Risk management practices and project performance: Evidence from Tanzania's standard gauge railway lot one, Dar es Salaam to Morogoro

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ABSTRACT

This study evaluated the effectiveness of risk management practices on the performance of government projects in Tanzania, with a focus on the Standard Gauge Railway (SGR). Specifically, it examined how risk mitigation practices affected SGR performance. The study also assessed the influence of risk monitoring and evaluation practices on SGR performance in Tanzania. Guided by contingency theory, it employed a case study design and a mixed-methods approach. The sample included 72 purposively sampled respondents. Data were collected through questionnaires, interviews, and document analysis. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data underwent content analysis. Findings showed that effective risk management practices adopted by the Tanzania Railways Corporation (TRC) for the Standard Gauge Railway (SGR) project Lot One in Tanzania significantly enhanced project performance, leading to better quality, cost savings, and on-time completion, with a mean score above the average, ranging between 4.04 and 4.23 out of 5.0, among the effects of risk monitoring and evaluation practices and the effects of risk mitigation practices. The study concluded that proper risk management is vital for the successful execution of projects. Recommendations for the TRC to invest in ongoing training, develop a comprehensive risk management framework, and establish regular monitoring and evaluation processes. The study also emphasized the importance of strengthening communication among stakeholders and involving external experts for high-risk projects.

Keywords: Standard Gauge Railways, Risk Management Practices, Public Project, SGR Lot One, Tanzania

I. INTRODUCTION

Risk management practices in construction projects date back to the early 20th century, when formalized project management began to develop in response to the increasing complexity of construction endeavors (Fewings & Henjewele, 2019). During this time, large-scale projects such as dams, bridges, and skyscrapers required the development of structured project management methods to handle their complexity (Lafhaj et al., 2024). These formal practices provide a systematic approach to ensuring projects are completed on time, within budget, and to specifications (Menon, 2024). Today, risk management is considered a critical part of project management in the construction industry (United Nations Conference on Trade and Development, [UNCTAD] 2022). Project managers and stakeholders utilize various techniques—such as risk registers, risk workshops, and sensitivity analysis—to identify and manage risks effectively, thereby improving project outcomes (Tumuhairwe & Ahimbisibwe, 2016). A risk refers to the chance of an event occurring that could impact specific goals in unexpected or unforeseen ways (Nineka, 2024). In the United States, government projects often conduct comprehensive risk assessments and management practices to identify potential risks and develop mitigation strategies (Eom et al., 2015). Practices like detailed feasibility studies, stakeholder involvement, and advanced project management techniques contribute to project success (Matto et al., 2021). Effective risk management helps reduce delays, cost overruns, and scope creep, ensuring the timely delivery of key projects (Khamaksorn, 2016). In India, risk management approaches vary among government departments and agencies (Erick, 2022; Fredrick, 2022). Despite ongoing efforts to improve these practices, challenges such as bureaucratic delays, political interference, and corruption can hinder effective risk identification and mitigation (Wang et al., 2022). Nevertheless, there is increasing recognition of the importance of risk management in government projects, especially in sectors like infrastructure and public services (Eom et al., 2015).

In Africa, Nigeria faces significant challenges in implementing effective risk management practices in government projects, including inadequate funding, weak institutional capacity, and regulatory uncertainties (UNCTAD, 2022). The lack of robust risk management frameworks often leads to project failures, delays, and budget overruns (Fredrick, 2022). Efforts are being made to improve risk management through capacity building, adoption of best practices, and strengthening regulatory frameworks (Fewings & Henjewele, 2019). In Kenya, risk management

practices in government projects are gaining prominence, driven by factors such as increased investment in infrastructure development and public sector reforms (Gacheru, 2025). The government has introduced guidelines and frameworks for risk management, emphasizing proactive risk management practices throughout the project lifecycle (UNCTAD, 2022). It is expected that effective risk management contributes to the successful delivery of strategic projects, enhances transparency, and builds investor confidence.

Risk management Practices are essential to the success of the Standard Gauge Railway (SGR) project (UNCTAD, 2022). The SGR project is a major infrastructure endeavor that aims to modernize Tanzania's railway network in order to boost regional connections, encourage economic development, and increase transportation efficiency. The Tanzanian government can improve project performance by minimizing disruptions, allocating resources optimally, and increasing the probability of accomplishing project goals within budgetary and schedule constraints by putting strong risk management practices into place (Kisobere & Badi, 2026). Risk identification, determining risk sources that may affect procurement, risk analysis and assessment, stakeholder involvement in risk management, having clear risk management policies, and risk monitoring, control, and review are some of the best practices in risk management (Kiral, 2025). Thus, this study uses a case study of Tanzania's standard gauge railways to assess risk management practices on the performance of government projects.

1.1 Statement of the Problem

Despite the growing recognition of the importance of risk management in ensuring the successful and value-for-money implementation of government strategic projects, there is still a gap in understanding the effectiveness of these practices, particularly in relation to major infrastructure projects in Tanzania (Oyediran et al., 2026). Although significant investments have been made in the Standard Gauge Railways (SGR) project, limited empirical evidence exists on how risk management practices are implemented and their impact on project performance. Previous studies in Tanzania (Matto et al., 2021) have primarily focused on the challenges and barriers to effective risk management in the construction and renovation of healthcare facilities, such as hospitals, clinics, and health centers. Additionally, research by Zeller and Andersen (2025) assessed the level of adherence to risk management frameworks and standards in Water Supply and Sanitation Projects within the Mwanza region. However, more comprehensive empirical evidence is needed. This study, therefore, aimed to investigate the implementation of risk management practices and their impact on the performance of the government's strategic projects in Tanzania, using the SGR project as a case study.

1.2 Research Questions

i. What are the effects of risk mitigation practices on the performance of the Standard Gauge Railways project in Tanzania?
ii. What are the effects of risk monitoring and evaluation practices on the performance of the Standard Gauge Railways project in Tanzania?

II. LITERATURE REVIEW

2.1 Theoretical Review

The study was informed by the contingency theory developed during the early 1950's by researchers at Ohio State University, who argued that organizations normally work in an uncertain environment, so the best action by the management is to respond to external and internal situations (Merchan, 2019). Contingency theory is a management theory that suggests there is no one universal approach to managing organizations or projects, but rather the most effective approach depends on the specific circumstances (Carroll & Burton, 2012). Additionally, contingency theory stresses the importance of organizational flexibility in responding to changing environmental conditions, suggesting that organizations should be adaptable and open to change to remain competitive and successful in dynamic environments (Jia, 2025).

In the context of the Standard Gauge Railways (SGR) project in Tanzania, contingency theory suggests that the effectiveness of risk management practices depends on specific contextual factors such as project complexity, stakeholder dynamics, regulatory requirements, and environmental conditions. The theory emphasizes the need for organizations to adapt their management practices to fit the unique circumstances of the SGR project, including adapting risk management practices to address specific risks and challenges like land acquisition issues. Overall, contingency theory provides a framework for understanding how contextual factors influence the effectiveness of risk management practices on the performance of the Standard Gauge Railways in Tanzania. By recognizing the importance of context and adaptation, project managers can better align risk management practices with the specific needs and challenges of the SGR project, ultimately enhancing project performance and success.

2.2 Empirical Review

2.2.1 Risk Mitigation Practices and Performance of Construction Projects

Risk mitigation strategies are the actions or options undertaken by the management of the organization to minimize the impact of risks and optimize opportunities of the identified risks (Athumani & Bisama, 2018). For every procurement risk being identified, there must be mitigation strategies in order to minimize the likelihood of occurrences and reduce the impacts of risk if it occurs. A study conducted by Arthur et al. (2021) indicated that procurement risk mitigation practices have a positive and significant relationship with organizational performance, and therefore, the organization needs to ensure that there are appropriate procurement risk mitigation strategies, such as compliance with the preparation and implementation of annual procurement, which consequently reduces procurement risks.

A study by Mkutano and Sang (2018) sought to establish the factors affecting the effectiveness of Risk Mitigation strategies in housing construction projects in Kenya. The research objectives were; to determine the extent to which level of top management support affect effectiveness of risk management in housing construction projects, to establish the extent to which competence of project team affect effectiveness of risk management in housing construction projects, to examine the extent to which project funding affect effectiveness of risk management in housing construction projects and to establish the extent to which project risk management affect effectiveness of risk management in housing construction projects. The study established that a low level of top management support, where project management failed to develop project procedures from the initiation stage, install training programs, establish a project management office, and support quality management, affected the effectiveness of risk management in the Kibera Housing Scheme. Furthermore, Kisobere and Badi (2026) assessed the “Impact of Risk Management Strategies on Performance of Microfinance Institutions in Tanzania”. The study was conducted at FAIDIKA's head office and its branches located in Dar es Salaam and the Coast region. A sample of 57 respondents who are employees of FAIDIKA. Finally, the study discovered that there is a direct relationship between risk management and performance of microfinance institutions, as it was established that risk management practices enhance profitability through improved strategic decision making, a safe operational environment, improved loan recovery, and a strong market position.

2.2.2 Risk Monitoring and Evaluation Practices on Performance of Construction Projects

Study of Tumuhairwe and Ahimbisibwe (2016) sought to investigate the effect of monitoring and evaluation practices on organizational performance. The study revealed that risk monitoring involves the continuous process of identifying, analyzing, planning, and tracking new risks in each stage of the risk management process in order to reduce their likelihood and impact on the procurement process. Adu Gyamfi et al., (2016) conducted a study to assess the causes for delay in the completion of road construction projects in Tanzania. The study involved engineers, consultants, contractors, procurement officers, and financial officers. A convenient sampling technique was utilized to recruit 49 respondents for the sample size. It is concluded that poor specifications or designs have a direct impact on the completion of road construction projects, which can be caused by the failure of consultants to make a significant actual investigation of the site. Also, delays can be caused by improper definitions of the essence of the road project. Moreover, changes in the scope of road projects also lead to delays in the construction of road projects. Changes of scope can be caused by an increase in the distance of the road to be constructed, changes in funding, changes in the interest of the road project, and changes in the demand of the population.

Though numerous research studies elucidated the impact of risk management strategies on construction project performance, only a limited number, such as those conducted by Tumuhairwe and Ahimbisibwe (2016), Adu Gyamfi et al., (2016), and Kisobere and Badi (2026), focused on specific risk management best practices, including risk management, and continuous monitoring practices, and their effects on construction project performances across various study areas. Unfortunately, little had been conducted on how risk management techniques affected the success of government strategic projects, with a particular focus on the new SGR project, Lot One and Two, which ran from Dar es Salaam to the Morogoro region of Tanzania and from Morogoro to Dodoma. This was the area of research that needed to be filled.

III. METHODOLOGY

3.1 Study area

This study was conducted at the Tanzania Railways Corporation (TRC) due to its unique project of Standard Gauge Railway, the major government project for social development and economic growth. The role of TRC in that project is planning, implementation, and management. Therefore, it is a suitable place to secure data for this study. As the government agency, TRC interacts with various stakeholders, such as government agencies, contractors, financiers, and local communities, for executing this project. The staff and other stakeholders contracted for the project were expected to be rich in practical experience in relation to risk management practices, which is the major objective of the study.

3.2 Research Design

The study adopted a case study design. The design allows for an in-depth exploration of the specific context, processes, and dynamics of the SGR project. Researchers can delve deeply into the complexities of risk management practices and their impact on project performance, providing rich and detailed insights that may not be captured through other research designs (Utomwen, 2024). Moreover, case studies enable researchers to take a holistic perspective by considering multiple factors and stakeholders involved in the SGR project, providing a comprehensive understanding of the topic (Mchome & Nzoya, 2023). Finally, the SGR project is a complex and dynamic undertaking with various interconnected components and stakeholders.

3.3 Research Approach

The study utilized a mixed approach whereby a qualitative approach was employed to collect qualitative data from respondents' views using interviews. The quantitative approach was used to collect quantitative data from questionnaires. Employing a mixed-methods approach, which integrates both quantitative and qualitative research techniques, is highly beneficial for studying the effectiveness of risk management practices in the performance of the Standard Gauge Railways (SGR) project in Tanzania. The approach allows for a more comprehensive understanding by leveraging the strengths of both methods. Quantitative research offers numerical insights into risk management practices, such as metrics on risk occurrence, mitigation success, and project performance, while qualitative methods provide a deeper contextual understanding and stakeholder perspectives (Utomwen, 2024).

3.4 Population, Sample, and Sampling Procedure

The study population consisted of 96 stakeholders directly involved in the SGR project, which included the project management team, such as project managers, engineers, planners, risk management personnel, and public relations officers. From the population, a sample of 77 respondents was calculated through the Yamane Formula (Yamane, 1967).

3.5 Data Collection and Analysis

Data were collected using questionnaires, interviews, and documentary analysis. A total of seventy-seven self-developed questionnaires were distributed to project managers, engineers, planners, risk managers, risk officers, compliance officers, public relations managers, and public relations officers for quantitative data. For validation purposes, 15 key-informants' interviews were conducted with risk managers, procurement experts, lawyers, quantity surveyors, and engineers, and supplemented by documentary analysis for project records and reports. The quantitative data were subjected to the statistical package for the Social Sciences (SPSS) version 27.0. for Analysis of Variance (ANOVA) and Chi-square test. Out of 77 questionnaires distributed, 72 were completely filled out and collected back, which makes a response rate of 93%, which is reasonable.

Table 1

The Operation of Variables and Measurement

Variables	Sub variables	Measurement	Data source
Risk Mitigation Practices	Risk avoidance Insurance Risk tolerance Risk Reduction Cost-benefit analysis	5-point Likert scale (1 = strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree and 5 = strongly agree	Managers Engineers Planners Risk officers Compliance officers Public relations officers
Risk monitoring and evaluation Practices	Comprehensive project records Project audit practices Review of project documents project risk trucking system Periodical reporting of project risks	5-point Likert scale (1 = strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree and 5 = strongly agree	Managers Engineers Planners Risk officers Compliance officers Public relations officers
Performance of construction projects	Project completion in Time Quality Construction Operational Efficiency	5-point Likert scale (1 = strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree and 5 = strongly agree	Managers Engineers Planners Risk officers Compliance officers Public relations officers

3.6 Validity and Reliability

To ensure the validity of the study, the researcher utilized content validity by seeking the opinions of experts to check for consistency and to rule out ambiguity and contradiction. This process involved a thorough evaluation of the research instrument to confirm that it adequately covered all the content relevant to the study's objectives. Experts in the field were consulted to provide feedback on the clarity, relevance, and comprehensiveness of the questions included in the questionnaire and interview guide. The researcher carefully considered their insights to refine the research instruments, ensuring that each question aligned with the specific aims of the study and not only enhanced the validity of the instruments but also ensured that the data collected would accurately reflect the perspectives and experiences of the respondents regarding risk management practices in the context of the Standard Gauge Railways project.

3.7 Reliability

Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable (Kothari, 2009). On that note, the test was performed using Cronbach's Alpha test. The reliability was expressed as a coefficient between 0 and 1, with higher coefficients indicating greater reliability of the test. According to Malhotra (2004), a standard minimum value of alpha of 0.6 was recommended. In this study, the researcher ensured reliability by employing the Cronbach's Alpha test. According to the findings in Table 3, the scale measuring risk mitigation practices comprised 5 items, with a Cronbach's Alpha of 0.826. This indicates strong reliability, as the higher value reflects a high level of internal consistency among the items measuring risk mitigation practices. The scale assessing risk monitoring and evaluation practices included 5 items and produced a Cronbach's Alpha of 0.76. Overall, the findings highlight the robustness of the measurement instruments used in this study, reinforcing the validity of the research conclusions.

Table 2

Reliability Test

S/N	Variables	No of Items	Cronbach (Alpha)	Description.
01.	Risk Mitigation Practices	05	.826	Reliable
02.	Risk Monitoring and Evaluation Practices	05	.761	Reliable

3.8 Ethical Consideration

The study observed research ethics and standards both during and following the data-gathering procedure. Before commencing the investigation, the researcher sought approval from the Tanzania Railways Corporation and then provided information to respondents who were allowed to decline participation in the study and to withdraw at any time, which was essential for respecting their autonomy and comfort. Furthermore, the utmost level of information privacy and confidentiality was maintained to ensure that any data collected was not disclosed without permission, safeguarding the participants' rights and fostering trust in the research process.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Demographic information of the respondents

The study examined respondent characteristics, including level of education and relevant work experience. The gender distribution among respondents was relatively balanced, with 56.9% (41) identifying as male and 43.1% (31) as female. This indicates a slight male predominance in the sample, which reflects the gender composition. The academic qualifications of the respondents were predominantly at the bachelor's level, with 34.7% (25) holding a bachelor's degree, while 27.8% (20) had postgraduate qualifications. Those with certificates comprised 23.6% (17) of the sample, and 13.9% (10) held diplomas. This indicates a highly educated workforce, which is essential for the technical and professional demands of TRC. The significant number of employees with higher education could enhance the organization's capabilities in risk management practices. By experience within TRC, 27.8% (20) of respondents had been employed for less than 5 years, and another 27.8% (20) had between 6 and 10 years of service. Additionally, 19.4% (14) had 11 to 15 years of experience, while 25.0% (18) reported over 15 years in the organization. The findings suggest a relatively young workforce in terms of tenure, with a mix of new and experienced employees. This blend can foster knowledge transfer and mentorship opportunities, benefiting organizational performance and employee development.

Finally, the distribution of employment positions indicated that 22.2% (16) of respondents were quantity surveyors, making it the largest group, followed closely by risk managers at 16.7% (12) and procurement experts at 15.3% (11). Lawyers and engineers each constituted 12.5% (9) of the sample, while other positions accounted for 20.8% (15). The varied employment positions reflect the multifaceted nature of operations at TRC, highlighting the importance of collaboration among different roles to achieve organizational objectives. This diversity in professional roles can

contribute to a holistic approach in addressing the challenges faced by TRC. The demographic characteristics of the respondents were presented in Table 3.

Table 3

Demographic Characteristics of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	41	56.9
	Female	31	43.1
		72	100
Education Level	Certificate	17	23.6
	Diploma	10	13.9
	Bachelor's Degree	25	34.7
	Postgraduate	20	27.8
	Total	**72**	**100**
Work Experience (Years)	Less than 5 years	20	27.8
	6–10 years	20	27.8
	11–15 years	14	19.4
	Above 15 years	18	25
	Total	**72**	**100**
Position	Quantity Surveyor	16	22.2
	Risk Manager	12	16.7
	Procurement Expert	11	15.3
	Lawyer	9	12.5
	Engineer	9	12.5
	Others	15	20.8
	Total	**72**	**100**

4.1.2 The Effects of Risk Mitigation Practices on the Performance of Standard Gauge Railways

Descriptive Statistical Analysis: The objective sought to examine the effects of Risk Mitigation Practices on the performance of the Standard Gauge Railway (SGR). The descriptive results in mean and standard deviation are presented in Table 4.

Table 4

The Effects of Risk Mitigation Practices on the Performance of Standard Gauge Railways

CODE	Statements	N	Minimum	Maximum	Mean	SD
RM1	TRC purchased insurance to mitigate risks in Standard Gauge Railways (SGR)	72	1.00	5.00	4.12	0.91
RM2	TRC reduces the risks of Standard Gauge Railways (SGR) through regular risk avoidance	72	1.00	5.00	4.19	0.85
RM3	TRC mitigated the risks of Standard Gauge Railways (SGR) through a risk tolerance strategy	72	1.00	5.00	4.04	0.88
RM4	TRC reduced risks through regular cost-benefit analysis	72	1.00	5.00	4.07	0.89
RM5	Our organization reduces the risks of Standard Gauge Railways (SGR) through regular cost-benefit analysis	72	1.00	5.00	4.11	0.90

The findings in Table 4 showed that risk mitigation practices were widely implemented in the Standard Gauge Railways (SGR) project. Respondents rated the statement "TRC purchased insurance to mitigate risks in Standard Gauge Railways (SGR)" with a mean of 4.12 and a standard deviation of 0.91, indicating that risk mitigation through insurance was generally agreed upon as a significant step. The relatively low standard deviation also suggests consistency in responses, implying a broad consensus among respondents on the value of insurance as a vital component of the project's risk management strategy. To support an argument, one of the interview respondents stated that

> *TRC has indeed taken proactive steps to mitigate risks by purchasing insurance for the Standard Gauge Railways (SGR). The insurance acts as a financial safeguard, allowing us to address incidents more effectively without disrupting the project's budget or timeline* (Risk Manager TRC, February, 2024).

The interview results support the descriptive results on the risk mitigation practices for project performance. By having this insurance in place, TRC is in a better position to handle accidents, structural issues, or even environmental impacts that could otherwise result in heavy losses. The above findings aligned with past studies, such as Min (2024) in

a case study on the Gautrain railway project in South Africa, also highlighted insurance as a common and effective risk mitigation tool in large infrastructure projects, underscoring the need to secure financial protection against unforeseen project-related events and practices, and underscores its commitment to maintaining the project's performance and resilience.

4.2.2 Chi-Square Test on Risk Mitigation Practices

A Chi-square test was employed to assess the strength of association between risk mitigation practices and the performance of the Standard Gauge Railways (SGR) Lot One project, which spans from Dar es Salaam to Morogoro. The results revealed a robust association, with a Chi-square statistic of $\chi 2(6, N=72) = 297.812$, $p<.05$. This indicates a significant relationship between the implementation of risk mitigation practices and the performance outcomes of the project, underscoring the importance of effective risk management in enhancing project efficacy.

The findings suggest that as the level of risk mitigation practices increases, so performs the SGR Lot One project. This correlation highlights the critical role that risk management strategies play in addressing potential challenges and uncertainties associated with large infrastructure projects. The significant p-value confirms that the observed relationship is unlikely to have occurred by chance, thereby reinforcing the notion that well-structured risk mitigation practices can positively impact project outcomes. In addition, the strength of the association emphasizes the necessity for the Tanzania Railway Corporation (TRC) to continue prioritizing risk mitigation strategies to ensure the successful completion and operation of the SGR project.

Table 5

Chi-Square Test Statistics on Risk Mitigation Practices

Risk Mitigation Practices	**Value**
Chi-Square	11.07
Degrees of Freedom (df)	5
Asymptotic Significance (p-value)	.000
Cells with Expected Frequency < 5	0 (0.0%)
Minimum Expected Cell Frequency	26.1

4.2.3 A One-way ANOVA for Risk Mitigation Practices

A One-way ANOVA was conducted to assess the mean differences in Risk Mitigation Practices and their impact on the Performance of the Standard Gauge Railways (SGR). The findings were presented in Table 6.

Table 6

A One-way ANOVA for Risk Mitigation Practices

Risk Mitigation Practices and Project Completion in Time					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	11.241	5	1.128	1.721	0.011
Within Groups	179.345	67	0.655		
Total	191.874	72			
Risk Mitigation Practices and Quality Construction					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	9.320	5	0.989	1.990	0.040
Within Groups	225.186	67	0.826		
Total	234.098	72			
Risk Mitigation Practices and Operational Efficiency					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	47.268	5	5.333	1.250	0.015
Within Groups	1112.054	72	4.895		
Total	1167.43	72			
$p < .05$					

The measurement parameters for this analysis were based on responses gathered from a Likert scale (0-5) that captured individual opinions on various risk mitigation strategies. These responses were then aggregated to calculate group means, as detailed in Table 6. The results revealed significant differences in the impact of Risk Mitigation Practices on three key performance areas of the Standard Gauge Railway (SGR) project: Project Completion in Time, Quality Construction, and Operational Efficiency. Each of these areas has been analyzed in terms of mean squares, F-

values, and significance levels ($p < .05$), revealing varying degrees of association between risk mitigation efforts and project outcomes.

The ANOVA results show a significant impact of risk mitigation practices on timely project completion, with an F-value of 1.721 and a significance level of 0.011 ($p < .05$). The sum of squares between groups is 11.241, and the mean square is 1.128. The analysis shows that risk mitigation practices significantly affect the quality of construction for the SGR project, with an F-value of 1.990 and a significance level of 0.040 ($p < .05$). The sum of squares between groups is 9.320, with a mean square of 0.989.

This finding highlights that risk management strategies play a critical role in maintaining construction quality. Regular cost-benefit analysis, for instance, likely contributes to a higher standard by ensuring that project risks are assessed in advance, allowing adjustments to be made to uphold quality. A study on the Haramain High-Speed Railway Project in Saudi Arabia (Al Harbi, 2014) similarly found that structured risk mitigation efforts, including quality control measures, improved construction standards significantly. The ANOVA results reveal a strong link between risk mitigation practices and operational efficiency, with an F-value of 1.250 and a significance level of 0.015 ($p < .05$). Here, the sum of squares between groups is 47.268, with a mean square of 5.333, indicating significant variation in operational efficiency due to risk mitigation practices. These practices ensure efficient project performance by minimizing disruptions and improving operational workflows.

4.3 The Effects of Risk monitoring and evaluation Practices on the Performance of Standard Gauge Railways

4.3.1 Descriptive Statistical Analysis

The objective examined the effects of Risk Mitigation Practices on the performance of the Standard Gauge Railway (SGR). The descriptive statistical analysis with a mean score ranging from 1.0 to 2.4 was categorized as "Strongly Disagree" or "Disagree" on a continuous Likert scale ($1.0 \leq SD < 2.4$). A mean score from 2.5 to 3.4 was classified as "Neutral" ($2.5 \leq N < 3.4$). In contrast, a variable with a mean score from 3.5 to 5.0 was classified under both "Agree" and "Strongly Agree" ($3.5 \leq A < 5.0$). See results in Table 7.

Table 7

Effects of Risk Monitoring and Evaluation Practices on Performance of Standard Gauge Railways

CODE	Statements	N	Min	Max	Mean	SD
ERM 1	TRC uses comprehensive project records to reduce risks in Standard Gauge Railways (SGR)	72	1.00	5.00	4.14	0.78
ERM 2	TRC conducts project audits to reduce risks in Standard Gauge Railways (SGR)	72	1.00	5.00	4.10	0.80
ERM 3	TRC conducts a comprehensive review of SGR documents to minimize risk	72	2.00	5.00	4.23	0.77
ERM 4	TRC tends to track SGR risks	72	1.00	5.00	4.06	0.82
ERM 5	TRC has practices of reporting SGR risks	72	1.00	5.00	4.12	0.84

The findings in Table 7 showed that various risk management practices were implemented by the Tanzania Railways Corporation (TRC) to mitigate risks associated with the Standard Gauge Railway (SGR) project from Dar es Salaam to Morogoro. Specifically, comprehensive project record-keeping (ERM5) demonstrated a high mean of 4.14 and a standard deviation of 0.78, indicating consistency among respondents in recognizing the effectiveness of thorough record management as a risk reduction strategy. To support an argument, one of the interview respondents stated that

> *"Our approach at TRC has always been to maintain comprehensive project records for the Standard Gauge Railway. By doing this, we make sure that no detail is overlooked, which is crucial for risk reduction (*Quantity Surveyor TRC, February, 2024).

The interview results verify the descriptive results about the SGR record management as a means to reduce risk and improve project performance. A similar strategy was observed in the Marmaray Rail Project in Turkey, where extensive project documentation was integral to minimizing operational risks and delays (Çolakoğlu, 2024). Additionally, project audits (ERM2) scored a mean of 4.10 with a standard deviation of 0.80, reflecting respondents' agreement that audits play a crucial role in maintaining project integrity and identifying risks proactively. Regular audits provide an external verification process that can uncover areas of improvement, leading to better project alignment with risk management goals. In addition to the findings, one of the interview respondents stated that

> *"Conducting project audits and project documents review regularly allows us to stay ahead of any potential issues within the SGR project. These practices serve as checkpoints, giving us a detailed look into how different phases of the project are performing in terms of risk."* (Engineer TRC February, 2024).

The interview results support the descriptive results on project audit and project documents review as risk monitoring and evaluation strategies. The approach concurs with the practice in the East Coast Rail Link (ECRL) Project

in Malaysia, where audit processes were pivotal in identifying and managing risk factors during construction phases (Aisiang, 2024). About the project document reviews, the measure concurs with the Gautrain Rapid Rail Link Project in South Africa, rigorous document reviews were fundamental to identifying gaps in risk management plans, ensuring smoother project implementation (Phiri, 2022), and the China-Pakistan Economic Corridor (CPEC) Railway adopted the same in addressing issues proactively and maintaining project flow (Khan, 2022).

4.3.2 Chi-Square Test on Monitoring and Evaluation Practices

A Chi-square test was conducted to assess the strength of association between monitoring and evaluation practices and the performance of the Standard Gauge Railways. The results indicated a strong association, with a Chi-square value of $\chi 2(5, N=72) = 280.471$, and a significance level of $p<.05p$. These findings, summarized in Table 8, suggest that effective monitoring and evaluation practices are significantly linked to improved performance outcomes for the Standard Gauge Railways.

Table 8

Chi-Square Test Statistics on Monitoring and Evaluation Practices

	Monitoring and Evaluation Practices
Chi-Square	11.07[a]
df	5
Asymp. Sig.	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 21.8.	
$p < .05$	

4.3.3 One-way ANOVA for Monitoring and Evaluation Practices

A One-way ANOVA was conducted to examine the mean differences between the measurement parameters of monitoring and evaluation practices and the performance of the Standard Gauge Railways. The measurement parameters were derived from responses to individual questions on a Likert scale (0-5), which were aggregated to calculate a group mean. The results of this analysis are presented in Table 9.

Table 9

One-way ANOVA for Monitoring and Evaluation Practices

Monitoring and Evaluation Practices and Project Completion in Time					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	20.98	5	1.888	2.248	0.035
Within Groups	169.778	67	0.540		
Total	190.759	72			
Monitoring and Evaluation Practices and Quality Construction					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	13.539	5	1.163	1.678	0.023
Within Groups	214.882	67	0.792		
Total	228.421	72			
Monitoring and Evaluation Practices and Operational Efficiency					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	49.321	5	4.593	0.795	0.037
Within Groups	1117.629	67	4.490		
Total	1166.95	72			
$p < .05$					

The analysis of variance (ANOVA) results in Table 9 shows significant associations between monitoring and evaluation (M&E) practices and various performance aspects of the Standard Gauge Railways (SGR) project, including project completion in time, quality of construction, and operational efficiency. The findings for each performance aspect are as follows: The ANOVA results indicate a statistically significant relationship between M&E practices and timely project completion, with $F(11,249) = 2.248F$ and $p=0.035$. The sum of squares between groups is 20.98, with a mean square of 1.888, while the sum of squares within groups is 169.778, with a mean square of 0.540. These findings imply that M&E practices are positively associated with the timely completion of the SGR project. Effective monitoring and

evaluation practices likely help in identifying and addressing delays, facilitating adherence to project timelines, a result echoed by studies on the Gautrain railway project in South Africa, which demonstrated similar improvements in scheduling due to robust M&E processes (Phiri, 2022).

4.4 The Performance of Standard Gauge Railways

4.4.1 Descriptive Statistical Analysis

The study assessed the performance of the Standard Gauge Railway (SGR) Lot One project, spanning from Dar es Salaam to Morogoro, to gauge its effectiveness and efficiency in meeting projected benchmarks. This evaluation was crucial because the SGR project represents a significant infrastructural investment intended to enhance regional connectivity, economic growth, and transportation efficiency within Tanzania. Given its strategic importance, understanding the extent of the project's performance helps in identifying areas of success as well as those needing improvement, which can inform decision-making for future infrastructure initiatives. By providing insights into these aspects, the study contributes valuable knowledge that can guide the management of similar projects within the region.

To achieve this, the study employed descriptive statistical analysis based on the information collected from respondents who participated in a survey designed to gauge their perceptions on this topic. A variable with a mean score ranging from 1.0 to 2.4 was categorized as "Strongly Disagree" or "Disagree" on a continuous Likert scale ($1.0 \leq SD < 2.4$). A mean score from 2.5 to 3.4 was classified as "Neutral" ($2.5 \leq N < 3.4$). In contrast, a variable with a mean score from 3.5 to 5.0 was classified under both "Agree" and "Strongly Agree" ($3.5 \leq A < 5.0$). See results in Table 10.

Table 10

Performance of the Standard Gauge Railway (SGR)

CODE	Statements	N	Min	Max	Mean	SD
PS01	SGR quality has improved through effective risk management practices	72	1.00	4.00	4.16	0.73
PS02	The cost of SGR projects has been saved through effective risk management practices	72	2.00	5.00	4.10	0.82
PS03	SGR projects are completed on time	72	3.00	5.00	4.19	0.75

The findings in Table 10 indicate that the Standard Gauge Railway (SGR) quality has notably improved through effective risk management practices, with a mean score of 4.16 and a standard deviation of 0.73. This suggests a strong consensus among respondents that risk management is positively impacting the quality of the SGR project. The relatively low standard deviation further implies that there is minimal variation in the responses, indicating that most respondents agree on the effectiveness of these practices. This aligns with existing literature, such as the study by Barde and Barde (2012), which examined the Guangzhou–Shenzhen–Hong Kong Express Rail Link project in China, highlighting that robust risk management strategies significantly enhance project quality by proactively addressing potential challenges.

Additionally, the data reveals that SGR projects have realized cost savings through effective risk management practices, reflected in a mean of 4.10 and a standard deviation of 0.82. The positive perception of cost savings suggests that the implementation of risk management measures is not only improving quality but also optimizing financial resources allocated to the project. Furthermore, the study indicates that SGR projects are completed promptly, with a mean score of 4.19 and a standard deviation of 0.75. This high mean reflects a strong belief among participants that effective risk management contributes to adherence to timelines and project schedules. Timeliness is a critical aspect of project success. The consistent results across these three key metrics—quality improvement, cost savings, and timely completion—imply that the integration of effective risk management practices into the SGR project is essential for achieving overall project success. This underscores the necessity for project managers to prioritize risk management as a strategic tool in the execution of infrastructure projects.

4.2. Discussion

4.2.1 The Effects of Risk Mitigation Practices on Performance of Standard Gauge Railways

The study's findings indicate that risk mitigation practices have a significant positive effect on the performance of the Standard Gauge Railways (SGR) Lot One project, extending from Dar es Salaam to Morogoro. Risk mitigation practices involve proactive strategies to minimize or eliminate identified risks, leading to improved project outcomes. This aligns with the findings of Yuan (2023), who examined the Abuja-Kaduna railway project in Nigeria, concluding that effective risk mitigation led to cost savings and enhanced project timelines. These results support the principles of Contingency Theory, which posits that organizations need to develop tailored responses to environmental uncertainties to ensure project success.

The data from the SGR project demonstrates that effective risk mitigation practices contribute to critical performance metrics, including project quality, cost management, and schedule adherence. Implementing preventive

measures allows project teams to handle potential challenges proactively, thereby reducing the likelihood of project delays or budget overruns. This finding aligns with Adoh (2019) research on the Addis Ababa Light Rail project in Ethiopia, which found that projects with well-developed risk mitigation practices experienced smoother execution and fewer interruptions. This relationship resonates with Systems Theory, emphasizing the importance of interconnectedness in project components to achieve seamless performance.

In addition, risk mitigation practices foster resilience within the project team, equipping them to better manage unexpected changes. For example, by establishing contingency plans and risk response strategies, the SGR project team is better positioned to address sudden disruptions without compromising quality or operational efficiency. A study by Krüger et al., (2021) on the Dar es Salaam Rapid Transit (DART) project also highlighted that structured risk mitigation practices resulted in operational stability and timely project delivery. This is consistent with the Resource-Based View (RBV) theory, which suggests that strategic resources, such as skilled risk management practices, are essential for sustained project performance.

Effective risk mitigation practices also improve stakeholder confidence and investment interest. For example, project teams that can demonstrate active risk management attract more support from stakeholders who see reduced risk as an indicator of project viability and stability. Keys (2024) illustrated this in their study on the Melbourne Metro Tunnel project in Australia, where visible risk mitigation efforts boosted investor confidence and stakeholder satisfaction. This finding aligns with Stakeholder Theory, which underscores the value of managing project risks to build trust and secure ongoing support from project stakeholders.

4.2.2 The Effects of Risk Monitoring and Evaluation Practices on Performance of Standard Gauge Railways

The analysis of risk monitoring and evaluation practices highlights their significant impact on the performance of the Standard Gauge Railways (SGR) Lot One project from Dar es Salaam to Morogoro. Effective monitoring and evaluation (M&E) practices ensure that identified risks are continuously tracked and assessed, enabling project teams to make timely adjustments. This finding aligns with Kwafo (2021), who examined the Ghana Eastern Corridor rail project and concluded that ongoing M&E practices allow for better risk response and mitigation, reducing delays and cost overruns. This connection reflects the Control Theory, which emphasizes that continuous feedback and adjustment are essential for managing risks in dynamic projects.

The study findings indicate that a proactive M&E approach enhances several performance metrics, including adherence to budget, project quality, and completion timelines. The high mean values for risk monitoring practices in this study suggest that respondents perceive M&E practices as critical for achieving project objectives. Supporting this perspective, a study by Oluchukwu and Pillah (2025) on the Nigerian Kaduna-Abuja railway project found that projects with structured risk M&E practices were more likely to complete on time and within budget. This aligns with the Project Management Body of Knowledge framework, which underscores the importance of monitoring and controlling processes in managing project risks effectively (Chadee et al., 2025)

Furthermore, effective M&E practices contribute to continuous improvement within project teams, as regular risk assessments reveal areas for potential enhancements. This aspect aligns with the findings of Jalil (2023), who studied the impact of M&E practices on the Kuala Lumpur–Singapore high-speed rail project. Their study demonstrated that systematic risk evaluation helped project teams refine their processes, which contributed to enhanced operational efficiency. This finding resonates with Continuous Improvement Theory, where iterative risk evaluations lead to progressive improvements in project practices and outcomes.

Risk monitoring and evaluation practices also foster transparency and accountability, strengthening stakeholder confidence in project management. A study by Wang et al. (2022) on the Beijing–Shanghai high-speed railway project found that frequent M&E reporting increased stakeholder trust, as project progress and risk-handling practices were communicated openly. This aspect of risk management supports the Agency Theory, which posits that effective communication and transparency help align stakeholders' expectations and reduce conflicts in project settings.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

The study concludes that the effectiveness of risk management practices—specifically, risk identification, mitigation, monitoring, and evaluation—has a substantial impact on the performance of strategic government projects, as evidenced by the Standard Gauge Railway (SGR) Lot One project from Dar es Salaam to Morogoro. Effective risk identification allows project teams to proactively recognize potential issues, enabling timely responses that prevent costly disruptions. The study further concludes that well-implemented risk mitigation strategies help streamline project timelines and reduce expenditures by addressing foreseeable obstacles before they escalate.

Moreover, the findings emphasize the importance of ongoing risk monitoring and evaluation. These practices not only ensure that emerging risks are managed promptly but also foster a culture of accountability and transparency,

thereby building stakeholder confidence. The positive correlations observed between these risk management practices and project performance suggest that adopting a comprehensive approach to risk management is crucial for achieving project objectives within expected budgets and timeframes. Overall, this study reinforces the view that robust risk management is essential for the successful completion of large-scale infrastructure projects. The conclusions align with both Contingency Theory, which advocates for adaptive strategies in dynamic project environments, and System Theory, which emphasizes the need for a holistic approach to manage interdependencies within complex projects. As such, the study recommends that government and project managers consistently integrate risk management practices into project planning and execution to enhance the success and sustainability of strategic infrastructure projects.

5.2 Recommendations

Based on the findings, the following recommendations are proposed for the Tanzania Railways Corporation (TRC) and relevant stakeholders to strengthen the effectiveness of risk management practices and improve the performance of strategic infrastructure projects like the Standard Gauge Railway (SGR). Equipping project managers and other relevant personnel with specialized training in risk management frameworks would empower them with the skills necessary to anticipate potential risks early in the project. Establishing a standardized risk management framework tailored to the specific needs of TRC's large-scale railway projects is essential for maintaining a structured approach to risk handling. Adoption of a proactive approach to risk monitoring and evaluation by establishing scheduled intervals for assessing risks throughout the entire project lifecycle. The establishment of an effective risk management relies heavily on strong communication and reporting mechanisms to facilitate the timely sharing of critical risk-related information. TRC should work to enhance communication channels between its project teams, contractors, and other key stakeholders, ensuring that all parties are well-informed and able to collaborate seamlessly.

A structured reporting system could be implemented to standardize how risks are identified, documented, and escalated, allowing teams to respond more effectively. This system would ensure that risks are escalated to the appropriate level of management swiftly, allowing for prompt decision-making and support where necessary. Furthermore, regular risk briefings and cross-departmental meetings could be introduced to foster transparency and alignment among stakeholders, reducing the chances of information silos. This enhanced communication structure would not only improve project efficiency but also foster a collaborative environment, where team members feel empowered to report and respond to risks as they arise. Through a well-coordinated communication and reporting framework, TRC can mitigate project delays and quality issues effectively. Further study may investigate the effectiveness of risk management practices in road construction projects in Tanzania, which are coordinated by the Tanzania Roads Agency.

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