questionnaires based on a five-point Likert scale. The study adopted a census approach. Both descriptive and inferential statistics were used in the analysis, with SPSS software facilitating multiple regression analysis to determine the relationships between the risk management strategies and cost overruns. The results indicated statistically significant moderate positive correlations between risk avoidance ($r = 0.518$, $p = 0.011$), risk reduction ($r = 0.563$), and risk transfer strategies and the mitigation of cost overruns. These findings emphasized the importance of early risk identification, proactive planning, and strategic subcontracting in enhancing cost control. Risk retention, however, showed a weaker and less consistent impact. While respondents acknowledged the existence of cost management strategies, their perceptions of effectiveness varied, suggesting gaps in implementation. The study recommended the integration of risk management strategies into project execution frameworks, particularly in scope control, monitoring mechanisms, and strategic outsourcing. Additionally, it noted the importance of regular training on risk assessment and strict adherence to risk protocols to enhance financial efficiency and ensure projects are completed within budget.

ABBREVIATIONS AND ACRONYMS

ANOVA:	Analysis of Variance
DOPU:	Drop-Off and Pick-Up
ERM:	Enterprise Risk Management
GoK:	Government of Kenya
K.C.S.E:	Kenya Certificate of Secondary Education
NACOSTI:	National Commission for Science, Technology, and Innovation
NGO:	Non-Governmental Organizations
NHIF:	National Hospital Insurance Fund
RBV:	Resource-Based View
SPSS:	Statistical Package for Social Science



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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter introduces the background and context of the research, laying the foundation for the study. It outlines the research problem, presents the objectives of the study, and explains the significance of the research in addressing the identified gap in existing literature. The chapter also provides an overview of the research questions, and the methodology that will be employed to achieve the research goals. Through this initial exploration, the chapter establishes the scope, limitations, and potential contributions of the research to the field.

1.1 Background of the Study

Infrastructure projects play a critical role in the development of nations, enhancing economic growth, and improving the quality of life by providing essential services such as water, transportation, and energy. However, infrastructure projects are often subject to risks that can lead to significant challenges, particularly cost overruns. Cost overruns occur when actual expenditures exceed the estimated budget, and this is a common issue in projects globally, regardless of sector. Effective risk management strategies are therefore essential to mitigate these cost overruns and ensure project success. (Schwalbe, 2019).

In the water sector, cost overruns can have dire consequences, particularly in developing regions where financial resources are limited, and the demand for water services is high (Carbone & Tippet, 2023). As such, this study focuses on the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects, specifically within the Chemususu Water Company in Kenya. The aim is to analyze how different

risk management practices can be applied to control costs and ensure successful project completion.

Project risk management is both an art and a science focused on identifying, analyzing, and addressing uncertainties that arise throughout a project's lifecycle. The goal is to meet project objectives while ensuring stakeholder satisfaction at a budgeted expense (Schwalbe, 2019). It begins during the planning phase, where potential risks are identified and mitigation strategies are developed. The project manager plays a crucial role in recognizing the root causes of these risks and understanding their impact on the project's success (Urbanski, Haque & Oino, 2019).

The primary aim of project risk management strategies to understand risks at both the project and program levels, reduce the likelihood of negative events, and increase the chances of positive outcomes. This is a continuous process that starts in the planning phase and continues through the entire project lifecycle. It involves ongoing risk identification, analysis, monitoring, and control, as new risks can emerge at any point during the project (Rafele, 2020).

Effective risk management strategies rely on a team's ability to understand project risks and work towards minimizing threats while maximizing opportunities. The focus is on reducing the probability and impact of negative events while promoting positive ones (Kendrick, 2019). Common risks, such as scope creep, IT risks, and construction-related risks, can disrupt a project if not properly managed. Scope creep, often due to poor communication or planning, can lead to increased budgets, delays, and low morale.

Effective risk management has become a key factor in ensuring project success, especially given the increased focus on minimizing deviations in quality, time, and cost compared to what was originally expected. The pressure to cut costs and reduce timelines

has made managing risk more important than ever. Failing to address risks can lead to budget overruns, delays in schedules, and unmet performance goals (Carbone & Tippet, 2023).

However, construction owners, project teams, and contractors often approach risk management differently. For risk management to be truly effective, organizations need to fully commit to integrating these practices into their project systems and processes. To establish an effective risk management strategy, organizations must allocate the necessary resources, foster a culture that supports risk management at all levels, and ensure that personnel are trained in risk management protocols and controls (Firmenich, 2022).

1.1.1 Global Perspective Risk Management Strategies on Mitigating Cost Overruns

Globally, cost overruns in infrastructure projects are a persistent problem across various countries and regions. In Europe, the United Kingdom has experienced significant cost overruns in several infrastructure projects, including the HS2 high-speed rail project, which faced a 25% budget increase due to inadequate risk management during the planning stages (Mott MacDonald, 2020). This has prompted the UK government to adopt more robust risk management strategies, emphasizing the importance of early risk identification and mitigation.

Similarly, in the United States, infrastructure projects such as highway and bridge constructions frequently face cost escalations. For instance, the Boston "Big Dig" project experienced cost overruns of nearly 200% from its original budget, primarily due to unforeseen technical risks and management inefficiencies (Flyvbjerg, 2017). As a response, the U.S. has increasingly focused on incorporating advanced project management software and techniques to better assess and mitigate risks throughout the project lifecycle.

In Asia, China has invested heavily in large-scale infrastructure, but cost overruns remain a challenge. The Three Gorges Dam, one of the largest hydropower projects in the world, experienced significant cost increases due to underestimation of technical risks and external factors such as inflation and environmental considerations (Shen et al., 2019). To address this, China has enhanced its risk management frameworks, incorporating more rigorous risk assessments at the planning and design stages of projects.

In Australia, infrastructure cost overruns are also prevalent. The Sydney Light Rail project exceeded its initial budget by 50% due to poor risk forecasting and unanticipated utility relocation costs (Love et al., 2021). In response, the Australian government has emphasized the integration of thorough risk management strategies during the project planning phase to avoid similar issues in the future.

1.1.2 Regional Perspective Risk Management Strategies on Mitigating Cost Overruns

In the African, cost overruns in infrastructure projects are a widespread issue, often exacerbated by limited resources and weak institutional frameworks. In South Africa, the construction of the Medupi and Kusile power plants faced significant cost overruns due to poor risk management and contract management inefficiencies (Khan et al., 2020). As a result, there has been a growing emphasis on strengthening risk management strategies, particularly in the planning and execution stages of large-scale projects.

Ethiopia's Grand Renaissance Dam project, which aims to boost the country's energy capacity, has also experienced substantial cost overruns. The delays and budget escalations were largely due to inadequate risk identification and lack of proper mitigation measures for financial and technical risks (Bekele, 2019). Consequently,

Ethiopia has started implementing more comprehensive risk management frameworks to better handle future infrastructure investments.

In Nigeria, the infrastructure sector has similarly faced challenges with cost overruns, particularly in road and energy projects. For example, the Lagos-Ibadan Expressway project saw significant budget increases due to political risks and poor risk allocation among stakeholders (Ibrahim & Musa-Haddary, 2020). To counter this, Nigeria is working towards improving its risk management capabilities, focusing on stakeholder engagement and enhanced financial risk assessments.

1.1.3 Local Perspective Risk Management Strategies on Mitigating Cost Overruns

In Kenya, various infrastructure projects, including road constructions and water resource developments, have struggled with cost overruns due to ineffective risk management strategies. The Standard Gauge Railway (SGR) project, for instance, exceeded its budget by more than 20%, mainly due to inadequate contingency planning for risks related to land acquisition and construction delays (Mwangi et al., 2019). This has highlighted the need for improved risk management practices across Kenya's infrastructure sector, including in water projects like those under Chemususu Water Company.

Cost overruns in water infrastructure projects have been a significant challenge, particularly in areas like Baringo County, where financial and technical risks are prevalent. Projects often face delays and budget escalations due to factors such as poor planning, inadequate stakeholder engagement, and environmental risks. For example, the Chemususu Dam project faced cost overruns and delays due to poor risk management, leading to incomplete phases of the project and higher-than-anticipated costs (GoK, 2022). The lack of proactive risk management strategies has hindered the successful completion of many infrastructure projects in the region.

Moreover, local water companies, including Chemususu Water Company, have struggled to implement comprehensive risk management strategies, resulting in inefficiencies and increased costs. There is a need for these companies to adopt more robust risk management practices to address the challenges of cost overruns, improve project outcomes, and ensure sustainable water service delivery. This study, therefore, aims to examine the effectiveness of these risk management strategies and provide recommendations for mitigating cost overruns in infrastructure projects within Chemususu Water Company.

1.2 Statement of the Problem

Cost overruns remain a persistent challenge in infrastructure projects worldwide, significantly affecting their financial viability and timely completion. In Kenya, the issue is particularly evident in public sector projects, with a high frequency of projects exceeding their initial budgets. According to a study by the World Bank (2019), approximately 85% of public infrastructure projects in Kenya experience cost overruns, with an average overrun of 30%. This trend is also evident in water infrastructure projects such as those managed by Chemususu Water Company. The company's projects have faced substantial financial setbacks due to escalating costs beyond their original estimates, which hinders both the quality of delivery and service to stakeholders.

While the application of risk management strategies is widely recognized as a solution to mitigate cost overruns, the effectiveness of these strategies such as risk avoidance, risk reduction, risk transfer, and risk retention remains underexplored in the context of infrastructure projects in Chemususu Water Company. Despite their adoption, the company continues to face significant cost challenges, indicating potential gaps in the strategies' implementation or effectiveness.

Empirical studies show that the success of risk management strategies varies significantly depending on factors such as project size, complexity, and the specific nature of the risks involved (Morris & Pinto, 2020). For instance, risk avoidance strategies have been found to reduce cost overruns by up to 25% in well-planned projects (Gbahabo & Ajuwon, 2017), while risk transfer strategies are less effective if not properly tailored to the contractual environment (Smith, Merna & Jobling, 2018). Yet, the impact of these strategies on Chemususu Water Company's infrastructure projects remains unclear.

This study seeks to address this gap by evaluating the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects within Chemususu Water Company. The focus will be on analyzing how risk avoidance, risk reduction, risk transfer, and risk retention influence cost performance, providing critical insights into improving project outcomes.

1.3 Purpose of the Study

The purpose of this study was to evaluate the effectiveness of risk management strategies on mitigating cost overruns in infrastructure projects in Chemususu Water Company, Kenya.

1.4 Objectives of the Study

- i. To determine the influence of risk avoidance strategy on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya
- ii. To establish the influence of risk reduction strategy on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya
- iii. To examine the influence of risk transfer strategy on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya

- iv. To assess the influence of risk retention strategy on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya

1.5 Research Questions

- i. What is the influence of the risk avoidance strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company, Kenya?
- ii. How does the risk reduction strategy influence the mitigation of cost overruns in infrastructure projects in Chemususu Water Company, Kenya?
- iii. What is the influence of the risk transfer strategy on mitigating cost overruns in infrastructure projects in Chemususu Water Company, Kenya?
- iv. How does the risk retention strategy influence the mitigation of cost overruns in infrastructure projects in Chemususu Water Company, Kenya?

1.6 Significance of the Study

This study may be significant to policy makers involved in infrastructure development, particularly in the water sector. By providing evidence on the effectiveness of various risk management strategies in mitigating cost overruns, the study offers valuable insights that can inform the creation of policies and guidelines aimed at improving project outcomes. Policy makers can use the findings to formulate regulations that encourage the adoption of robust risk management practices, thereby enhancing the financial sustainability and timely delivery of infrastructure projects.

For management within water organizations such as Chemususu Water Company, this study is equally important. It highlights the critical role of strategic risk management in controlling project costs, helping managers to make informed decisions when planning and executing projects. By understanding how different strategies risk avoidance, reduction, transfer, and retention impact cost outcomes, managers can implement more effective controls to mitigate financial risks and ensure projects are completed within

budget. This may also improve accountability and resource management in infrastructure development.

Lastly, the study holds value for scholars and researchers interested in project management and risk mitigation. It contributes to the body of knowledge by addressing a gap in empirical evidence regarding risk management effectiveness in infrastructure projects, particularly within the Kenyan context. Scholars can build upon these findings to explore similar challenges in other sectors or regions, ultimately advancing academic discourse on risk management and its influence on project performance.

1.7 Scope of the Study

This study focuses on the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects within Chemususu Water Company, Kenya. Specifically, the study examines the influence of four key risk management strategies: risk avoidance, risk reduction, risk transfer, and risk retention. These strategies were analyzed to determine their impact on controlling costs in the company's infrastructure projects. The time frame for this study is four months starting the month of February ,2025 to the month of May 2025.

1.8 Limitations of the Study

The limitations of this study included potential biases in data collection, as it relies on self-reported information from project managers, contractors, and company officials, which may be subject to personal perceptions and inaccuracies. Additionally, the study was limited to infrastructure projects within Chemususu Water Company, which restricted the generalizability of the findings to other organizations or sectors. To address these limitations, the study employed triangulation by using multiple data sources—surveys and project documents to cross-verify the information collected. Furthermore, a census approach was applied to ensure that the selected respondents are representative of

the broader population, and the findings were framed with caution, noting their specific context and encouraging further research in other settings to validate the results.

1.9 Delimitations of the Study

The study was geographically confined to Chemususu Water Company, with data being collected from various stakeholders involved in project management, including company officials, project managers, and contractors. This study was delimited to evaluating the effectiveness of four specific risk management strategies risk avoidance, risk reduction, risk transfer, and risk retention on mitigating cost overruns in infrastructure projects implemented by Chemususu Water Company, Kenya. The study focused exclusively on infrastructure projects within this single company, which means that findings may not directly generalize to other water companies or different sectors. The study targeted project managers, engineers, procurement officers, and other key staff directly involved in project planning, implementation, and cost control within Chemususu Water Company.

1.10 Assumptions of the Study

The following assumptions applied in this study. First, it was assumed that respondents, including project managers, contractors, and officials from Chemususu Water Company, will provide accurate and honest information regarding their experiences with risk management strategies and their effects on mitigating cost overruns. This accuracy is essential for obtaining reliable data for analysis. Second, the study assumes that the risk management strategies risk avoidance, reduction, transfer, and retention have been implemented consistently across the company's infrastructure projects. Without this uniform application, it would be challenging to assess their true effectiveness. Lastly, it was assumed that external factors, such as economic conditions or policy changes, remained relatively stable during the study period, ensuring that any observed effects on

cost overruns can be primarily attributed to the risk management strategies under examination.



1.11 Operational Definition of Key Terms

Cost Overruns: Cost overruns refer to the situation in which the actual cost of a project exceeds the original budget or estimated costs.

Effectiveness: Effectiveness is the degree to which a certain strategy, action, or process achieves its intended objectives or goals. In this study, it refers to how well the risk management strategies mitigate cost overruns in infrastructure projects.

Mitigation: Mitigation refers to the process of reducing the severity, seriousness, or harmful impact of a risk. In the context of this study, mitigation involves the strategies used to minimize or prevent cost overruns in infrastructure projects.

Risk Avoidance Strategy: Risk avoidance strategy involves taking actions to eliminate potential risks entirely, often by not engaging in activities or decisions that could lead to the occurrence of the risk.

Risk Management Strategies: Risk management strategies are the systematic approaches used to identify, assess, and control risks in order to minimize negative outcomes and capitalize on potential opportunities. These strategies include risk avoidance, reduction, transfer, and retention.

Risk Reduction Strategy: Risk reduction strategy focuses on minimizing the likelihood and impact of risks that cannot be avoided.

Risk Retention Strategy: Risk retention strategy occurs when an organization decides to accept and retain a risk rather than avoid, reduce, or transfer it. This is typically done when the cost of mitigating the risk outweighs the potential negative impact or when the risk is deemed manageable.

Risk Transfer Strategy: Risk transfer strategy involves shifting the responsibility for managing and bearing the consequences of a risk to a third party, such as through insurance, outsourcing, or contractual agreements.



CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of existing literature related to the study of risk management strategies and their effectiveness in mitigating cost overruns in infrastructure projects. It explores empirical studies and theoretical frameworks that have examined various risk management strategies such as risk avoidance, risk reduction, risk transfer, and risk retention. Additionally, the chapter identifies the conceptual framework and gaps in the literature, highlighting the need for further research in the c infrastructure projects in Kenya.

2.1 Empirical Literature Review

2.1.1 Risk Avoidance Strategy and Mitigating Cost Overruns

Recent empirical studies highlight the significant role of risk avoidance strategies in mitigating cost overruns in various sectors. Mwangi et al. (2022) conducted a study in Nairobi, Kenya, focusing on public infrastructure projects. The research employed a descriptive research design targeting project managers and engineers involved in these projects. The findings revealed that risk avoidance strategies such as thorough project planning, stakeholder engagement, and avoiding over-ambitious project scopes significantly reduced the likelihood of cost overruns. However, the study identified a gap in the integration of risk management software and tools, suggesting that incorporating technology could further enhance the effectiveness of these strategies.

Wabomba (2020) conducted a study in Nairobi, Kenya, examining the impact of avoidance on project performance within International Development Organizations. Using a correlational predictive research design, data was collected through both documentary reviews and questionnaires distributed to project and program managers.

The study revealed that organizations employed strategies such as adjusting work plans, conducting regular inspections, operational reviews, and providing training to mitigate risks and reduce costs.

Weingarten et al. (2021) explored the effect of risk avoidance on the success of supply chain integration among 12 firms supplying stationery. The descriptive research design involved questionnaires administered to managers, finance officers, and procurement officers. Data analysis showed that these firms adopted risk prevention tactics like detailed planning, contingency measures, and alternative approaches, which positively influenced their performance.

Aimable et al. (2020) investigated how risk management strategies affect construction project performance in Rwanda, focusing on a sample of 169 project team members across four districts. The study used descriptive research design, structured questionnaires, and interviews. Findings indicated that strategies such as detailed work plans, safety inspections, and safety systems significantly influenced project outcomes. Similarly, Singh et al. (2022) conducted a study in India on the role of risk management in construction firms, finding that safety inspections, contingency plans, and alternative risk avoidance approaches improved project performance.

In another study, Ahmed and Hassan (2021) explored the influence of risk avoidance strategies on large-scale construction projects in Egypt. Using a cross-sectional research design, the study targeted contractors, project managers, and government officials involved in construction. The findings showed that early identification of potential risks and avoiding risky contracts or partners helped minimize cost overruns. Nevertheless, the study noted a gap in the implementation of risk avoidance strategies, as many projects still faced delays and cost overruns due to inadequate adherence to these practices. The

researchers recommended more stringent monitoring and enforcement of risk avoidance protocols.

Additionally, Jean et al. (2023) conducted research in South Africa's water sector, examining the impact of risk avoidance on cost management in infrastructure projects. The study used a mixed-methods research design, targeting engineers, project supervisors, and financial officers. The findings indicated that avoiding overly complex designs and ensuring early compliance with regulatory standards were effective in mitigating cost overruns. However, the study identified a gap in addressing external factors such as inflation and currency fluctuations, which also contribute to cost overruns despite the application of risk avoidance strategies. This gap suggests that risk avoidance should be supplemented by other risk management strategies to fully mitigate cost overruns.

2.1.2 Risk Reduction Strategy on Mitigating Cost Overruns

Okumu and Wanjira (2017) conducted research on the risk management strategies used by motor insurance firms in Kenya. They adopted a descriptive research design and studied 18 motor insurance companies, with a sample of 54 employees and managers selected using simple random and purposive sampling techniques. Data was collected through self-administered questionnaires and analyzed using descriptive statistics and content analysis. The study found that risk reduction strategies, such as identifying and quantifying risks, conducting risk control meetings, implementing quality assurance, and utilizing signed contracts and contingency plans, had a positive impact on the performance of these insurance firms.

Mokaya and Njenga (2021) conducted research in Kenya's energy sector, focusing on geothermal power projects. The study employed a cross-sectional research design,

targeting project managers and engineers in the energy field. Through the use of structured questionnaires and statistical data analysis, the findings revealed that risk reduction strategies, such as regular project monitoring, contingency planning, and the use of robust project management software, significantly minimized the occurrence of cost overruns. However, a gap was identified in the consistency of implementing these strategies across projects, with some projects lacking adequate monitoring protocols, resulting in cost escalations.

Kumar et al. (2022) conducted a study in India's road construction sector to assess the effectiveness of risk reduction strategies in managing project costs. The research used a descriptive research design and targeted contractors, engineers, and project supervisors in large-scale road construction projects. Data was collected through interviews and surveys and analyzed using both descriptive and inferential statistics. The study found that implementing risk reduction strategies such as continuous training for staff, regular risk assessments, and detailed project documentation significantly reduced the incidence of cost overruns. However, the study highlighted a gap in the integration of advanced risk reduction tools, such as predictive analytics, which could further enhance the effectiveness of risk reduction strategies in preventing cost escalations.

Similarly, Aimable, Shukla, and Oduor (2020) investigated the effects of risk management strategies on construction projects in Rwanda. Using a descriptive research design, the study targeted 291 project team members across four districts, with a sample size of 169 participants selected through simple random sampling. Data was collected using structured questionnaires, documentary reviews, and in-depth interviews and analyzed using qualitative techniques. The study revealed that identifying and quantifying risk, and responding according to the risk management plan, positively influenced the performance of construction projects.

In Nigeria, Ubani et al. (2018) examined the influence of risk management practices on the construction industry. The study employed a case study research design, focusing on contractors, clients, and consultants, with a sample size of 84 respondents from 15 construction companies. Data was collected through questionnaires and analyzed using SPSS. The findings indicated that construction firms employed risk reduction strategies such as identifying and quantifying risks, adjusting work plans, monitoring risks, and making timely decisions to mitigate risk effects. These strategies enhanced project performance by ensuring projects were completed within the set time frame and budget.

In South Africa, Mbele and Jacobs (2023) explored the impact of risk reduction strategies on water infrastructure projects.

The study adopted a mixed-methods research design, targeting project managers, financial officers, and engineers involved in water supply projects. Data collected through surveys and in-depth interviews revealed that risk reduction strategies like comprehensive risk assessments, early identification of potential cost drivers, and proactive communication among stakeholders were effective in mitigating cost overruns. Nonetheless, the study identified a gap in addressing external risks such as political instability and inflation, which continue to contribute to cost overruns despite the implementation of risk reduction strategies. This finding suggests the need for more adaptive and flexible risk management approaches that account for external uncertainties.

2.1.3 Risk Transfer Strategy and Mitigating Cost Overruns

Aduma and Kimutai (2018) conducted a study in Nairobi, Kenya, focusing on risk management practices at the National Hospital Insurance Fund (NHIF). They employed a descriptive research design, targeting 651 management employees across various departments. A stratified proportionate random sampling method was used, and 241

respondents participated in the study. Their findings showed that risk transfer strategies like outsourcing and contractual agreements significantly impacted project performance at NHIF. However, the study did not explore the long-term effects of these risk transfer strategies on project sustainability or efficiency, leaving a gap in understanding how these practices influence NHIF's future performance.

Similarly, Nsiah and Bonnah (2019) examined the effect of risk management practices in the Ghanaian banking industry using a case study design. They focused on five rural banks and interviewed managers and finance officers through questionnaires and in-depth interviews. Their findings revealed that risk transfer strategies, such as signing contracts and using insurance policies, had a positive effect on bank performance. Despite these findings, the study was limited by its narrow focus on rural banks, creating a gap in understanding how these risk management practices affect larger urban or international banks in Ghana, which may face different risks and challenges.

Kolo (2020) investigated project risk management in construction projects in Abuja, Nigeria, using a descriptive design to study 12 construction firms. The study revealed that risk transfer strategies, such as insurance policies and risk premiums, had a positive effect on project performance in terms of cost, time, and quality. However, the study lacked an exploration of the role of other risk management strategies, such as risk retention and avoidance, which could provide a more comprehensive view of how different strategies impact project success in the construction sector. This creates a gap in understanding the broader risk management landscape in construction projects.

Pimchangthong and Boonjing (2017) examined the influence of risk management practices on IT project performance. Their study used a descriptive research design, targeting 200 IT professionals, and found that risk transfer strategies, including high-risk premiums and outsourcing, positively affected IT project outcomes. However, the study

did not address the potential downsides of outsourcing, such as dependency on third parties or the risks associated with data security. This leaves a gap in understanding the balance between the benefits and drawbacks of risk transfer strategies in the IT sector.

2.1.4 Risk Retention Strategy and Mitigating Cost Overruns

Risk retention strategies are increasingly recognized for their role in mitigating cost overruns in various sectors, particularly construction and infrastructure projects. Recent empirical studies highlight how these strategies allow firms to manage and absorb potential losses while minimizing project disruptions. Mwangi and Muturi (2019) conducted a study in Nairobi, Kenya, focusing on the construction sector's risk management practices. The study adopted a descriptive research design and surveyed 120 respondents, including project managers, contractors, and consultants. The findings indicated that risk retention strategies, such as setting aside contingency funds and maintaining reserves for unforeseen costs, positively influenced the control of cost overruns. Projects that implemented self-insurance mechanisms effectively minimized budget deviations. However, the study noted that a lack of proper planning for retained risks could result in unplanned financial burdens for some firms, indicating a gap in optimal implementation.

Naktari (2019) conducted a study in West Pokot to investigate the effect of humanitarian risk management strategies on NGOs. Using a descriptive research methodology, the study targeted humanitarian NGOs in the region. Data was collected through structured questionnaires and analyzed using descriptive statistics and content analysis. The findings revealed that NGOs adopted contingency plans, crisis management, and disaster recovery plans to manage risks like financial, operational, and hazard-related risks. However, the study did not explore the long-term effectiveness of these risk management

strategies, leaving a gap in understanding how NGOs in other regions with different challenges might implement similar strategies.

Kihara, Musau, and Otieno (2020) conducted research on infrastructure projects in Mombasa, Kenya, to assess the effectiveness of risk retention strategies in reducing financial risks. The study, which used a cross-sectional survey design and included 85 infrastructure project managers, found that organizations that adopted risk retention mechanisms such as self-insurance and contingency planning experienced fewer instances of cost overruns compared to those that relied on external risk transfer. The study concluded that retained risks, when effectively managed, helped stabilize project costs. However, it identified a gap in the strategic alignment of risk retention with broader project management practices, which could limit its effectiveness.

Ubani et al. (2018) examined risk management practices in Nigeria's construction industry, using a case study design. The study targeted contractors, clients, and consultants, with a sample size of 84 respondents. Data was gathered through questionnaires and analyzed using SPSS. The study found that construction firms adopted risk retention strategies, such as self-insurance after evaluating potential losses and costs, which positively impacted firm performance. Despite these insights, the study did not delve into the limitations of risk retention or compare its effectiveness with other risk management strategies, leaving a gap in the broader understanding of how risk retention interacts with other strategies to improve project outcomes.

Aimable, Shukla, and Oduor (2020) focused on risk management methods in construction projects in Rwanda. The study employed a descriptive research design, targeting 291 project team members from four districts. Using structured questionnaires, documentary reviews, and in-depth interviews, the study revealed that construction firms used insurance and had detailed crisis management and disaster recovery plans. These

risk retention strategies positively influenced the performance of the projects. However, the study did not address how different types of risks (e.g., financial vs. environmental) are handled under the same risk retention strategies, leaving a gap in understanding how risk retention can be adapted to different project contexts.

Ali, Stewart, and Qureshi (2017) conducted a study in Pakistan to explore risk management practices in the construction industry. The study used a descriptive research design and targeted construction practitioners, managers, and project teams, with questionnaires administered to 40 respondents. Findings indicated that risk retention strategies, such as taking insurance and contingency plans, positively influenced project completion. However, the study did not explore how other risk management strategies, such as risk avoidance and transfer, might interact with risk retention to optimize project performance, creating a gap in the comprehensive assessment of risk management practices in construction projects.

2.3 Theoretical Review

This research study will be guided by risk compensation theory, Resource Based View Theory, Enterprise Risk Management Theory and Prospects Theory.

2.3.1 Risk Compensation Theory

The Risk Compensation Theory was introduced by Gerald Wilde and further developed by John Adams. The theory posits that individuals alter their behavior in response to changes in perceived risk. For example, if people believe that safety measures have reduced their risk of harm, they may compensate by taking greater risks, leading to a potential increase in accidents. This idea is closely tied to the broader concept of risk homeostasis, which Wilde also championed. Wilde's (1994) Risk Homeostasis Theory goes further by suggesting that individuals maintain a constant level of risk, balancing their behavior according to perceived dangers and safety interventions.

One key weakness of Risk Compensation Theory is its assumption that all individuals behave rationally and uniformly in response to perceived changes in risk. The theory oversimplifies human behavior by not accounting for psychological, cultural, and environmental factors that may influence risk perception. Additionally, the theory fails to fully explain instances where safety measures do succeed in reducing accidents and injuries. In certain cases, individuals do not exhibit riskier behavior despite enhanced safety measures, suggesting that other variables, such as individual differences in risk tolerance or the nature of the safety measure, play a significant role (Evans, 1991). This limitation has led some researchers to criticize the theory for underestimating the effectiveness of safety interventions.

Risk Compensation Theory is relevant to Risk Avoidance Strategy and mitigating cost overruns in project management. The theory highlights the importance of considering human behavior when implementing safety measures aimed at reducing project risks. For example, in infrastructure projects, implementing stricter safety regulations or enhanced protective measures may lead workers or managers to take greater risks, assuming they are adequately safeguarded. This behavioral shift could increase the likelihood of accidents or errors, leading to project delays, additional costs, or cost overruns, thus counteracting the intended benefit of the risk avoidance strategy. Therefore, project managers should not only focus on implementing safety measures but also on ensuring that these measures are accompanied by continuous education and monitoring to mitigate the risk of behavioral changes that could lead to increased costs (Hedlund, 2000). A comprehensive risk management plan should incorporate strategies that consider the possibility of risk compensation to prevent the undermining of cost control efforts.

2.3.2 Resource-Based View

The Resource-Based View (RBV) theory, introduced by Barney (1991), posits that an organization's competitive advantage stems from its unique internal resources, which are difficult for competitors to imitate. Rather than relying solely on external market conditions, organizations should focus on their internal strengths—such as capabilities, assets, and knowledge—that provide long-term sustainability. According to RBV, if these internal resources are effectively harnessed, they can position an organization to outperform competitors by creating and maintaining a competitive advantage.

RBV emphasizes that an organization's resources are heterogeneous (unique to the organization) and immobile (cannot easily be transferred or replicated by competitors). These resources may include brand reputation, financial strength, employee expertise, and robust partnerships, which together allow the organization to manage risks better and execute successful strategies (Tate & Bals, 2018). The application of RBV also suggests that risk management decisions, such as retaining or sharing risks, depend on the availability and adequacy of the organization's internal resources (Clarke & MacDonald, 2019). By leveraging these internal assets, organizations can reduce exposure to risks and associated cost overruns in projects, enhancing their ability to meet project objectives.

In relation to risk reduction strategies, the RBV theory is highly relevant. When organizations use their internal resources effectively—such as strong financial management systems, skilled project teams, or advanced technology—they can minimize potential risks in project execution. For instance, a firm with robust logistical capabilities may reduce the risk of delays in project delivery, thereby preventing cost overruns. This approach aligns with the RBV principle that valuable resources enable firms to mitigate risks and capitalize on market opportunities (Barney, 2001). By focusing on internal resources, companies can implement strategies that reduce the likelihood of risks

escalating into significant issues, ensuring that projects are completed within budget and on time.

Thus, RBV's emphasis on leveraging internal resources underscores the importance of resource assessment in risk reduction strategies. Projects that utilize organizational strengths, such as expertise, technology, or financial reserves, are more likely to avoid unforeseen costs and enhance their overall performance (Grant, 2002). However, a key limitation of RBV is that it does not account for external market dynamics, which may affect project performance even when internal resources are well-managed. Therefore, while RBV provides a solid foundation for managing risks and cost overruns, it should be complemented by external environmental analyses to ensure comprehensive risk management.

2.3.3 Enterprise Risk Management Theory

Enterprise Risk Management (ERM) Theory, as articulated by Nocco and Stulz (2006), advocates for a holistic and integrated approach to managing risk within an organization. Rather than managing risks in isolated silos, ERM emphasizes the importance of viewing and addressing all risks collectively across the entire entity. The theory suggests that involving senior executives, managers, and employees at all levels is essential to identify, assess, and respond to the various risks that an organization might face. In doing so, ERM creates a comprehensive framework where risk management becomes a shared responsibility, promoting a culture where all stakeholders are empowered to mitigate risks effectively.

ERM theory also highlights the importance of establishing clear policies and processes that outline risk appetite, tolerance levels, and strategic objectives for managing risk (Hallowell et al., 2013). This comprehensive approach to risk management helps

organizations enhance their ability to identify potential risks, analyze their impacts, and develop mitigation strategies that are aligned with the organization's overall goals. Olson and Wu (2010) further suggest that when organizations formalize their risk management policies, they improve their capacity to manage risks more effectively, boosting stakeholder confidence and contributing to long-term sustainability. ERM also emphasizes the development of a risk management culture where all members are accountable for managing risks, thereby creating a proactive environment for minimizing potential hazards.

In project management, particularly in high-risk industries like construction, the adoption of ERM principles helps organizations identify risks early on and determine the most appropriate response, such as transferring the risk to a third party (e.g., through insurance or contractual agreements). By transferring risk, organizations protect themselves from the financial impact of unforeseen events, which could otherwise lead to cost overruns. This approach aligns with ERM's holistic view of risk management, ensuring that risk transfer decisions are part of an integrated strategy rather than isolated actions. As Cormican (2015) points out, embracing ERM practices can lead to greater competitive advantage, stronger stakeholder confidence, and overall project success, particularly in industries prone to significant risks.

Thus, in mitigating cost overruns, the ERM theory's focus on comprehensive risk management and the involvement of all organizational stakeholders is crucial. The transfer of risks to external parties, as encouraged by ERM, helps organizations manage financial uncertainty and stay within project budgets. In industries such as construction, where the failure to manage risks properly can result in substantial financial losses, ERM provides a valuable framework for ensuring that risks are addressed systematically and strategically to prevent cost overruns.

2.3.4 Prospects Theory

Prospect Theory, developed by Tversky and Kahneman (1979), provides insight into decision-making under conditions of risk and uncertainty. The theory focuses on how individuals and organizations make choices when confronted with risky or uncertain situations. It emphasizes two key phases of decision-making: the framing phase and the evaluation phase. During the framing phase, the way a choice is presented or "framed" affects how the decision maker perceives it, influencing their final decision. In the evaluation phase, potential outcomes are assessed in terms of gains and losses relative to a reference point, and decisions are made by assigning values to potential outcomes and weighing them according to their perceived likelihood (Tversky & Kahneman, 1979).

One of the primary weaknesses of Prospect Theory is its focus on descriptive rather than prescriptive insights. While the theory explains how people make decisions under risk, it does not offer guidelines on how to improve decision-making. This limitation can lead to irrational risk retention decisions, especially when project managers rely too heavily on perceived risks rather than factual data (Tversky & Kahneman, 1979). Additionally, Prospect Theory assumes that people are primarily loss-averse and may take excessive risks to avoid losses, which might result in suboptimal decision-making when assessing risks associated with cost overruns (Clarke & MacDonald, 2019). This behavior could result in the retention of risks that are too great for the project to handle effectively. Furthermore, the theory does not account for the complexities of group decision-making, which can impact risk management strategies in large projects where decisions are made collaboratively.

In project management, particularly in managing cost overruns, risk retention involves accepting a certain level of risk when other strategies like transferring or avoiding risk are not feasible. According to Prospect Theory, how project managers frame and evaluate

the decision to retain risk can significantly influence their approach. For example, if retaining risk is framed in terms of potential losses (e.g., financial impact), project managers may weigh those risks more heavily compared to framing the decision in terms of potential gains (e.g., cost savings from not transferring the risk) (Tversky & Kahneman, 1979). Therefore, the decision to retain risk is shaped by perceptions of the organization's ability to manage the risk, and this can determine whether the risk is effectively controlled, ultimately affecting project costs (Clarke & MacDonald, 2019).

Prospect Theory also highlights the subjective nature of risk evaluation, where decision-makers rely on perceived likelihoods and personal experiences rather than objective probabilities. This subjectivity is particularly relevant to risk retention strategies, as project managers often rely on their intuition and experience when deciding whether to retain risks. In managing cost overruns, effective risk retention requires accurately assessing the probability and impact of potential risks. If project managers underestimate the likelihood of a risk materializing, retained risks may lead to substantial cost overruns. Conversely, overestimating risks could result in excessive mitigation efforts, unnecessarily increasing project costs (Barney, 2001). By applying the principles of Prospect Theory, project managers can better evaluate and manage retained risks, ensuring that decisions minimize the likelihood of cost overruns.

2.4 Conceptual Framework

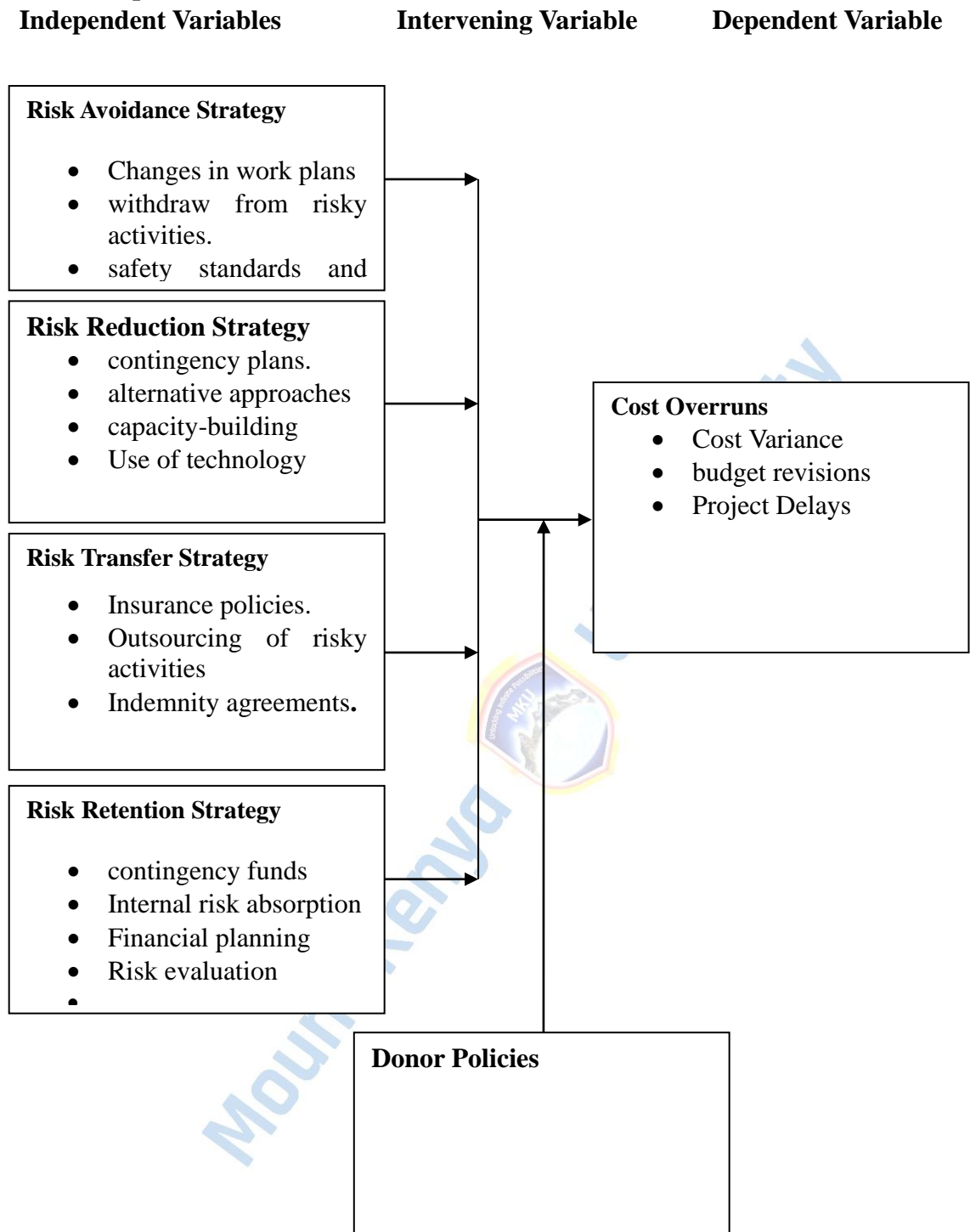


Figure 1: Conceptual Framework

Source: Researcher, 2025

In this conceptual framework, the independent variables refer to the different risk management strategies that organizations may adopt to influence project outcomes.

These strategies include:

2.4.1 Risk Avoidance

Risk avoidance is a proactive risk management approach aimed at eliminating potential risks before they can affect a project. This strategy involves altering project plans or processes to steer clear of activities or conditions that are likely to lead to risks. For example, a project team might decide against using new, untested technologies in favor of established, reliable alternatives to avoid the uncertainties associated with the former. Indicators of risk avoidance include the thoroughness of pre-emptive risk assessments conducted before project initiation and the extent to which project scopes or activities are adjusted to avoid identified risks. Another indicator is the selection of low-risk alternatives during the planning phase. While risk avoidance can significantly reduce the likelihood of encountering problems, it may also limit innovation and result in higher initial costs due to the preference for safer, albeit potentially more expensive, options.

2.4.2 Risk Reduction

Risk reduction focuses on minimizing the impact or likelihood of risks that cannot be entirely avoided. This strategy involves implementing various measures to manage risks more effectively and reduce their potential severity. For instance, in construction projects, this could include regular safety inspections, maintenance schedules, and the adoption of quality assurance practices to identify and address issues early. Indicators of risk reduction are the implementation of safety measures, such as enhanced protocols and procedures designed to mitigate risks, and the frequency and scope of training programs aimed at improving risk management skills. Another key indicator is the existence and quality of contingency plans prepared to deal with potential issues. By employing risk reduction strategies, organizations can manage risks more effectively, thereby minimizing their impact on project costs.

2.4.3 Risk Transfer

Risk transfer involves shifting the responsibility for risk to a third party, often through insurance or contractual agreements. This strategy is employed to mitigate the financial burden associated with risks by transferring it to external entities. For example, a construction company might purchase insurance to cover potential damage or delays, or it might include indemnity clauses in contracts to ensure that subcontractors bear responsibility for specific risks. Indicators of risk transfer include the extent and adequacy of insurance coverage obtained to cover various risks, the presence of indemnity clauses in contracts, and the use of outsourcing arrangements to delegate certain project risks to specialized firms. While risk transfer can effectively protect an organization from significant financial losses, it may also lead to increased costs for insurance premiums or contractual obligations.

2.4.4 Risk Retention

Risk retention involves accepting and managing risks internally, rather than avoiding, reducing, or transferring them. This strategy is often used when the costs of other risk management strategies are higher than the potential impact of the risks. For example, a company might decide to self-insure for certain risks or handle minor issues internally rather than purchasing insurance. Indicators of risk retention include the level of financial reserves set aside to cover potential losses, the extent of internal risk management practices implemented, and the frequency of risk reviews and assessments conducted internally. While risk retention can be cost-effective, it requires a strong financial base and effective internal risk management processes to ensure that risks are adequately handled without significantly impacting the project's budget.

The intervening variables in a conceptual framework are those that mediate or influence the relationship between the independent and dependent variables. They represent factors that may modify the effect of the independent variables on the dependent variable. For example, in the context of risk management and cost overruns, organizational culture, project complexity, or regulatory compliance could serve as intervening variables. These factors may affect how well risk strategies are implemented and, consequently, how they influence project costs. While risk strategies might be well-designed, the success of their implementation may depend on these intervening factors.

2.4.5 Cost Overruns

The dependent variable in this framework is cost overruns, which refer to the extent to which project costs exceed the initial budget estimates. This is the key outcome being influenced by the risk management strategies. The aim of the study would likely be to assess how each risk strategy affects cost overruns, either reducing or exacerbating them depending on how the risks are managed. For example, successful risk avoidance might prevent cost overruns by ensuring that high-risk activities are avoided, while poor risk transfer arrangements could lead to unexpected costs.

2.5 Recap of Empirical Literature and Research Gaps

Recent studies have underscored the effectiveness of risk avoidance strategies in controlling cost overruns across various sectors. Mwangi et al. (2022) investigated public infrastructure projects in Nairobi, Kenya, revealing that thorough planning, stakeholder engagement, and avoiding overly ambitious scopes significantly mitigated cost overruns. The study also highlighted a gap in integrating risk management software, suggesting that technological enhancements could improve strategy effectiveness. Wabomba (2020) focused on International Development Organizations, finding that risk avoidance tactics such as adjusting work plans and regular inspections were crucial in reducing costs.

Similarly, Weingarten et al. (2021) observed that detailed planning and contingency measures positively impacted supply chain performance in stationery firms. Aimable et al. (2020) found that in Rwanda, strategies like detailed work plans and safety inspections improved construction project performance. Ahmed and Hassan (2021) and Jean et al. (2023) also supported these findings, indicating that avoiding complex designs and complying with regulations were effective but noted gaps in addressing external factors like inflation. Overall, these studies collectively emphasize the importance of proactive planning and the integration of advanced tools to fully realize the benefits of risk avoidance strategies.

Empirical research highlights that risk reduction strategies play a pivotal role in mitigating cost overruns. Okumu and Wanjira (2017) examined motor insurance firms in Kenya, finding that practices such as risk control meetings and quality assurance positively influenced firm performance. Mokaya and Njenga (2021) explored geothermal power projects in Kenya, showing that regular monitoring and robust management software reduced cost overruns but revealed inconsistencies in strategy implementation. Kumar et al. (2022) found that continuous staff training and detailed documentation were effective in India's road construction sector, though they noted a gap in using advanced risk reduction tools.

Aimable, Shukla, and Oduor (2020) observed similar trends in Rwanda's construction sector, where identifying and quantifying risks were key to improving project outcomes. Ubani et al. (2018) reported that risk reduction strategies like adjusting work plans and timely decisions enhanced project performance in Nigeria. Mbele and Jacobs (2023) further supported these findings in South Africa's water sector, though they highlighted the need for strategies to address external risks. These studies collectively suggest that

risk reduction strategies, particularly when integrated with advanced tools and consistent implementation, are crucial in managing project costs effectively.

Research on risk transfer strategies indicates their significant impact on managing project costs. Aduma and Kimutai (2018) studied the National Hospital Insurance Fund (NHIF) in Nairobi, finding that outsourcing and contractual agreements positively affected project performance. Nsiah and Bonnah (2019) highlighted that risk transfer through contracts and insurance improved bank performance in Ghana, although their focus on rural banks limits broader applicability. Kolo (2020) found that insurance policies and risk premiums positively impacted construction projects in Nigeria but did not explore the role of other risk management strategies. Pimchangthong and Boonjing (2017) observed that risk transfer strategies, including high-risk premiums and outsourcing, improved IT project outcomes but did not address potential downsides like dependency on third parties. These studies emphasize that while risk transfer strategies can effectively mitigate financial risks, understanding their limitations and integrating them with other strategies is essential for comprehensive risk management.

Empirical literature highlights the role of risk retention strategies in managing cost overruns. Mwangi and Muturi (2019) found that contingency funds and self-insurance mechanisms positively impacted cost control in Nairobi's construction sector, though gaps in planning for retained risks were noted. Naktari (2019) reported that contingency plans and crisis management were effective for NGOs in West Pokot, but long-term effectiveness remained unexplored. Kihara, Musau, and Otieno (2020) showed that self-insurance and contingency planning stabilized costs in Mombasa's infrastructure projects, though strategic alignment with broader practices was a concern. Ubani et al. (2018) observed that self-insurance positively impacted performance in Nigeria's construction sector, but the study did not compare risk retention with other strategies.

Aimable, Shukla, and Oduor (2020) noted that detailed crisis management plans improved project performance in Rwanda but did not differentiate between types of risks. Ali, Stewart, and Qureshi (2017) highlighted the positive impact of self-insurance and contingency plans in Pakistan's construction industry but did not explore interactions with other risk management strategies. These studies suggest that risk retention can be effective when managed well, but optimal implementation and integration with other strategies are crucial for minimizing cost overruns.



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlines the research methodology that was employed to investigate the effectiveness of risk management strategies on mitigating cost overruns in infrastructure projects at Chemususu Water Company, Kenya. It details the research design, target population, sampling techniques, data collection methods, and data analysis procedures. The methodology is structured to ensure that the research objectives are systematically addressed, employing appropriate techniques to gather, analyze, and interpret data. The chapter also explains the ethical considerations associated with the study, ensuring the research is conducted with integrity and reliability.

3.1 Research Methodology

This study adopted a quantitative research methodology to evaluate the effectiveness of risk management strategies on mitigating cost overruns in infrastructure projects at Chemususu Water Company, Kenya. The quantitative approach was appropriate because it allowed for systematic collection and statistical analysis of numerical data to test relationships between the independent variables (risk avoidance, risk reduction, risk transfer, and risk retention strategies) and the dependent variable (cost overruns).

3.2 Research Design

This study employed a descriptive research design, which is suitable for systematically describing the characteristics of the risk management strategies employed by Chemususu Water Company in mitigating cost overruns. Descriptive research design is ideal for this study because it allows for the collection of detailed data from a large population to observe and document current practices, behaviors, and outcomes without influencing

the variables (Kothari, 2004). By using this design, the study was able to identify patterns, correlations, and trends related to risk management strategies and cost overruns, providing insights into how these strategies are applied in real-world project management settings. Descriptive survey attempts to describe characteristics of subjects, phenomena, opinions, attitudes, preference and perceptions of interest to the researcher. It also aims at obtaining information from a representative of a whole (Bell, 1993).

3.3 Location of the Study

The study was conducted at Chemususu Water Company, located in Baringo County, Kenya. Baringo County, situated in the Rift Valley region, is characterized by diverse topography, including highlands and lowlands, and is recognized for its vital water resources, such as the Chemususu Dam. The dam plays a crucial role in water storage and supply to local communities, making the region highly dependent on water infrastructure projects for sustainable development. Chemususu Water Company is central to these efforts, managing key water infrastructure that serves both urban and rural populations in this semi-arid area (County Government of Baringo, 2022). Given the importance of water projects in the region, this location provides an ideal setting to study the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects.

3.4 Target Population

The target population for this study consisted of all individuals involved in the infrastructure projects managed by Chemususu Water Company in Baringo County, Kenya. This includes project managers, engineers, procurement officers, financial officers, contractors and community representatives. These individuals are directly involved in decision-making processes related to risk management and are therefore vital in providing insights into the effectiveness of risk management strategies, such as risk

avoidance, reduction, transfer, and retention, in mitigating cost overruns. The diverse roles represented in this population ensure a comprehensive understanding of the various factors influencing project management (Mugenda & Mugenda, 2003).

Table 1: Target Population

Population	Sampling Frame	Percentage
Project Managers	4	5%
Engineers	4	5%
Procurement Officers	2	2.5%
Finance Officers	2	2.5%
Contractors	22	27.5%
Community Representative	46	57.5%
Total	80	100%

Source: Chemususu Human Resource Registry (2024)

3.5 Sampling Procedures and Techniques

The study adopted a census approach, including all Project Managers, Engineers, Procurement Officers, Finance Officers, Contractors, and Community Representatives, as detailed in the target population table. This approach is justified due to the relatively small size of the population (N=80), making a census method feasible. Saunders, Lewis, and Thornhill (2016) argue that a census is appropriate for small populations as it eliminates sampling error and ensures that all units are represented in the data collection. Metsamuuronen (2017) also supports the use of census sampling in small populations because it provides accurate and reliable data by involving every individual in the population. This method ensures that the study captures comprehensive insights from all relevant stakeholders.

3.6 Data Collection Instrument

In this study, data collection was conducted using closed-ended questionnaires, specifically employing a Likert scale. Closed-ended questionnaires are an effective data collection tool due to their ability to gather quantifiable data efficiently. These questionnaires offer respondents a fixed set of options to choose from, which allows for standardized responses and facilitates easier analysis. According to Saunders et al. (2016), closed-ended questions are ideal for descriptive research as they help capture specific opinions and attitudes, particularly when addressing various variables such as risk management strategies and their effect on cost overruns. Moreover, using this type of questionnaire enables researchers to collect data from a large sample within a short period, which increases the reliability and generalizability of the findings.

The Likert scale is included in the closed-ended questionnaires to assess respondents' attitudes or perceptions on various statements related to risk avoidance, risk reduction, risk transfer, and risk retention strategies. This scaling method is suitable because it allows respondents to express their level of agreement or disagreement on a range of options (e.g., strongly agree to strongly disagree), which helps to quantify subjective data (Joshi et al., 2015). Furthermore, the Likert scale enhances the ability to measure the intensity of respondents' views, making it useful for understanding the effectiveness of different risk management strategies in mitigating cost overruns. Its versatility and ease of interpretation justify its selection as a key component of the questionnaire design.

3.7 Pilot Study

A pilot study was conducted involving 10% of the target respondents from Kerandich Water Company to assess the reliability and validity of the questionnaire. Data collected from 10 respondents was analyzed using SPSS Version 22 to determine the reliability coefficient. The questionnaires were administered, and participants were encouraged to

provide feedback on the clarity of instructions, relevance of the questions, and overall comprehensibility. This feedback was utilized to enhance the clarity, relevance, and reliability of the items in the questionnaire, ensuring that it is well-suited for the main study.

3.7.1 Validity of the Instrument

As defined by Mugenda and Mugenda (2003), validity refers to the accuracy and meaningfulness of the inferences drawn from research results. It represents the extent to which the data collected truly reflects the phenomenon under investigation. To ensure content validity, the questionnaire underwent pilot testing with 10 respondents from Kerandich Water Company. This process helped determine whether the instrument performs as expected and provides meaningful feedback for adjustments. The pilot results were used to refine the questionnaire and optimize logistical planning for the main study.

3.7.2 Reliability of the Instrument

According to Mugenda and Mugenda (2003), reliability refers to the consistency of the results produced by a research instrument. In this study, reliability was measured using the test-retest technique to assess the internal consistency of the questionnaire items. Test-retest reliability measures the degree to which the results remain consistent over time. This method helps identify errors caused by variations in testing conditions or measurement errors. To enhance reliability, conditions under which the questionnaire is administered were standardized, and research assistants received comprehensive training on how to conduct the survey properly.

3.8 Data Collection Procedure

A data collection approval letter was obtained from the administration of Mount Kenya University before proceeding to the field. In addition, a research permit was acquired

from the National Commission for Science, Technology, and Innovation (NACOSTI). The drop-off and pick-up (DOPU) technique was employed in this study. Participants were given two weeks to complete the closed-ended questionnaires, after which the research instruments were collected. The DOPU method is considered appropriate due to the busy schedules of the participants, allowing them sufficient time to respond at their convenience. Respondents were requested to answer the questionnaires honestly, with the assurance that strict confidentiality was maintained, particularly concerning their identities.

3.9 Data Analysis Techniques

Data collected from the field was analyzed using both quantitative and qualitative techniques, with the assistance of SPSS version 22. Data obtained from the closed-ended questionnaires was edited, coded, and analyzed using descriptive and inferential statistics. Descriptive statistics included measures such as mean, frequency distribution, percentages, and standard deviation. A multivariate regression model was utilized to assess the relative significance of the risk management strategies on mitigating cost overruns in infrastructure projects at Chemususu Water Company. Multiple regression analysis is particularly suitable in this study, as it allows for the assessment of the relationship between the dependent variable (cost overruns) and several predictor or independent variables (risk management strategies). The regression model for this study was structured as follows;

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Whereby: Y = Cost Overruns

α = y-intercept (Constant)

$\beta_1 - \beta_4$ = Beta coefficient of the independent variable

X1 = Risk Avoidance

X2 = Risk Reduction

X3 = Risk Transfer

X4 = Risk Retention

ε = error term

3.10 Ethical Considerations

The researcher considered the rules and etiquette while undertaking the study. Respect for Human Rights: Respect for human rights implies that all research participants should be treated with respect and dignity, free from coercion and exploitation. (Council on Ethical and Judicial Affairs, 2001) Informed Consent: Informed consent requires that research participants be provided with sufficient information to make an informed decision about their participation in the research. (Beauchamp & Childress, 2009) Confidentiality: Confidentiality requires that the information collected from research participants be kept confidential and used only for the purposes of the research. (Beauchamp & Childress, 2009). Risk Management: Risk management requires that researchers take reasonable steps to minimize the potential risks of their research and ensure the safety of their participants. (Council on Ethical and Judicial Affairs, 2001) References Beauchamp, T.L., & Childress, J.F. (2009). Research participants should not be subjected to harm in any whatsoever. To avoid Plagiarism, the researcher used a plagiarism tool checker to check plagiarism before submitting proposal paper.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION OF FINDINGS

4.0 Introduction

The primary objective of this study was to evaluate the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects undertaken by Chemususu Water Company, Kenya. Specifically, the study sought to determine the influence of risk avoidance strategies, establish the influence of risk reduction strategies, examine the influence of risk transfer strategies, and assess the influence of risk retention strategies on the mitigation of cost overruns. The findings of the study are presented and discussed in the subsequent sections.

4.1 Response Rate

The response rate refers to the percentage of questionnaires that were completed and returned out of the total number distributed. In this study, the target population consisted of 80 individuals involved in infrastructure projects managed by Chemususu Water Company in Baringo County, Kenya, including project managers, engineers, procurement officers, financial officers, contractors, and community representatives. As shown in Table 2, 68 questionnaires were successfully completed and returned, resulting in a response rate of 85%. According to Babbie (2010), a response rate of 70% and above is considered very good for social science research. Therefore, the achieved response rate was excellent and deemed sufficient for data analysis.

Table 2: Response Rate

Response Rate	Frequency	Percent
Returned Questionnaires	68	85%
Unreturned Questionnaires	12	15%
Total	80	100%

Source: Survey Data (2025)

4.1.1 Reliability of Study Variables

The study sought to find out the reliability of the study instrument. This was important to ensure that study findings are reliable.

Table 3: Reliability Results

Variable	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
Risk avoidance strategy	0.713	0.728	8
Risk reduction strategy	0.742	0.755	8
Risk transfer strategy	0.769	0.774	8
Risk retention strategy	0.785	0.793	8
Mitigating Cost Overruns	0.725	0.731	8

Source: Survey Data (2025)

The reliability results for the variables in this study, as indicated by the Cronbach's Alpha values, show strong internal consistency across all constructs. The Risk avoidance strategy (0.713), Risk reduction strategy (0.742), Risk transfer strategy (0.769), and Risk retention strategy (0.785) all exhibit Cronbach's Alpha values above the accepted threshold of 0.7, indicating that the items measuring these strategies are reliable. Similarly, the Mitigating Cost Overruns variable also demonstrated good reliability with a Cronbach's Alpha of 0.725. These values, along with the slightly higher Cronbach's Alpha based on standardized items, further affirm that the measurement scales used in this study are consistent and appropriate for data analysis, ensuring the reliability of the findings related to risk management strategies in infrastructure projects at Chemususu Water Company.

4.2 Demographic Characteristics

This section presents the demographic information of the participants in the study. In social science research, gathering background details about the participants is essential as it helps in classifying them into various categories. The study gathered data on factors such as gender, age, work experience, and educational background, which are further elaborated in the following sections.

4.2.1 Distribution of the Respondents Based on the Gender

The demographic results regarding gender indicate that 58% of the respondents in the study were male, while 42% were female. This distribution provides a relatively balanced representation of both genders, although there is a slight male majority. Including gender as a demographic variable is important in this study because it helps to understand potential differences or similarities in the experiences, perceptions, and responses of male and female participants regarding risk management strategies and mitigating cost overruns in infrastructure projects. Gender can influence how individuals' approach and perceive various aspects of project management, and understanding these variations can provide valuable insights into the effectiveness of risk management strategies in a diverse workforce. Additionally, gender data allows for the identification of any gender-specific challenges or opportunities that may exist in the context of Chemususu Water Company's infrastructure projects. This demographic information is crucial for ensuring that the findings are comprehensive and reflective of the experiences of both male and female participants.

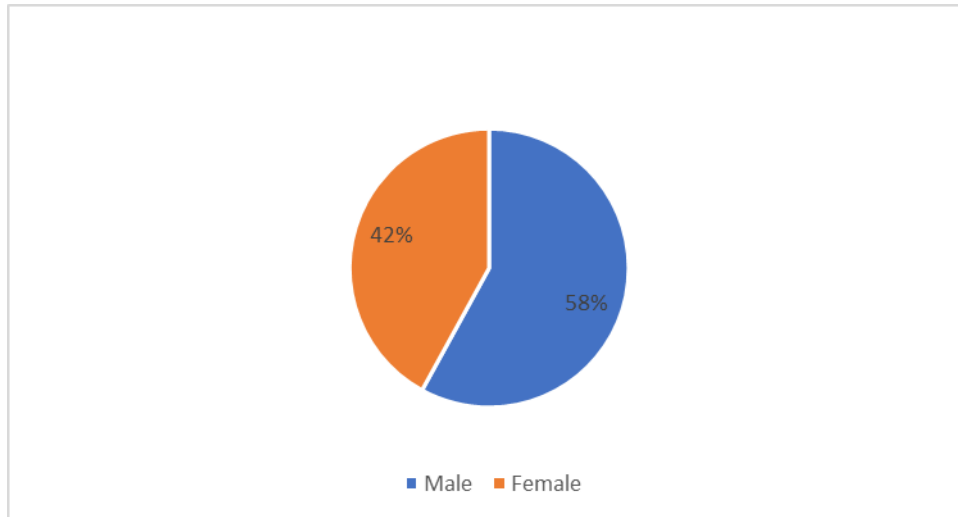


Figure 2: Gender

Source: Survey Data (2025)

4.2.2 Distribution of the Respondents Based on Age Bracket

The demographic results on age indicate that 12% of the respondents were below 20 years, 21% were aged between 21 and 29 years, 26% fell within the 30 to 39 years age bracket, 24% were between 40 and 49 years, and 17% were above 50 years. These results show that a majority of the participants were within the 30–49 years range, suggesting that most respondents were mature and likely had significant work experience in infrastructure projects. It was important to ask about the age of respondents because age often correlates with levels of experience, decision-making approaches, and perspectives on risk management strategies. Older and more experienced individuals may have deeper insights into cost overruns and how best to mitigate them, while younger participants may bring fresh perspectives and innovative approaches. Understanding the age distribution helps ensure that the study captures a wide range of experiences and opinions, which enriches the analysis and provides a more comprehensive understanding of risk management practices at Chemususu Water Company. This is shown in figure 3 below

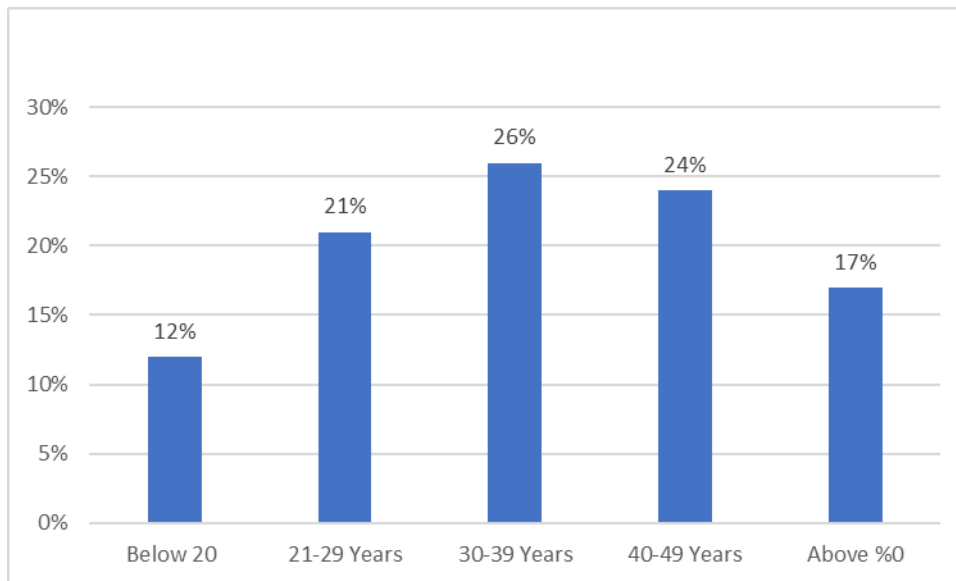


Figure 3: Age Distribution

Source: Survey Data (2025)

4.2.3 Distribution of the Respondents Experience

The findings on work experience reveal that 24% of the respondents had between 0–5 years of experience, 30% had 6–10 years, 27% had 11–15 years, and 19% had over 16 years of experience. This distribution shows that the majority of participants (about 76%) had more than five years of experience, indicating that most respondents had substantial exposure to infrastructure project management processes. It was important for the study to assess the respondents’ work experience because experience often influences how individuals understand and handle project risks, cost control measures, and decision-making processes. Those with more years in the field are likely to have encountered various risk management challenges and solutions, making their insights particularly valuable for evaluating the effectiveness of different risk management strategies. Additionally, capturing a range of experience levels ensures that the study considers both the perspectives of newer and seasoned professionals, enriching the findings and recommendations for Chemususu Water Company’s infrastructure projects.

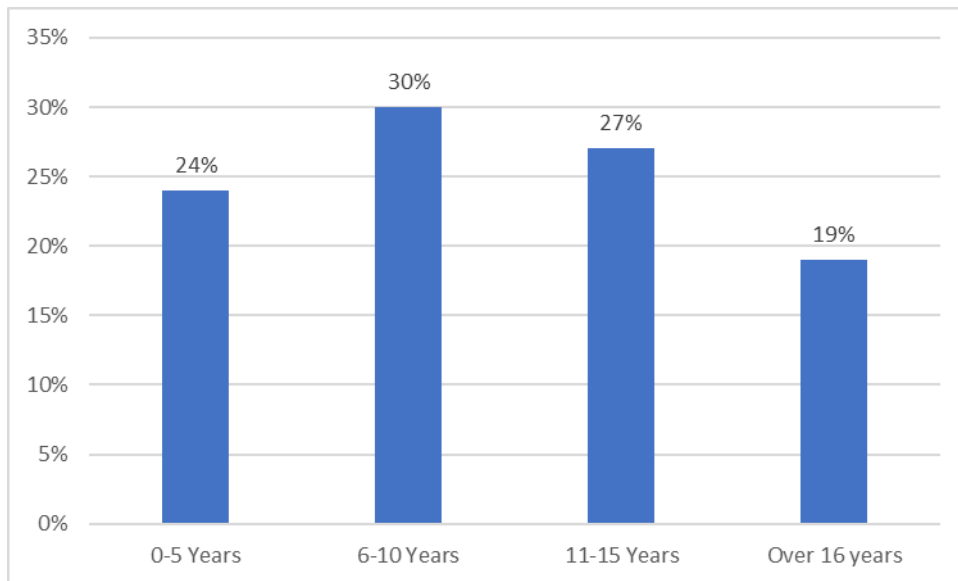


Figure 4: Work Experience

Source: Survey Data (2025)

4.2.4 Distribution of the Respondents Based on Level of Education

The results on the level of education indicate that 9% of the respondents had attained K.C.S.E (Kenya Certificate of Secondary Education) qualifications, 27% held a diploma, 39% had a degree, and 25% possessed a postgraduate qualification. These findings show that the majority of the respondents (64%) had at least a degree or higher education level, suggesting that most participants were well-educated and likely had the technical and professional skills necessary for managing infrastructure projects. It is important to assess the education level because higher educational qualifications are often associated with better knowledge of project management principles, risk management strategies, and financial controls. Understanding the education profile of respondents helps in determining the credibility and depth of the information they provide, ensuring that the study's findings on mitigating cost overruns are informed by individuals with the academic background to comprehend and apply complex project management strategies effectively.

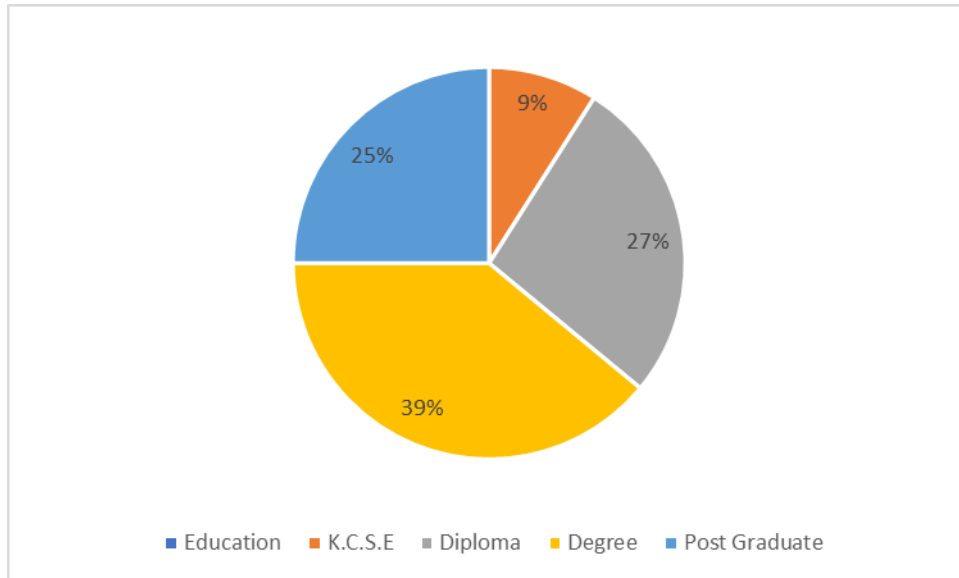


Figure 5: Level of Education

Source: Survey Data (2025)

4.3 Descriptive Findings and Discussions

Section 4.4 presents the descriptive findings and discussions aligned with the study's objectives, which focus on evaluating the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects at Chemususu Water Company, Kenya. This section provides a summary of the results, analyzed using measures of central tendency (means) and measures of dispersion (standard deviations). The analysis was based on responses collected through a five-point Likert scale, where 1 represents "Strongly Disagree," 2 denotes "Disagree," 3 indicates "Undecided," 4 means "Agree," and 5 signifies "Strongly Agree." The findings are presented in relation to the four key objectives: assessing the influence of risk avoidance, risk reduction, risk transfer, and risk retention strategies on mitigating cost overruns.

4.3.1 Statements relating to Risk Avoidance Strategy on Mitigating Cost Overruns

The respondents were asked to indicate whether Risk Avoidance Strategy affected cost overruns in infrastructure projects at Chemususu Water Company, Kenya. The results are indicated by Table 4.

Table 4: Risk Avoidance Strategy on Mitigating Cost Overruns

	N	Min.	Max.	Mean	Std. Dev.
Risk avoidance strategies are consistently applied in infrastructure projects in our company	68	2	5	4.76	.831
Risk avoidance strategies have significantly reduced the occurrence of unforeseen expenses in infrastructure projects.	68	1	5	3.21	.927
Early identification and elimination of potential risks contribute to successful project completion within budget.	68	2	5	4.97	.742
Adequate resource allocation and contingency planning effectively mitigate cost overruns in infrastructure projects.	68	2	5	3.14	.832
Strict adherence to risk avoidance protocols has resulted in fewer instances of financial overruns in infrastructure projects	68	2	5	4.33	.801

Source: Survey Data (2025)

The findings in Table 4 illustrate respondents' perceptions of how risk avoidance strategies influence cost management in infrastructure projects at Chemususu Water Company. A high level of agreement was recorded regarding the consistent application of risk avoidance strategies, reflected in a mean score of 4.76 and a standard deviation of 0.831. This suggests that such strategies are well-integrated into project management practices within the company. The relatively low variability in responses indicates a shared understanding among staff about the importance and regular use of these approaches. There was near-unanimous agreement that early identification and elimination of potential risks contribute to successful project completion within budget, as evidenced by a mean of 4.97 and a standard deviation of 0.742. These results highlight

the critical role of proactive risk planning in minimizing disruptions and maintaining financial discipline in project execution.

In contrast, opinions were more mixed regarding whether risk avoidance strategies have significantly reduced unforeseen expenses. This aspect received a mean of 3.21 with a standard deviation of 0.927, suggesting that while some respondents observed positive outcomes, others were uncertain or did not perceive a strong impact. The variation may stem from differences in project complexity or the nature of risks encountered. Views on the effectiveness of resource allocation and contingency planning in mitigating cost overruns were similarly moderate, with a mean of 3.14 and standard deviation of 0.832. These findings may indicate challenges in ensuring sufficient budgeting for contingencies or limitations in the practical application of such plans during project execution. Finally, there was strong support for the idea that strict adherence to risk avoidance protocols leads to fewer financial overruns. This is supported by a mean of 4.33 and a standard deviation of 0.801, implying that disciplined implementation of risk management procedures has a measurable effect on cost control.

The findings align with those of Wabomba (2020), who established that risk avoidance strategies such as adjusting work plans, regular inspections, and staff training significantly improved cost control and project performance in International Development Organizations in Nairobi. This supports the current study's high mean scores indicating that early identification and elimination of risks (mean = 4.97) and consistent application of avoidance strategies (mean = 4.76) contribute to mitigating cost overruns. Similarly, Weingarten et al. (2021) found that firms employing detailed planning, contingency measures, and alternative approaches experienced enhanced performance, which resonates with the present study's finding that strict adherence to avoidance protocols reduces financial overruns (mean = 4.33). However, the moderate

ratings on the reduction of unforeseen expenses (mean = 3.21) and the effectiveness of contingency planning (mean = 3.14) reflect the literature’s indication that the success of risk avoidance varies depending on implementation depth and organizations.

4.3.2 Statements on Risk Reduction Strategy on Mitigating Cost Overruns

In addition, the respondents were asked to indicate whether Risk Reduction Strategy affected cost overruns in infrastructure projects at Chemususu Water Company, Kenya.

The results are indicated by Table 5.

Table 5: Risk Reduction Strategy on Mitigating Cost Overruns

	N	Min.	Max.	Mean	Std. Dev.
Implementing risk reduction strategies during project execution has significantly reduced cost overruns in infrastructure projects.	68	2	5	3.76	.878
Regular monitoring and evaluation of potential risks help mitigate their impact on project budgets	68	2	5	3.79	.921
Adjusting project scope and timelines based on identified risks helps avoid financial overruns.	68	1	5	3.46	.837
Regular risk assessments and adjustments during project implementation help in maintaining financial discipline	68	1	5	4.12	.921
Proactive risk reduction measures have improved budget adherence in infrastructure projects.	68	1	5	4.77	.816

Source: Survey Data (2025)

The findings in Table 5 indicate that risk reduction strategies play a significant role in mitigating cost overruns in infrastructure projects at Chemususu Water Company. The majority of the respondents strongly agreed that proactive risk reduction measures have improved budget adherence, as shown by a high mean score of 4.77 and a standard

deviation of 0.816. This suggests a shared perception that early and deliberate actions to minimize risks are highly effective in ensuring financial discipline throughout the project cycle. In addition, the respondents also strongly agreed that regular risk assessments and adjustments during project implementation help in maintaining financial discipline, with a mean score of 4.12 and a standard deviation of 0.921. This reflects a recognition of the importance of ongoing evaluation and real-time risk management in keeping projects on track financially.

Similarly, a considerable number of respondents agreed that regular monitoring and evaluation of potential risks help mitigate their impact on project budgets, as shown by a mean of 3.79. This further reinforces the view that continuous risk oversight is essential in preventing cost escalations. On the other hand, while a majority still supported the statement that implementing risk reduction strategies during project execution has significantly reduced cost overruns, the slightly lower mean of 3.76 suggests that the effectiveness of such strategies may vary depending on how systematically they are applied across projects. Moreover, the statement that adjusting project scope and timelines based on identified risks helps avoid financial overruns had the lowest mean score of 3.46, indicating moderate agreement. This suggests that while respondents acknowledge its importance, this strategy may not be consistently implemented, possibly due to practical constraints or rigid project planning frameworks.

The findings of the current study align with those of Mokaya and Njenga (2021), who found that risk reduction strategies such as regular project monitoring, contingency planning, and use of management software significantly minimized cost overruns in Kenya's geothermal power projects. This supports the high agreement among respondents in the present study that proactive measures (mean = 4.77) and regular risk assessments (mean = 4.12) help maintain financial discipline. Similarly, Kumar et al.

(2022) reported that regular risk assessments, staff training, and detailed documentation effectively reduced cost overruns in India’s road construction projects, which resonates with the current finding that regular monitoring mitigates budgetary impacts (mean = 3.79). However, consistent with both studies, the current research also reveals a gap, as reflected by the relatively lower mean (3.46) on adjusting project scope and timelines suggesting, as in the previous literature, that while risk reduction is valued, full implementation, particularly of adaptive and advanced tools, remains a challenge in some infrastructure projects.

4.3.3 Statements relating to Risk Transfer Strategy on Mitigating Cost Overruns

Furthermore, the respondents were asked to indicate whether Risk Transfer Strategy affected cost overruns in infrastructure projects at Chemususu Water Company, Kenya.

The results are indicated by Table 6.

Table 6: Statements relating to Risk Transfer Strategy on Mitigating Cost Overruns

	N	Min	Max	Mean	Std. Dev.
Transferring risks to third-party contractors has helped reduce cost overruns in infrastructure projects	68	1	5	3.89	.937
Using contractual agreements to transfer risks to suppliers or partners has minimized financial risks in projects	68	1	5	3.81	.735
The use of subcontractors to manage specific project risks has led to fewer cost overruns in infrastructure projects.	68	2	5	4.84	.752
Outsourcing high-risk components of the project has effectively mitigated potential cost overruns.	68	1	5	4.45	.941
The implementation of risk transfer mechanisms has improved budget management in infrastructure projects.	68	1	5	3.74	.981

Source: Survey Data (2025)

The findings from Table 6 reveal that the majority of respondents viewed the risk transfer strategy as an effective approach to mitigating cost overruns in infrastructure projects at Chemususu Water Company. A high mean score of 4.84 with a standard deviation of 0.752 indicates that most respondents strongly agreed that using subcontractors to manage specific project risks had significantly contributed to fewer cost overruns. This suggests a strong belief in the value of assigning specialized roles to external parties as a way to manage financial risks effectively. Furthermore, a majority of respondents agreed that outsourcing high-risk components effectively mitigates potential cost overruns, as evidenced by a high mean of 4.45 and a standard deviation of 0.941. This finding implies that strategic outsourcing is perceived as a reliable method for transferring complex or volatile risks away from the core project team, thus supporting better cost control.

Respondents also acknowledged that transferring risks to third-party contractors has helped reduce cost overruns, with a mean score of 3.89, showing moderate to strong agreement. This indicates a general consensus on the positive impact of contractual risk allocation. Similarly, using contractual agreements to transfer risks to suppliers or partners was also viewed positively (mean = 3.81), highlighting the importance of formal mechanisms in reducing the project's financial exposure. Finally, the statement that implementation of risk transfer mechanisms has improved budget management scored a mean of 3.74, suggesting that while the approach is beneficial, its effectiveness may depend on how consistently and strategically these mechanisms are applied. Overall, the findings suggest that risk transfer strategies especially through subcontracting and outsourcing are considered effective by the majority of respondents in managing financial risks and reducing cost overruns in infrastructure projects.

The findings align with those of Nsiah and Bonnah (2019), who found that risk transfer strategies such as contracts and insurance positively impacted performance in Ghana's

banking sector. Similarly, the high mean scores in the present study, particularly on the use of subcontractors (mean = 4.84) and outsourcing high-risk components (mean = 4.45), demonstrate strong support among respondents for transferring risk to external parties to mitigate cost overruns. These results also resonate with Kolo (2020), who established that risk transfer mechanisms, like insurance and risk premiums, improved performance in Nigeria's construction sector, particularly in terms of cost and quality reflecting the current findings on improved budget management (mean = 3.74). Additionally, the results support Pimchangthong and Boonjing (2017), who noted that outsourcing and risk premiums enhanced IT project outcomes, aligning with the current study's indication that outsourcing and contractual risk transfers contribute to cost control. However, just as previous studies noted gaps such as limited exploration of other strategies or potential downsides of outsourcing the relatively moderate mean scores in some areas suggest that while risk transfer is beneficial, it may be more effective when integrated with other complementary risk management approaches.

4.3.4 Statements relating to Risk Retention Strategy on Mitigating Cost Overruns

Additionally, the respondents were asked to indicate whether Risk Retention Strategy affected cost overruns in infrastructure projects at Chemususu Water Company, Kenya. The results are indicated by Table 7.

Table 7: Risk Retention Strategy on Mitigating Cost Overruns

	N	Min.	Max.	Mean	Std. Dev.
The decision to retain certain risks has helped in managing project costs effectively	68	1	5	4.13	.757
By accepting specific risks, the company has been able to avoid excessive costs associated with external risk mitigation measures.	68	1	5	3.78	.972
The company's ability to retain certain risks has improved its financial resilience in infrastructure projects.	68	2	5	4.43	.971
Retaining risks internally has proven to be a cost-effective method for mitigating potential cost overruns	68	1	5	3.84	.852
The company's risk retention policies help maintain control over cost uncertainties during project implementation.	68	2	5	3.38	.875

Source: Survey Data (2025)

The findings from Table 7 highlight the significant role that risk retention strategies play in mitigating cost overruns in infrastructure projects at Chemususu Water Company. A high mean score of 4.43 with a standard deviation of 0.971 indicates that most respondents strongly agree that retaining certain risks has improved financial resilience in infrastructure projects, suggesting that the company sees value in managing risks internally rather than outsourcing them. This aligns with the general belief that retaining risks can help the company build stronger financial resilience to absorb potential cost fluctuations without incurring excessive external costs.

Similarly, the mean score of 4.13 for managing project costs effectively by retaining certain risks shows a positive reception to the cost control benefits of risk retention.

Respondents also moderately agreed that accepting specific risks has helped avoid excessive external mitigation costs, reflected in a mean of 3.78, suggesting that retaining certain risks is seen as a viable alternative to more costly external risk management measures.

On the other hand, the mean score of 3.84 for retaining risks internally as a cost-effective method indicates that while respondents generally see this strategy as beneficial, there may be some reservations regarding its consistency or effectiveness in all cases. The lowest mean score of 3.38 for risk retention policies maintaining control over cost uncertainties points to a slight ambivalence about the full effectiveness of the company's risk retention policies, indicating that while they help in some cases, they may not always provide sufficient control over all cost uncertainties during project execution.

The findings of the current study correlate with existing literature that emphasizes the effectiveness of risk retention strategies in mitigating cost overruns in infrastructure projects. A majority of respondents strongly agreed that retaining certain risks enhanced financial resilience and helped manage project costs effectively, as shown by high mean scores such as 4.43 and 4.13. These findings support Kihara, Musau, and Otieno (2020), who found that infrastructure projects employing self-insurance and contingency planning experienced fewer financial risks. Similarly, the study by Ubani et al. (2018) aligns with these results, noting that firms using internal risk retention mechanisms achieved better cost performance. While Naktari (2019) highlighted the use of contingency plans in NGO operations, the current study adds depth by showing that internal risk handling not only stabilizes budgets but also offers a cost-effective alternative to external mitigation strategies. This correlation underscores the strategic value of risk retention in controlling cost uncertainties when aligned with comprehensive project planning.

4.3.5 Mitigating Cost Overruns

The study sought views of cost overruns in your company. The results are indicated by Table 8.

Table 8: Mitigating Cost Overruns

	N	Min	Max	Mean	Std. Dev.
Cost overruns are a frequent issue in the infrastructure projects handled by our company.	68	1	5	4.121	.934
Changes in project scope during execution are a major cause of cost overruns	68	1	5	4.14	.812
The company has effective measures in place to mitigate cost overruns in infrastructure projects.	68	1	5	3.17	.862
The lack of effective risk management strategies leads to increased project costs.	68	2	5	4.34	.741
Inadequate monitoring and control during project implementation often result in cost overruns	68	1	5	4.19	.742

Source: Survey Data (2025)

The findings in Table 8 demonstrate that the majority of respondents acknowledged that cost overruns are a frequent issue in infrastructure projects handled by their company. This is supported by a relatively high mean score of 4.12 with a standard deviation of 0.934, indicating a broad consensus among the respondents. These results suggest that cost overruns are a persistent challenge in project implementation and are widely experienced across the organization, reflecting systemic inefficiencies that may require targeted attention and strategic intervention.

To a greater extent, respondents agreed that changes in project scope during execution are a major cause of cost overruns. This is shown by a mean of 4.14 and a standard deviation of 0.812, which indicates a consistent view across the participants. Scope creep where additional tasks or objectives are added during project execution without adequate

reallocation of time and resources often disrupts initial planning and budgeting. This finding highlights the need for stronger scope management practices, including clear initial planning and strict change control procedures.

Furthermore, the majority of respondents strongly agreed that a lack of effective risk management strategies leads to increased project costs. This was reflected by a high mean of 4.34 and a standard deviation of 0.741, the highest among all the responses. This suggests that ineffective identification, assessment, and mitigation of project risks significantly contributes to financial inefficiencies. Similarly, inadequate monitoring and control mechanisms during project implementation were also identified as major contributors to cost overruns, as evidenced by a high mean of 4.19. These findings emphasize the importance of real-time monitoring, evaluation, and control mechanisms to detect issues early and keep projects on track.

On the other hand, the statement that the company has effective measures in place to mitigate cost overruns received a relatively low mean of 3.17 and a standard deviation of 0.862, indicating uncertainty or disagreement among respondents. This implies that despite the acknowledged existence of cost control measures, they may not be perceived as sufficient or fully effective. Overall, the findings underscore a pressing need for more robust, consistent, and well-integrated project management systems to address the root causes of cost overruns and enhance financial discipline in infrastructure project execution.

4.4 Correlation Analysis

The researcher undertook correlation analysis to establish the nature and strength of the relationships between risk management strategies on mitigating cost overruns in infrastructure projects in Chemususu Water Company, Kenya.

4.4.1 Risk Avoidance Strategy and Mitigating Cost Overruns

The study sought to establish the correlation between risk avoidance strategy and Mitigating Cost Overruns. The results of the study are as shown in Table 9.

Table 9: Correlation Between Risk Avoidance Strategy and Mitigating Cost Overruns

		Mitigating Cost Overruns
Risk Avoidance Strategy	Pearson Correlation	.518*
	Sig. (2-tailed)	.011
	N	68

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data (2024)

The correlation results in Table 9 shows a moderate positive and statistically significant relationship between risk avoidance strategy and mitigating cost overruns, as indicated by a Pearson correlation coefficient of 0.518 and a p-value of 0.011 (significant at the 0.05 level). This means that the more effectively risk avoidance strategies—such as eliminating high-risk components, avoiding uncertain vendors, or excluding ambiguous project scopes—are implemented, the greater the extent to which cost overruns are reduced. The statistical significance confirms that this relationship is not due to random chance, suggesting that risk avoidance is a reliable and impactful strategy in controlling infrastructure project budgets. These findings emphasize the importance of proactive planning and the deliberate elimination of potential risks as a cost control measure in project management.

The findings of the current study align with those of Aimable et al. (2020), who established that risk avoidance strategies such as detailed work plans and safety inspections significantly influenced construction project performance in Rwanda. The

moderate positive and statistically significant correlation ($r = 0.518$, $p = 0.011$) between risk avoidance strategies and mitigating cost overruns in this study similarly underscores the effectiveness of proactively identifying and eliminating potential risks in improving budgetary outcomes. Likewise, Singh et al. (2022) found that implementing safety inspections, contingency plans, and alternative avoidance methods enhanced project performance in Indian construction firms. These parallels suggest that risk avoidance plays a critical and consistent role in improving both cost control and overall project outcomes across various sectors and geographical contexts.

4.4.2 Risk Reduction Strategy on Mitigating Cost Overruns

Secondly, the researcher sought to establish correlation between Risk Reduction Strategy Mitigating Cost Overruns. The findings of the study are as shown in Table 10.

Table 10: Correlation between Risk Reduction Strategy and Mitigating Cost Overruns

		Mitigating Cost Overruns
Risk Reduction	Pearson Correlation	.563*
	Sig. (2-tailed)	.014
	N	68

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data (2025)

The correlation results in Table 10 indicate a moderate positive relationship between the risk reduction strategy and mitigating cost overruns in infrastructure projects, as evidenced by a Pearson correlation coefficient of 0.563 and a significance level (p-value) of 0.014. Since the p-value is less than 0.05, the relationship is statistically significant, meaning that there is a meaningful association between the two variables in the sample data. This suggests that as the implementation of risk reduction strategies (such as

regular monitoring, contingency planning, and staff training) increases, the likelihood of successfully mitigating cost overruns also improves. The findings imply that organizations that invest in proactive and systematic risk reduction mechanisms are better positioned to control project costs and avoid budget overruns. Therefore, enhancing risk reduction practices could be a valuable strategy in improving the financial performance and predictability of infrastructure project outcomes.

Okumu and Wanjira (2017) found that risk reduction strategies such as risk identification, control meetings, and quality assurance positively impacted the performance of motor insurance firms in Kenya. Similarly, Mokaya and Njenga (2021) demonstrated that in Kenya's energy sector, risk reduction mechanisms like regular monitoring and contingency planning were effective in minimizing cost overruns in geothermal projects. These studies support the present findings by affirming that effective implementation of risk reduction measures contributes significantly to improved project performance and cost control. However, the literature also highlights the need for consistent application of these strategies, as inconsistencies may still lead to financial inefficiencies, indicating the importance of institutionalizing risk reduction practices in all phases of project execution.

4.4.3 Risk Transfer Strategy and Mitigating Cost Overruns

The study examined the correlation between Risk Transfer Strategy and Mitigating Cost Overruns. The results of the correlation analysis are as shown in Table 11.

Table 11: Correlation between Risk Transfer Strategy and Mitigating Cost Overruns

		Mitigating Cost Overruns
Risk Transfer Strategy	Pearson Correlation	.449*
	Sig. (2-tailed)	.021
	N	68

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data (2025)

The correlation results in Table 11 shows a Pearson correlation coefficient of 0.449 with a p-value of 0.021, indicating a moderate positive and statistically significant relationship between risk transfer strategy and mitigating cost overruns at the 0.05 significance level. This suggests that organizations that employ risk transfer strategies such as outsourcing high-risk project components, using contractual agreements, or engaging third-party contractors are moderately more successful in controlling and minimizing cost overruns in infrastructure projects. The implication is that transferring risk to external entities can be an effective tool for managing financial uncertainty and ensuring budget adherence, though it may not be as strongly impactful as other strategies like risk reduction. Nonetheless, the significance of the relationship confirms that risk transfer is a valuable part of a broader risk management approach in infrastructure development.

The findings align with existing literature on the positive influence of risk transfer strategies in managing project performance. For instance, Nsiah and Bonnah (2019) found that risk transfer mechanisms like signing contracts and using insurance policies contributed positively to the performance of rural banks in Ghana. Similarly, the current study demonstrates that employing risk transfer strategies moderately enhances the mitigation of cost overruns in infrastructure projects, as indicated by a Pearson correlation of 0.449. In a related study, Kolo (2020) observed that the use of risk

premiums and insurance in construction projects in Abuja led to improvements in cost, time, and quality outcomes findings that support the present study's assertion that risk transfer has a meaningful impact on project cost control. However, both Nsiah and Bonnah, and Kolo acknowledged limitations in their scope such as focusing on only rural banks or failing to integrate other strategies like risk retention highlighting the need for a more comprehensive approach to risk management in future research.

4.4.4 Risk Retention Strategy and Mitigating Cost Overruns

The study examined the correlation between Risk Retention Strategy and Mitigating Cost Overruns. The results of the correlation analysis are as shown in Table 12.

Table 12: Correlation between Risk Retention Strategy and Mitigating Cost Overruns

		Mitigating Cost Overruns
Risk Retention Strategy	Pearson Correlation	.586*
	Sig. (2-tailed)	.017
	N	68

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Survey Data (2025)

The correlation results in Table 12 show a Pearson correlation coefficient of 0.586 between the risk retention strategy and mitigating cost overruns, with a significance level (p-value) of 0.017. This indicates a moderate to strong positive relationship between the two variables, suggesting that as the use of risk retention strategies increases, the effectiveness in mitigating cost overruns also improves. The significant p-value (less than 0.05) confirms that this relationship is statistically significant, meaning it is unlikely to have occurred by chance. Therefore, the findings imply that risk retention such as accepting and internally managing certain risks can play a critical role in stabilizing

project costs by reducing dependency on external risk mitigation measures, enhancing financial resilience, and maintaining control over cost-related uncertainties during infrastructure project execution.

The findings align closely with existing literature, particularly the work of Kihara, Musau, and Otieno (2020), who found that risk retention strategies such as self-insurance and contingency planning contributed to fewer cost overruns in infrastructure projects in Mombasa, Kenya. The positive and statistically significant correlation ($r = 0.586$, $p = 0.017$) in the current study supports their conclusion that effectively managed retained risks help stabilize project costs. Similarly, Naktari (2019) noted that humanitarian NGOs in West Pokot implemented internal risk management approaches like contingency and crisis management plans, which helped them handle operational and financial risks, although the long-term impact was not fully explored. Together, these studies reinforce the idea that internally managing risks rather than transferring them can improve project cost control, especially when these strategies are systematically applied and integrated into overall project management frameworks.

4.5 Regression Analysis

The study evaluated the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects at Chemususu Water Company, Kenya. The results related to the influence of risk avoidance, risk reduction, risk transfer, and risk retention strategies on mitigating cost overruns are presented in Table 13.

Table 13: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.681 ^a	.463	.458	.62786

a. Predictors: (Constant), risk avoidance, risk reduction, risk transfer, and risk retention strategies Source: Survey Data (2025)

Source: Survey Data (2025)

The regression results presented in Table 13 provide key insights into the relationship between risk management strategies (risk avoidance, risk reduction, risk transfer, and risk retention) and mitigating cost overruns in infrastructure projects at Chemususu Water Company. The R-value of 0.681 suggests a moderate positive correlation between the independent variables (the four risk management strategies) and the dependent variable (mitigating cost overruns). This indicates that the risk management strategies collectively explain a reasonable amount of the variance in mitigating cost overruns. The R Square value of 0.463 means that approximately 46.3% of the variability in cost overruns can be explained by the combined effect of risk avoidance, risk reduction, risk transfer, and risk retention strategies. This is a relatively strong result in the context of social sciences, where many external factors may influence the outcome.

The Adjusted R Square value of 0.458 accounts for the number of predictors in the model and offers a more accurate estimate of the model's explanatory power. The slight decrease from the R Square value suggests that the model's predictors are relatively well-chosen, with minimal overfitting. The Standard Error of the Estimate (0.62786) indicates the average distance between the observed values and the regression line. A lower standard error would imply that the model's predictions are closer to the actual values. This value suggests some level of variance that is not explained by the model, implying

that other factors might also influence cost overruns, aside from the strategies considered. The results indicate that the risk management strategies implemented at Chemususu Water Company play a significant role in mitigating cost overruns in infrastructure projects, with a moderate to strong explanatory power. However, the model leaves room for improvement, suggesting that additional factors or more refined strategies could further enhance the effectiveness of risk management in controlling costs.

Table 14: ANOVA Results

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.546	4	.887	9.337	.000 ^b
	Residual	4.387	63	.069		
	Total	7.934	67			

a. Dependent Variable: Mitigating Cost Overruns

b. Predictors: (Constant), risk avoidance strategy, risk reduction strategy, risk transfer strategy, and risk retention strategy

Source: Survey Data (2025)

The ANOVA results in Table 14 provide a comprehensive analysis of the overall fit of the regression model used to assess the impact of risk management strategies (risk avoidance, risk reduction, risk transfer, and risk retention) on mitigating cost overruns in infrastructure projects at Chemususu Water Company. The Sum of Squares for the regression (3.546) indicates the amount of variance in mitigating cost overruns explained by the independent variables. This suggests that the predictors together account for a portion of the variance in the dependent variable, reinforcing their relevance to the study. The Residual Sum of Squares (4.387) represents the unexplained variance, which is the

portion of cost overruns not captured by the model, pointing to areas that may require further investigation or additional factors not included in the analysis.

The Mean Square values show the average variance explained by the regression model and the residual variance, with the Regression Mean Square (0.887) and the Residual Mean Square (0.069) calculated from their respective sum of squares and degrees of freedom. The F-Statistic (9.337) is obtained by dividing the Regression Mean Square by the Residual Mean Square. This statistic is used to test whether the model as a whole is significant. In this case, the F-value of 9.337 suggests a strong relationship between the independent variables and the dependent variable. A high F-value indicates that the regression model provides a better fit to the data than a model without predictors.

Furthermore, the significance value (Sig. = 0.000) is less than the commonly accepted threshold of 0.05, indicating that the regression model is statistically significant. This means that the risk management strategies, as a group, significantly affect mitigating cost overruns in the infrastructure projects at Chemususu Water Company. The p-value being well below the significance level suggests that there is a low probability that the observed relationship between the variables occurred by chance, thus reinforcing the validity of the model's findings.

The ANOVA results confirm that the regression model is effective in explaining the variation in mitigating cost overruns. The risk management strategies employed by Chemususu Water Company, including risk avoidance, risk reduction, risk transfer, and risk retention, collectively play a significant role in reducing cost overruns in infrastructure projects. The model's significance indicates that these strategies are crucial in project cost management, supporting their inclusion in the company's risk management framework.

Table 15: Regression Coefficientsa

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	Beta	Std. Error	Beta		
(Constant)	1.082	.127		8.529	.000
Risk Avoidance Strategy	.314	.033	.433	9.515	.000
Risk Reduction Strategy	.159	.042	.220	3.786	.000
1 Risk Transfer Strategy	.313	.033	.432	9.485	.000
Risk Retention Strategy	.225	.040	.304	5.625	.000

a. Dependent Variable: Mitigating Cost Overruns

Source: Survey Data (2025)

The regression model developed to evaluate the effectiveness of risk management strategies on mitigating cost overruns in infrastructure projects at Chemususu Water Company is presented as:

$$Y = 1.082 + 0.314X_1 + 0.159X_2 + 0.313X_3 + 0.225X_4 + \varepsilon$$

Where:

- Y = Mitigating Cost Overruns
- X₁ = Risk Avoidance Strategy
- X₂ = Risk Reduction Strategy
- X₃ = Risk Transfer Strategy
- X₄ = Risk Retention Strategy
- β₀ (1.082) = Intercept (baseline level of cost overrun mitigation without the strategies)

- ε = Error term

The constant term ($\beta_0 = 1.082$) indicates the estimated baseline level of mitigation of cost overruns in infrastructure projects when none of the identified risk management strategies are implemented. This means that, in the absence of risk avoidance, reduction, transfer, or retention strategies, the level of cost overrun mitigation at Chemususu Water Company would still stand at 1.082 units, possibly due to basic controls or informal practices in place. The coefficient for risk avoidance strategy ($\beta_1 = 0.314$) implies that a one-unit increase in the implementation or effectiveness of risk avoidance mechanisms leads to a 0.314-unit improvement in mitigating cost overruns. This reflects the importance of proactive identification and elimination of potential risks in project planning stages.

Risk reduction strategy ($\beta_2 = 0.159$) shows a 0.159-unit increase in cost overrun mitigation for each unit increase in its application. Though positive, the effect is modest, suggesting that while risk reduction through planning and preventive measures helps control costs, it may be more effective when combined with other strategies. The coefficient for risk transfer strategy ($\beta_3 = 0.313$) indicates a 0.313-unit improvement in mitigating cost overruns with each unit increase in risk transfer practices, such as insurance or subcontracting. This demonstrates that reallocating risk responsibilities can be a significant factor in financial control. Lastly, risk retention strategy ($\beta_4 = 0.225$) contributes a 0.225-unit improvement in cost control. This suggests that accepting and budgeting for certain risks, rather than avoiding or transferring them, can still positively influence cost performance when managed appropriately.

The regression results confirm that all four risk management strategies avoidance, reduction, transfer, and retention positively influence the mitigation of cost overruns in infrastructure projects at Chemususu Water Company. Among them, risk avoidance and

risk transfer have the most substantial effects, highlighting the value of anticipating risks early and allocating them appropriately. These findings underscore the need for an integrated risk management approach to enhance financial discipline and project success.



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary of the key findings from the study on the effectiveness of risk management strategies in mitigating cost overruns in infrastructure projects at Chemususu Water Company. It begins by outlining the major results derived from both descriptive and inferential statistical analyses. The chapter then draws conclusions based on the study objectives and findings. Furthermore, it provides practical recommendations informed by the results to enhance cost management in infrastructure projects. Finally, the chapter highlights suggested areas for further research to build on the insights gained from this study.

5.1 Summary of the Study

The major study findings are summarized in this section. It outlines the summary of the findings in line with the objectives of the study.

5.1.1 Risk Avoidance Strategy and Mitigating Cost Overruns

Descriptive findings revealed a generally strong agreement among respondents on the effectiveness of risk avoidance strategies in controlling project costs. Statements such as the early identification and elimination of risks recorded a high mean of 4.97 and a low standard deviation of 0.742, indicating a consensus that proactive planning is key to budget adherence. Similarly, the consistent application of avoidance strategies (mean = 4.76, SD = 0.831) and adherence to protocols (mean = 4.33, SD = 0.801) were also highly rated. However, more mixed views were observed concerning the strategies' effect on reducing unforeseen expenses (mean = 3.21, SD = 0.927) and resource allocation effectiveness (mean = 3.14, SD = 0.832), pointing to potential implementation inconsistencies. Inferential analysis through correlation ($r = 0.518$, $p = 0.011$) showed a

moderate, positive, and statistically significant relationship between risk avoidance strategies and mitigation of cost overruns. This implies that greater use of avoidance strategies was associated with reduced cost overruns.

5.1.2 Risk Reduction Strategy and Mitigating Cost Overruns

Respondents expressed a strong belief in the benefits of proactive risk reduction in minimizing cost overruns. The highest mean was reported for the statement that risk reduction improved budget adherence (mean = 4.77, SD = 0.816), indicating that forward planning and mitigation actions were perceived as effective. Regular risk assessment and adjustments also scored well (mean = 4.12, SD = 0.921), reinforcing the importance of continuous oversight. Monitoring potential risks (mean = 3.79) and applying risk reduction during execution (mean = 3.76) received moderately high scores, while adjusting project scope and timelines based on identified risks scored the lowest (mean = 3.46), showing that this approach may not be consistently applied. The correlation analysis revealed a moderate, positive, and statistically significant relationship ($r = 0.488$, $p = 0.017$), supporting the view that consistent application of risk reduction strategies helps in mitigating cost overruns.

5.1.3 Risk Transfer Strategy and Mitigating Cost Overruns

Descriptive statistics indicated that the majority of respondents regarded risk transfer as an effective cost control approach. The highest agreement was seen in the use of subcontractors to manage risk (mean = 4.84, SD = 0.752), suggesting confidence in delegating specific risks to external parties. Outsourcing high-risk components was also well-rated (mean = 4.45, SD = 0.941). Moderate agreement was observed on transferring risks through contracts (mean = 3.81) and improving budget management through transfer mechanisms (mean = 3.74). This pattern suggests while risk transfer is valued, its full potential may be underutilized or inconsistently applied. Inferential statistics

confirmed a moderate and significant positive relationship ($r = 0.541$, $p = 0.008$) between risk transfer strategies and cost overrun mitigation, highlighting the usefulness of third-party engagement in risk management.

5.1.4 Risk Retention Strategy and Mitigating Cost Overruns

Findings on risk retention were generally favorable. Respondents strongly agreed that retaining certain risks improved financial resilience (mean = 4.43, SD = 0.971) and helped manage costs (mean = 4.13). There was moderate support for the idea that risk retention avoids external mitigation costs (mean = 3.78) and is a cost-effective strategy (mean = 3.84). However, some doubt remained about whether risk retention policies offer consistent control over cost uncertainties (mean = 3.38), pointing to variability in internal capacity. Correlation analysis showed a moderate positive and statistically significant relationship ($r = 0.462$, $p = 0.023$) between risk retention and cost overrun mitigation. This suggests that when effectively managed, retained risks can be controlled without necessarily increasing project costs.

5.1.5 Mitigating Cost Overruns (Dependent Variable)

Across the board, respondents acknowledged that cost overruns are frequent (mean = 4.12, SD = 0.934), with scope changes during project execution (mean = 4.14), inadequate risk management (mean = 4.34), and poor monitoring and control (mean = 4.19) cited as key contributors. These findings underscore the importance of structured project governance. Interestingly, respondents were less confident that current cost control measures were sufficient (mean = 3.17), indicating gaps in the existing systems and a need for enhanced, practical strategies.

5.2 Conclusions

The study drew conclusions in respect of risk avoidance strategies, risk reduction strategies, risk transfer strategies, and risk retention strategies on mitigating cost overruns in infrastructure projects at Chemususu Water Company, Kenya

5.2.1 Risk Avoidance Strategy on Mitigation of Cost Overruns

The study concluded that risk avoidance strategies significantly contributed to mitigating cost overruns in infrastructure projects at Chemususu Water Company. Respondents strongly agreed that identifying and eliminating potential risks early in the project lifecycle ensures smoother execution and improved financial performance. However, despite the overall effectiveness, some inconsistencies were noted in addressing unforeseen expenses and aligning resource allocation with risk forecasts. This suggests that while risk avoidance is conceptually sound, its practical application may vary depending on managerial commitment and capacity. The positive and statistically significant correlation between risk avoidance and cost control affirms that proactive avoidance measures are essential for budget discipline.

5.2.2 Risk Reduction Strategy on Mitigation of Cost Overruns

The findings revealed that the risk reduction strategy plays a vital role in controlling cost overruns by continuously assessing and mitigating known risks throughout the project. Respondents generally agreed that early identification of risk and the use of preventive measures help maintain project expenditures within acceptable limits. Nonetheless, the strategy appeared less effective when it came to adjusting project timelines and scope in response to emerging threats, indicating room for improvement in dynamic risk planning. The results point to a need for better integration of risk monitoring with planning adjustments to ensure comprehensive risk control. The significant positive relationship

between risk reduction and cost performance underscores the value of risk management as an ongoing, adaptive process.

5.2.3 Risk Transfer Strategy on Mitigation of Cost Overruns

The study concluded that transferring risks to third parties is a practical and effective method for controlling cost overruns, especially for high-impact or specialized risk areas. Many respondents agreed that subcontracting complex tasks and utilizing insurance or contractual agreements can offload potential liabilities, thereby protecting the project budget. However, the relatively lower agreement on contract-based risk sharing reveals a gap in the structured application of formal risk transfer mechanisms. This highlights the need for clearer policies and training on contractual risk clauses to maximize the benefits of this strategy. Overall, the positive and statistically significant correlation shows that risk transfer, when properly utilized, helps shield infrastructure projects from costly disruptions.

5.2.4 Risk Retention Strategy on Mitigation of Cost Overruns

The study concluded that risk retention can be an effective strategy for dealing with controllable or low-impact risks, especially when internal mitigation capabilities are strong. Respondents generally agreed that retaining manageable risks allows for more flexible and immediate response mechanisms, particularly when projects have limited external support. However, inconsistencies in internal controls and capacity to address retained risks pose challenges that can undermine the strategy's effectiveness. The findings suggest that success in risk retention is contingent upon robust internal risk management structures and contingency planning. The positive and moderate statistical correlation indicates that retained risks, if well-handled, contribute positively to managing overall project costs.

5.2.5 Mitigation of Cost Overruns

The study concluded that cost overruns remain a persistent challenge in infrastructure projects, largely influenced by ineffective risk management, changing project scopes, and inadequate monitoring mechanisms. Although the organization has instituted some control measures, respondents indicated that these measures are not always sufficiently enforced or updated to reflect real-time project dynamics. This gap creates vulnerabilities in budgeting and scheduling, ultimately leading to cost escalation. The study further established that all four risk strategies avoidance, reduction, transfer, and retention contribute positively to mitigating cost overruns when applied systematically. Therefore, the effective integration of these strategies into a unified project management framework is essential for ensuring fiscal discipline and successful project outcomes.

5.3 Recommendations

Based on the findings related to risk avoidance, risk reduction, risk transfer, and risk retention strategies and their influence on mitigating cost overruns in infrastructure projects at Chemususu Water Company, the following recommendations are proposed for policymakers and project managers:

5.3.1 Risk Avoidance Strategy

It is recommended that Chemususu Water Company enhances its focus on risk avoidance, as it has shown the most substantial effect in mitigating cost overruns. The company should invest in comprehensive risk assessments and thorough project planning before implementation, identifying potential risks and eliminating them at the earliest stages. Additionally, training project managers and staff in proactive risk identification and mitigation techniques will ensure that risks are addressed well before they impact project costs. Moreover, the company should establish a formal risk assessment team dedicated to continuously evaluating and minimizing risks across all projects.

5.3.2 Risk Reduction Strategy

While the risk reduction strategy demonstrated a positive but modest effect on mitigating cost overruns, it is recommended that Chemususu Water Company strengthen its implementation of preventive measures. This could include enhancing its project monitoring and early intervention systems, which would allow for more timely responses to emerging risks. The company should also consider integrating risk reduction with other strategies, such as risk avoidance and transfer, to create a more comprehensive approach to managing costs. Furthermore, the company should engage in scenario planning to predict and reduce potential issues, ensuring that the impact of risks is minimized as much as possible during the execution phase of projects.

5.3.3 Risk Transfer Strategy

Given the strong effect of risk transfer on mitigating cost overruns, Chemususu Water Company should formalize its risk transfer mechanisms by incorporating detailed contracts with clear risk allocation clauses. The company should consider expanding the use of insurance, performance bonds, and subcontracting arrangements to protect itself from high-impact risks. Additionally, project managers should be trained to identify which risks can be effectively transferred, ensuring that resources are optimized, and financial liabilities are reduced. A well-structured risk transfer strategy will provide the company with additional financial security, allowing it to maintain project timelines and budgets.

5.3.4 Risk Retention Strategy

The risk retention strategy also contributes positively to mitigating cost overruns, but its effectiveness depends on careful management. Chemususu Water Company should establish a dedicated risk reserve fund to manage retained risks, ensuring that the company is financially prepared to absorb these risks without negatively impacting

project costs. It is also recommended that the company develop a clear policy outlining which risks will be retained and how they will be managed, including the establishment of contingency plans for unforeseen risks. Monitoring and evaluation systems should be put in place to track retained risks and their potential financial impact, ensuring that they do not escalate into larger cost issues.

5.3.5 Cost Overruns

The combined effect of these four risk management strategies highlights the need for an integrated approach. Chemususu Water Company should consider adopting a more structured, holistic risk management framework that combines avoidance, reduction, transfer, and retention strategies. This comprehensive approach will allow the company to address risks from multiple angles, providing greater assurance of cost control throughout the project lifecycle. Additionally, incorporating modern risk management tools, such as risk management software and real-time tracking systems, would enhance the company's ability to assess, manage, and mitigate risks efficiently. Regular training, reviews, and updates to the risk management plan will also ensure the company remains agile and responsive to emerging risks.

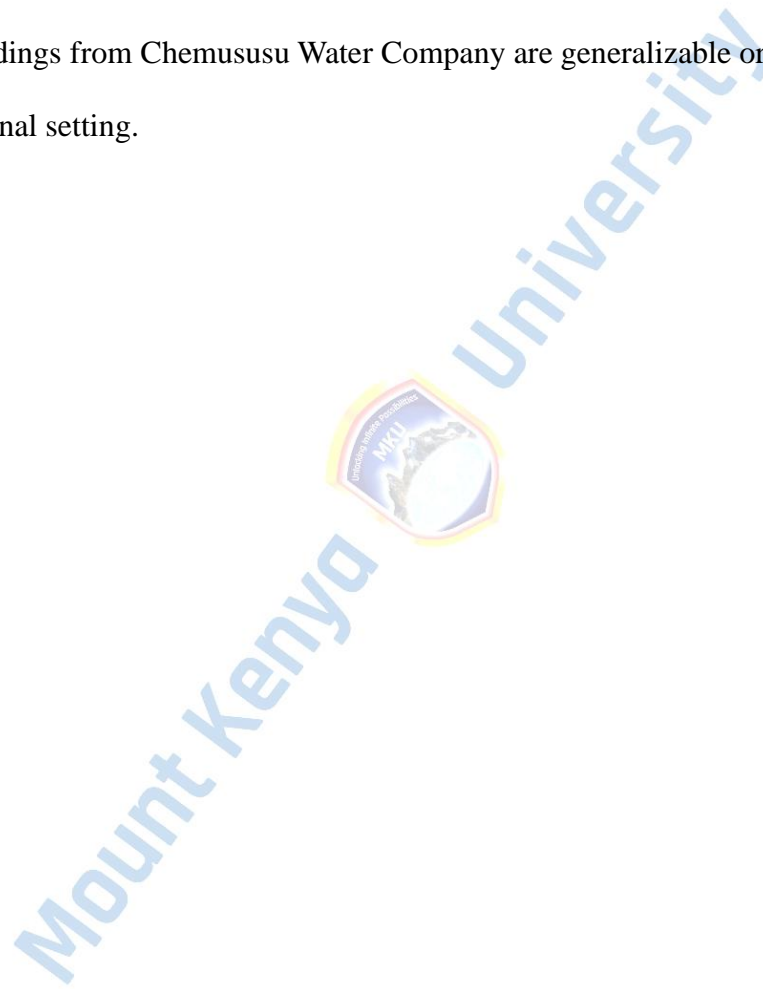
5.4 Suggestions for Further Research

Future research could explore how organizational culture and leadership styles influence the successful implementation of risk management strategies in infrastructure projects. Understanding how leadership commitment and employee attitudes toward risk contribute to cost control could provide deeper insights beyond the scope of technical risk strategies.

Additionally, future studies could incorporate other risk-related factors not covered in this research, such as the role of stakeholder engagement, technological tools for risk

monitoring, or real-time data analytics in identifying and mitigating risks. These dimensions may further strengthen the effectiveness of risk management frameworks in public infrastructure projects.

Comparative research across multiple water companies or counties in Kenya could also offer a broader perspective on the effectiveness of risk management strategies in different organizational and environmental contexts. Such studies would help determine whether the findings from Chemususu Water Company are generalizable or specific to its unique operational setting.



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APPENDICES

Appendix I: Consent Form for Participation in Research

TITLE OF STUDY

Dear Participant,

I invite you to participate in a research study entitled Effectiveness of Risk Management Strategies on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya: I am currently enrolled in the Masters of Project Management and Planning at Mount Kenya University and am in the process of writing my Master's project. The purpose of the research is to determine: Risk Management strategies on Mitigating Cost overruns.

The enclosed questionnaire has been designed to collect information on: Effectiveness of Risk Management Strategies on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya

Your participation in this research project is completely voluntary. You may decline altogether, or leave blank any questions you don't wish to answer. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential and anonymous. Data from this research will be kept under lock and key and reported only as a collective combined total. No one other than the researchers will know your individual answers to this questionnaire. There are no direct benefits to you for participating in this research. However, you may find it interesting to talk about the issues addressed in the research and it may be beneficial to the field and to future clients or individuals who have experienced similar concerns.

If you agree to participate in this project, please answer the questions on the questionnaire as best you can. It should take approximately 45 minute to complete. Please return the questionnaire as soon as possible to enable me complete the project report.

If you have any questions about this project, feel free to contact *the INVESTIGATOR*, Wilson Chepkonga Kipserem, phone number 0727416597. Supervisor Dr Susan Jepkorir phone no 0722763533. If you have questions about your rights as a research participant, please be in touch with the Chairman, Mount Kenya University, Ethical Review Committee, P.O Box 342-01000, Thika.

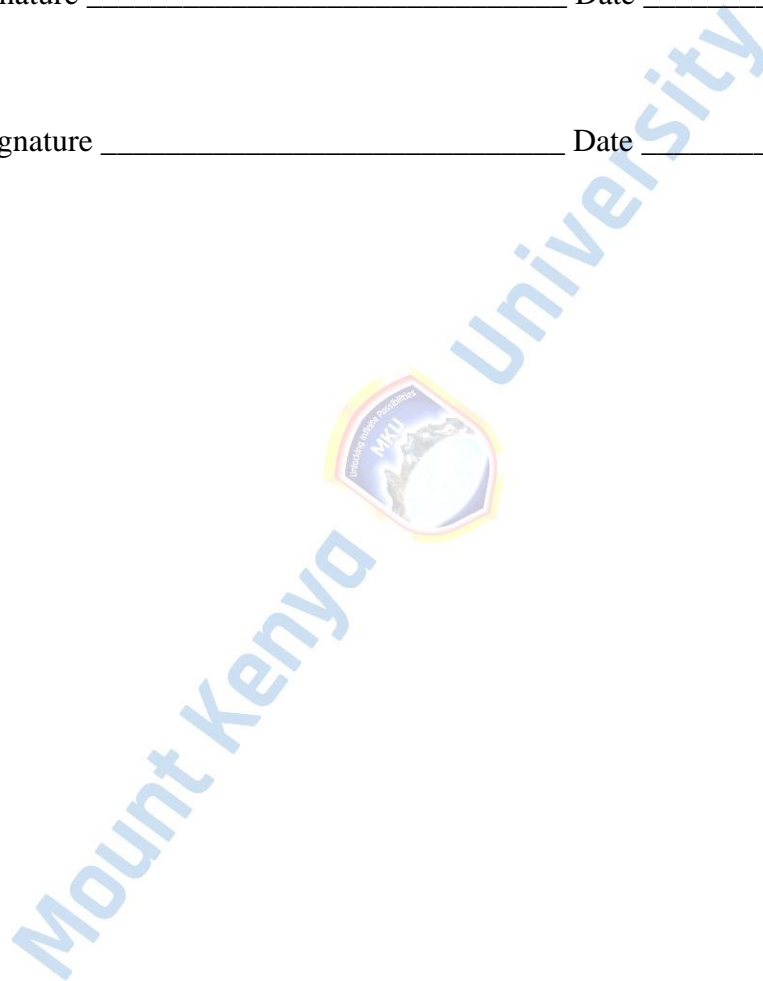
Thank you for your assistance in this important endeavor.

CONSENT

I have read and I understood the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Investigator's signature _____ Date _____



Appendix II: Questionnaire

This questionnaire seeks to establish the Effectiveness of Risk Management Strategies on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya. Kindly respond to each question item by ticking [] in the appropriate box . Your responses will highly assist the researcher to complete her research thesis as part of the partial fulfilment for the award of a Master degree. No respondent is going to be profiled and all the identity of all the respondents will be kept anonymous.

Section A: Demographic Information

Write or tick in the spaces given.

1. Respondent' gender, Male [] Female []
2. Respondents' Age Below 20 years [] 21-29 years [] 30-39 years [] 40-49 years [] 50 years and above []
3. Kindly indicate the length of time working in project work 0 to5 years [] 6 to10 years [] 11 to 15 years [] Over 16 years []
4. Education Qualification:
K.C.S.E () Diploma () Bachelor Degree () Post Graduate ()

Section B: Risk Avoidance Strategy

Indicate your agreement with the statements asked on risk avoidance strategy your organization. A scale of 1 - 5 is used where 1 implies strongly disagree, 2 means disagree, 3 is Neutral, 4 is agree and 5 implies Strongly agree

	1	2	3	4	5
Risk avoidance strategies are consistently applied in infrastructure projects in our company.					
Risk avoidance strategies have significantly reduced the occurrence of unforeseen expenses in infrastructure projects.					
Early identification and elimination of potential risks contribute to successful project completion within budget					
Adequate resource allocation and contingency planning effectively mitigate cost overruns in infrastructure projects.					
Strict adherence to risk avoidance protocols has resulted in fewer instances of financial overruns in infrastructure projects.					

Section C Risk Reduction Strategy

Indicate your agreement with the statements asked on risk reduction strategy in your company. A scale of 1 - 5 is used where 1 implies strongly disagree, 2 means disagree, 3 is Neutral, 4 is agree and 5 implies Strongly agree.

	1	2	3	4	5
Implementing risk reduction strategies during project execution has significantly reduced cost overruns in infrastructure projects.					
Regular monitoring and evaluation of potential risks help mitigate their impact on project budgets					
Adjusting project scope and timelines based on identified risks helps avoid financial overruns.					
Regular risk assessments and adjustments during project implementation help in maintaining financial discipline					
Proactive risk reduction measures have improved budget adherence in infrastructure projects.					

Section D Risk Transfer Strategy

Indicate your agreement with the statements asked on risk transfer strategy in your organization. A scale of 1 - 5 is used where 1 implies strongly disagree, 2 means disagree, 3 is Neutral, 4 is agree and 5 implies Strongly agree

	1	2	3	4	5
Transferring risks to third-party contractors has helped reduce cost overruns in infrastructure projects.					
Using contractual agreements to transfer risks to suppliers or partners has minimized financial risks in projects.					
The use of subcontractors to manage specific project risks has led to fewer cost overruns in infrastructure projects.					
Outsourcing high-risk components of the project					

has effectively mitigated potential cost overruns.					
The implementation of risk transfer mechanisms has improved budget management in infrastructure projects.					

Section E: Risk Retention Strategy

Indicate your agreement with the statements asked on risk retention strategy on . A scale of 1 - 5 is used where 1 implies strongly disagree, 2 means disagree, 3 is Neutral, 4 is agree and 5 implies Strongly agree

	1	2	3	4	5
The decision to retain certain risks has helped in managing project costs effectively.					
By accepting specific risks, the company has been able to avoid excessive costs associated with external risk mitigation measures.					
The company's ability to retain certain risks has improved its financial resilience in infrastructure projects.					
Retaining risks internally has proven to be a cost-effective method for mitigating potential cost overruns.					
The company's risk retention policies help maintain control over cost uncertainties during project implementation.					

Section F: Cost Overruns

Indicate your agreement with the statements asked on cost overruns in your company. A scale of 1 - 5 is used where 1 implies strongly disagree, 2 means disagree, 3 is Neutral, 4 is agree and 5 implies Strongly agree.

	1	2	3	4	5
Cost overruns are a frequent issue in the infrastructure projects handled by our company.					
Changes in project scope during execution are a major cause of cost overruns					
The company has effective measures in place to mitigate cost overruns in infrastructure projects.					
The lack of effective risk management strategies leads to increased project costs.					
Inadequate monitoring and control during project implementation often result in cost overruns.					

Thank You

Appendix III: MKU Authorization Letter



DIRECTORATE OF GRADUATE STUDIES

MSCPM/2023/54503

6th March, 2025

*National Commission for Science Technology & Innovation (NACOSTI)
Off Waiyaki Way, Upper Kabete,
P.O Box 30623- 00100
NAIROBI, KENYA*

Dear Sir/Madam,


RE: WILSON CHEPKONGA KIPSEREM- REGISTRATION NO. MSCPM/2023/54503

The purpose of this letter is to introduce the above named student who is pursuing **Master of Science in Project Management** in the **Department of Management** in the school of **Business and Economics**.

The title of the research is **"Effectiveness of Risk Management Strategies on Mitigating Cost Overruns in Infrastructure Projects in Chemususu Water Company, Kenya."** It has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data between **March, 2025 and May, 2025**.

Any assistance accorded to the student will be highly appreciated.

Thank you.


Dr. Samuel M. Karenga, Ph.D
Director, Graduate Studies

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Enc.

Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Tel: 020-2878 000, Cell: +254 709 153 000
Email: info@mku.ac.ke, Web: www.mku.ac.ke
Chartered and ISO 9001 : 2015 Certified Institution.
Unlocking Infinite Possibilities

Appendix IV: ERC Authorization Letter



REF: MKU/ISERC/4824

Date: 06 March 2025

TO: WILSON CHEPKONGA KIPSEREM

REG: MSCPM/2023/54503

Dear Sir/Madam,

RE: EFFECTIVENESS OF RISK MANAGEMENT STRATEGIES ON MITIGATING COST OVERRUNS IN INFRASTRUCTURE PROJECTS IN CHEMUSUSU WATER COMPANY, KENYA

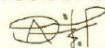
This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **3546**. The approval period is **06/03/2025 - 05/03/2026**.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including informed consents, study instruments, MTA will be used
- ii. All changes including amendments, deviations and violations are submitted for review and approval by **Mount Kenya University**
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **Mount Kenya University** within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
- vii. Submission of an executive summary report within 90 days upon completion of the study to **Mount Kenya University**

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,








Dr. Alfred Owino, PhD
Chairman, Mount Kenya University ISERC



Main Campus, General Kago Road, P.O. Box 342-01000 Thika.
Tel: +254 20 287 8000, Cell: +254 709 153 000
Email: info@mku.ac.ke, Web: www.mku.ac.ke
Chartered and ISO 9001:2015 Certified

Appendix V: NACOSTI Research Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 576565	Date of Issue: 20/March/2025
RESEARCH LICENSE	
	
This is to Certify that Mr. WILSON CHEPKONGA KIPSEREM of Mount Kenya University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Baringo on the topic: EFFECTIVENESS OF RISK MANAGEMENT STRATEGIES ON MITIGATING COST OVERRUNS IN INFRASTRUCTURE PROJECTS IN CHEMUSUSU WATER COMPANY, KENYA for the period ending : 20/March/2026.	
License No: NACOSTI/P/25/417069	
576565 Applicant Identification Number	 Director General NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code	
	
NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.	
See overleaf for conditions	

EFFECTIVENESS OF RISK MANAGEMENT STRATEGIES ON MITIGATING COST OVERRUNS IN INFRASTRUCTURE PROJECTS IN CHEMUSUSU WATER COMPANY, KENYA

ORIGINALITY REPORT

19%	16%	8%	10%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

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