Risks Management Practices on Performance of Road Projects of Kenya Rural Roads Authority in Nakuru Region Kenya

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ABSTRACT

Successful road project implementation improves traffic safety and road quality. The performance of road projects of Kenya Rural Roads Authority helps to improve the living conditions of the local population. However, the performance of road projects of Kenya Rural Roads Authority in Nakuru has been fraught with difficulties, which has hampered the quality of the roads that have been built. Delays in project completion, cost overruns, poor quality projects, disputes, litigation, and, in some cases, complete project abandonment. Therefore, the main purpose of this study was to investigate the effect of risks management practices on performance of road projects of Kenya Rural Roads Authority in Nakuru Region Kenya. The study was guided by the following objectives; to assess the effect of risk identification on performance of road projects of Kenya Rural Roads Authority and to establish the effect of risk mitigation policy on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya. The study was guided by the following theories; Uncertain theory, Project Management Competency Theory, agency theory and Control Theory. This study used descriptive survey research design. The accessible population were 208 employees. The sample size was 136 respondents. The researcher used a questionnaire as the main research instrument. The completed questionnaires were entered into the Statistical Package for Social Sciences (SPSS) Version 25 for coding. Data analysis involved both descriptive and inferential statistical methods. Descriptive statistics were employed to summarize the quantitative data, providing a meaningful representation of the score distribution. These included frequencies, means, and standard deviations. For inferential statistics, correlation and multiple regression analyses were utilized. The analyzed data was presented using percentages, means, and standard deviations through frequency tables. The outcomes of this study are expected to aid the Government, specifically the Ministry of Transport and Public Works, in enhancing the quality of road

construction in the county. This study would equally aid the county government in formulating policies and guidelines on how roads are supposed to be constructed with minimal risk. It was concluded that risk management practices are positive correlates of performance of road projects at KeRRA. It was recommended that in order to ensure timely completion of road projects at KeRRA within established quality standards, personnel and budget as well as schedule risks should be carefully identified by the project managers. There is need for accurate estimation of all costs during risk measurement to avoid cost overruns that may negatively affect the quality of the roads constructed by KeRRA. Project managers working with KeRRA should optimally leverage the existing methods of risk mitigation including avoidance, transfer and acceptance depending on the prevailing circumstances in order to enhance the quality and timeliness of the road projects. There is need for sound policies governing risk management activities at KeRRA.

1. Introduction

The successful completion of road projects is crucial for economic development, as roads serve as vital infrastructure for transportation and commerce. However, road construction projects are often exposed to various risks that can significantly impact their performance. These risks include financial uncertainties, environmental factors, and project management challenges, which can lead to cost overruns, delays, and compromised quality. Effective risk management practices are therefore essential to mitigate these potential setbacks and ensure that road projects are completed on time, within budget, and to the required standards. According to Zou, Zhang, and Wang (2017), risk management in construction projects involves identifying potential risks, assessing their impacts, and implementing strategies to manage or mitigate these risks throughout the project lifecycle.

In the context of road projects, the implementation of risk management practices is particularly critical given the complexity and scale of such projects. Road construction often involves multiple stakeholders, including government agencies, contractors, suppliers, and local communities, each with their own interests and risk exposures. The diverse nature of these stakeholders can complicate the risk management process, making it necessary for project managers to adopt comprehensive and systematic approaches to risk identification and mitigation. According to PMI (2017), a structured risk management process can help in anticipating potential challenges, improving decision-making, and enhancing the overall performance of the project.

Globally, managing risks in infrastructure construction projects is vital across various countries to ensure successful outcomes in terms of time, cost, quality, and scope. In India, risk management is integral to meeting project objectives, with a focus on addressing social opposition, design changes, and work suspensions through collaboration from the feasibility stage (Pawar & Patil, 2018). In Malaysia, the road sector struggles with service delivery due to inadequate risk mitigation practices and the industry's inherent complexities (Sudarsana et al., 2014). Similarly, in France, evolving transport infrastructure planning, influenced by privatization and European reforms, necessitates early risk identification and mitigation strategies (Cagliano et al., 2015). Australia's shift towards alternative procurement methods like design-build has increased uncertainty, highlighting the need for improved planning and stakeholder support to ensure long-term project success (Wilcox et al., 2013). In China, project risk management is crucial but remains largely theoretical,

focusing on financial, design, and contractual risks that challenge the industry's ability to meet project goals (Vishwakarma et al., 2016).

Regionally, Effective risk identification is crucial for the success of road projects in diverse contexts across Africa, where challenges such as inadequate infrastructure, political instability, and financial constraints are prevalent. In Nigeria, understanding and addressing these risks through collaboration with stakeholders is essential to meet project timelines and budgets (Muhammad & Johar, 2019; Khodeir & Nabawy, 2019; Taofeeq, Adeleke & Hassan, 2019). Similarly, in Lesotho and Uganda, construction projects suffer from poor risk measurement and management, leading to delays and cost overruns, underscoring the need for skilled project managers and advanced risk assessment techniques (Awuzie & McDermott, 2016; Nketekete, Emuze & Smallwood, 2016; Alinaitwe, Apolot & Tindiwensi, 2013; Umutoni, 2014). In South Africa, the effectiveness of risk mitigation in transportation projects directly impacts socio-economic mobility, with failures often tied to underestimations and corruption (Coe & Yeung, 2015; SANRAL, 2019/2020; Murwira & Bekker, 2017). Meanwhile, Tanzania faces significant road safety risks, highlighting the need for better risk governance to support development and improve safety outcomes (Uganda, Sarema & Ezra, 2013; Lehtiranta & Junnonen, 2014; Chileshe & Kikwasi, 2014)

In Kenya, county-level road construction projects face significant implementation challenges, partly due to inadequate performance measurement systems (Ford, 2018). While infrastructure development is crucial for economic growth and aligned with Vision 2030, government-funded projects often suffer from delays and high costs (Mbaabu, 2012; Yung & Chan, 2012). Risk mitigation practices, such as cost estimation and dispute resolution, are vital but have mixed effects on project performance (Mesfin, 2014; Olson & Wu, 2015). Critical factors like government policies, funding, and participatory planning are statistically linked to the successful implementation of public infrastructure projects (Onyango, Bwisa & Orwa, 2017). In Nakuru, technical skills, organizational culture, and funding are especially influential in road project performance (Mabel, 2014; Mauki, 2014). Monitoring and evaluation personnel are essential for effective project execution, while poor contractor workmanship can negatively impact outcomes (Kamau & Mohamed, 2015; Kariuki, 2015). In Kenya, the management of road projects has faced various challenges related to risk, particularly in rural areas where factors such as inadequate funding, poor project planning, and lack of skilled personnel are prevalent. The Kenya Rural Roads Authority (KeRRA) is responsible for managing road projects in these areas, and the effectiveness of its risk management practices has a direct impact on the performance of these projects. Previous studies have indicated that poor risk management practices contribute to delays, increased costs, and reduced quality in road projects (Ngacho & Das, 2014). Therefore, there is a need to examine the current risk management practices employed by KeRRA and their impact on the performance of road projects in regions like Nakuru, to identify areas for improvement and enhance project outcomes.

Statement of the Problem

The effective execution of road projects by the Kenya Rural Roads Authority enhances both traffic safety and the overall quality of the roads. These projects play a crucial role in improving the living conditions of the local residents. The investments in the implementation of these road projects have generated significant short-term employment opportunities and have stimulated local economic growth. This growth is attributed to better access to social and economic facilities and services, as well as the creation of long-term employment opportunities. Performance of road projects of Kenya Rural Roads Authority in Nakuru have faced challenges which affect the quality of implemented roads, such as delays in project completion, time overrun, cost overrun, poor quality projects, disputes, litigation, and in some cases complete abandonment of projects. These factors have led to failing to achieve the demanded quality performance of road projects of Kenya Rural Roads Authority in the Nakuru Region. This is manifested by poor road projects implementation in the region and failure in realizing intended benefits, restraining economic growth. The implementation faces risk factors right from the project inception stage to the project handover stage upon completion.

Lack of effective risk mitigation leads increased project costs, delayed project completion, reduced appetite by commercial banks to fund projects, injuries and accidents and poor delivery of final product. As a result of these challenges, public projects attract less direct investment by private players which may hinder the Government's good intention to provide suitable infrastructure to the citizens. A good example is the construction of and upgrading to bitumen standard of Njoro- Beeston- Nesuit/ Beeston- Lawina- Elburgon/ Mauche- Sururu Roads (RWC 641) where 35% of the project period has lapsed with the progress being at just 02%. Another road project Kiti (Jcn B8) – Mawanga – Murunyu – Bavuni – Githioro Road where, despite the project period being 112%, the progress is still at 42.721% with a lag of 69.28%. Similarly, the few projects that are completed often face issues such as scope creep, cost overruns, substandard workmanship, and delays (Dandan, Sweis, Sukkari & Sweis, 2019).

Numerous prior studies have examined project implementation. For instance, Wambui, Ombui, and Kagiri (2015) investigated factors affecting the completion of road construction projects in Nairobi City County, focusing on the Kenya Urban Roads Authority (KURA). Their study revealed that resource management significantly impacts the performance of construction companies. Mwangi (2016) explored factors influencing contractor performance in the road construction sector, examining selected contractors in Kenya. He found that political interference and insufficient funding hindered the completion of KeRRA activities, despite the full implementation of procurement policies. Nevertheless, there remains a need to specifically investigate the effect of risk mitigation strategies on road construction implementation in Nakuru. Given the financial and temporal waste, along with the declining quality of roads in the county, it is crucial to research risk management practices to address issues such as poor road quality, cost overruns, and project delays in the region.

Objectives of the Study

The study was guided by the general as well as specific objectives;

General Objective

The main objective of this study was to investigate the effect of risks management practices on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya.

Specific Objectives

i.   To assess the effect of risk identification on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya.
ii. To establish the effect of risk mitigation on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya.

Research Hypotheses

H_{01}: Risk identification has no effect on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya.

H_{02}: Risk mitigation has no effect on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya.

LITERATURE REVIEW

Theoretical Review

The research was anchored towards uncertain theory and agency theory.

Uncertain Theory

Uncertainty Theory, introduced by Liu (2010), emerged as a framework to address the broadening scope of uncertainty. Li and Liu (2009) applied this theory to define the truth value of a proposition as the uncertain measure of its validity. Liu further developed the concept of "uncertain entailment," which helps determine the truth of an uncertain formula based on the truth values of other related uncertain formulae. In project management, addressing uncertainty has long been a priority. The 1950s saw the introduction of activity network approaches like PERT (Program Evaluation and Review Technique) to account for variations in task durations. By the 1960s, probabilistic branching techniques, such as the Graphical Evaluation and Review Technique, were introduced. Later, tools like the Synergistic Contingency Evaluation and Review Technique and Analysis of Potential Problems were developed to help project managers prepare for uncertainties through risk mitigation and contingency planning (Henriksen & Uhlenfeldt, 2006).

The abundance of knowledge in project management today has enhanced our ability to effectively manage large, high-risk projects using strategies like the Critical Path Method (CPM). Techniques such as contract formalization, responsibility charts, and conflict

management play crucial roles in managing stakeholder relationships, particularly under conditions of unidentified uncertainty. For instance, one project team used the strategy of "proactively occupying the white spaces" in contracts, allowing them to anticipate uncertainties and incorporate contingencies ahead of other stakeholders (Prinsolo, 2015). Managing predicted uncertainties involves risk management, identifying potential risks, and implementing preventive measures. It also requires continuous tracking of project progress, communication with stakeholders about risks, and the ability to address issues as they arise, underscoring the importance of risk identification in project performance (Schrøder, 2015).

Agency Theory

Smith and Stulz (1985) introduced agency theory, which extends the analysis of firms by considering the separation of ownership and control, as well as the motivations of managers. In the context of corporate risk management, agency issues can significantly influence how managers approach risk-taking and hedging. The theory highlights potential conflicts of interest among shareholders, management, and debt holders due to uneven earnings distribution, which may lead to either excessive risk-taking or the neglect of value-positive projects (Mayers & Smith, 2012). Therefore, well-defined hedging policies are crucial for enhancing firm value (Fite & Pfleiderer, 1995).

Agency theory also suggests that agents, driven by self-interest and bounded rationality, often have goals and risk preferences that differ from those of the principals who hire them (Payne & Petrenko, 2019). This divergence can lead to suboptimal outcomes in the principal-agent relationship due to conflicts of interest and information asymmetry. To address these agency costs, mechanisms such as monitoring and incentive alignment are implemented to reduce opportunistic behavior (Kallmuenzer, 2015). In project management, agency risk can be minimized by fostering competition among managers or by separating management and risk-bearing responsibilities as the project size increases (Hamimah, 2010; Minato, 2012).

However, agency theory has its critics who argue that its control mechanisms, while designed to protect shareholder interests, can be both costly and economically inefficient. These mechanisms may hinder strategic decisions, limit collective action, distort investment strategies, and neglect other stakeholders' interests, thereby undermining their commitment to creating economic value (Kultys, 2016). Additionally, some scholars argue that the theory overlooks the fact that stakeholders other than shareholders, who also bear risks and contribute vital resources, play a crucial role in the firm's operations, a viewpoint that aligns more closely with stakeholder theory (Bosse & Phillips, 2016).

Conceptual Framework

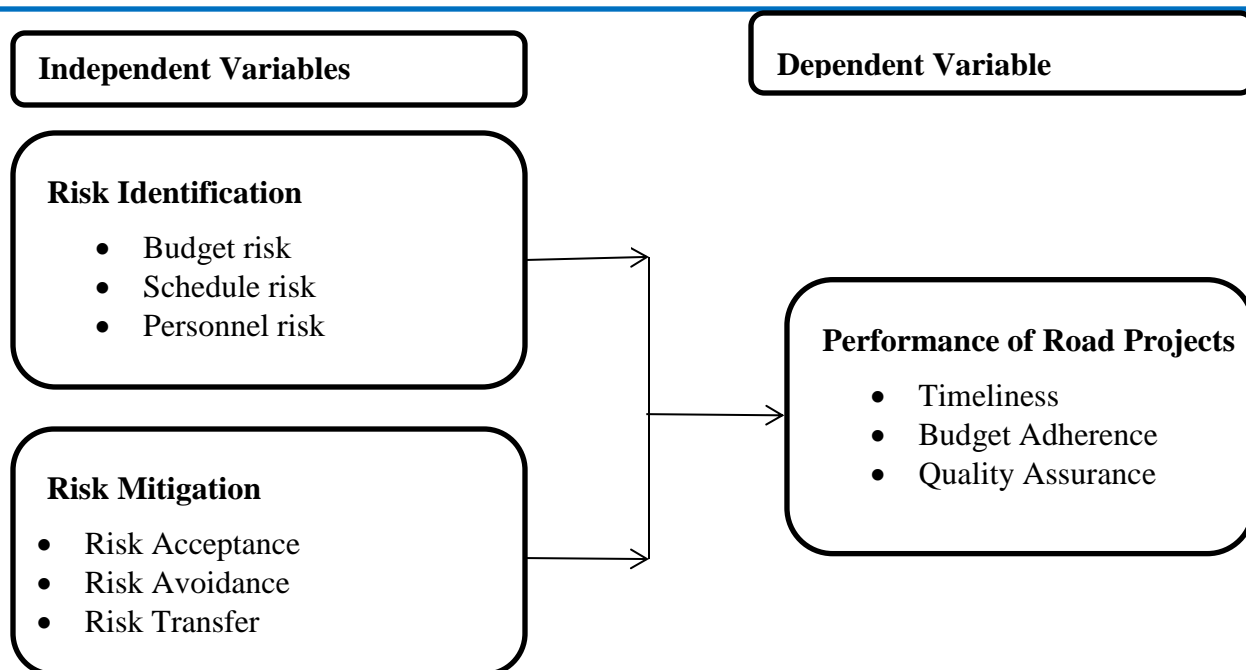The conceptual framework of the study is shown in Figure 1

Independent Variables		Dependent Variable

Risk Identification

- Budget risk
- Schedule risk
- Personnel risk

Performance of Road Projects

- Timeliness
- Budget Adherence
- Quality Assurance

Risk Mitigation

- Risk Acceptance
- Risk Avoidance
- Risk Transfer

Figure 1: Conceptual Framework

2. Empirical Literature Review

Risk Identification

Dindar and Bilge (2018) did a case study to investigate risk identification and assessment in highway construction projects. The researchers collected data from a specific highway construction project in Turkey, utilizing a combination of interviews, document analysis, and observations to identify and assess potential risks. The study identified various risk factors in the examined highway construction project, including issues related to design changes, weather conditions, and unforeseen geological challenges. The study emphasized the importance of proactive risk identification and assessment for effective project management, suggesting that early risk recognition allows for the development of mitigation strategies and improved project outcomes. This work highlights the significance of systematically addressing risks in road construction projects to ensure their successful implementation and timely completion.

Alimov and Hegazi (2017) conducted a comprehensive literature review to explore the current state of risk management in road construction projects. The researcher systematically analyzed and synthesized a wide range of research articles, reports, and case studies related to risk identification and mitigation strategies in the road construction domain. The review by Alimov and Hegazi revealed that risk management in road construction projects is a multifaceted process that involves identifying, assessing, and mitigating a myriad of risks. The study highlighted the importance of incorporating risk management into the entire project lifecycle, from the initial planning stages to construction and post-construction phases. The study emphasized the role of various risk

identification techniques, including qualitative and quantitative methods, as well as the use of historical data and expert judgment.

Indah, Harlili, and Firdaus (2015) conducted a study focusing on risk identification for enterprise resource planning (ERP) post-implementation using the COBIT 5 framework for risk. The research was carried out in a company that had reached the ERP post-implementation stage. The findings revealed that the ERP post-implementation success rate was only 55.6%, with a significant 44.4% failure rate, highlighting risks that need to be managed. The study identified 26 ERP post-implementation risks, categorized into nine risk groups. The recommended risk responses included transferring one risk, mitigating 21 risks, and accepting four risks.

Gitau (2015) examined the effects of risk identification during the project planning phase on the performance of construction projects in Rwanda. The study targeted various stakeholders, including architects, engineers, project managers, quantity surveyors, contractors, regulatory authorities, and key clients with major investments in the construction industry. Both qualitative and quantitative data collection methods were employed. The findings suggested that risk management practices at the planning stage influenced project performance. Despite the involvement of qualified engineers and architects in most projects, the majority of respondents lacked formal education in risk management. While 92% of participants acknowledged the practice of risk management, it was mainly informal, with inadequate risk identification and no measures in place for risk mitigation.

Al-Shibly, Louzi, and Hiassat (2017) investigated the impact of risk management through identification on the success of construction projects from the perspective of employees. The survey, designed according to the research framework, included two main sections. The first section inquired about the procedures followed in the organization for risk management. The second section aimed to determine if the projects met the success criteria. The results indicated a significant impact of both risk identification and risk assessment on project success, adherence to scheduled time, budget compliance, and the ability to meet technical specifications. Additionally, the study found that risk response positively affected project success, scope management, schedule adherence, and quality standards achievement.

Risk Mitigation

Vassallo (2016) assesses three mechanisms employed in Chile to address traffic risk: the 'Minimum Income Guarantee' (MIG), the 'Least Present Value of the Revenues' (LPVR), and the 'Revenue Distribution Mechanism' (RDM). This paper discusses the recession-induced reasons behind the government's implementation of the RDM mechanism. Additionally, it offers guidelines on the potential application of these mechanisms in other countries, emphasizing the advantages of LPVR in mitigating traffic risk and preventing concession contract renegotiations, and provides recommendations to enhance LPVR's appeal to private promoters.

Chang, Hwang, Deng, and Zhao (2018) conducted a study to identify strategies for mitigating political risk in international construction projects. Through questionnaires, 155 relevant professionals evaluated 27 strategies, and exploratory factor analysis was used to examine the interrelationships among these strategies. The results indicated that all 27 strategies are crucial for political risk mitigation in international construction projects. These strategies were categorized into six components: making correct decisions, conducting favorable negotiations, completing full preparations, shaping a good environment, reducing unnecessary mistakes, and obtaining a reasonable response. Based on project management, risk mitigation, and strategic management theories, the components were renamed accordingly.

Macharia (2017) examined risk mitigation strategies and the performance of construction projects in public secondary schools in Kenya. Utilizing a descriptive research design and purposive sampling, public secondary schools in Murang'a County were selected for the study. Primary data was collected through questionnaires, and the findings were presented using tables, frequencies, percentages, and pie charts for clarity. The study found that the risk avoidance strategy had the most significant impact on the performance of construction projects, while the risk transfer strategy had the least impact.

Ochieng (2018) investigated the influence of project risk mitigation strategies on organizational performance in Kenya's motor industry. The descriptive study collected data from 133 respondents using structured questionnaires, with data analysis involving descriptive and inferential statistics. Findings revealed that project risk analysis and project risk response significantly impacted the performance of Isuzu East Africa. The study noted that project risk identification and control were not directly related to organizational performance but were closely linked to project risk analysis, thereby potentially impacting performance indirectly. However, this study focused on the motor industry, unlike the current study.

3. Research Methodology

Research Design

A research design outlines the methodologies and procedures necessary to gather required information. It represents the overarching plan or framework of a project, detailing the types of data to be collected, the sources from which it will be obtained, and the methods employed (Kuada, 2012). For this study, a descriptive survey research design was utilized. This approach was selected to capture the perceptions, opinions, attitudes, and beliefs of respondents regarding current risk management practices affecting the performance of road projects managed by the Kenya Rural Roads Authority. The design proved effective in collecting substantial data concurrently and cost-effectively. Consequently, this research design was appropriate for the objective of obtaining detailed information on risk management practices influencing the performance of road projects in the Nakuru Region of Kenya.

Target Population

Target population is the entire set of units for which the survey data is to be used to make inferences (Kothari, 2006). According to Kombo and Tromp (2006), the target population is the total group that a researcher is focused on and aims to draw conclusions about. In this study, the target population comprised road construction workers involved in 26 KeRRA road projects within the Nakuru Region.

Sample Size and Sampling Technique

Kothari (2008) define a sample size as part of the target population that has been procedural selected to represent it. The researcher obtained 136 employees sample size using Yamane formulae (1967). Sampling involves the systematic selection of representative elements from a larger population. The sampling procedure entails choosing a subset of the population for research purposes, allowing the findings to be extrapolated to the entire population. This study employed both random and purposive sampling techniques. Random sampling was utilized to select contractors and key contractor staff members. Random sampling operates on the principle that individuals, locations, or items are selected in an unbiased manner (Kombo & Tromp, 2006).

Data Collection Instruments

The researcher utilized a questionnaire as the primary tool for gathering data. Kombo and Tromp (2006) describe a questionnaire as a collection of written questions with predefined answer options, designed for conducting surveys or statistical research. Similarly, Mugenda and Mugenda (2003) characterize a questionnaire as a form that includes a series of questions, particularly intended for gathering data from a statistically significant sample for survey purposes. To ensure consistent responses from participants, structured (closed-ended) questionnaires were employed. These closed-ended questions were designed using a Likert scale, with "strongly agree" (SA) rated at 5, the highest score, and "strongly disagree" (SD) rated at 1, the lowest. This approach facilitates easier analysis for the researcher and is also advantageous in terms of time and cost efficiency. Closed-ended questions contribute to greater uniformity in responses and simplify the processing of data.

Pilot Testing

A pilot study was conducted to test the reliability of the research questionnaire and also to ensure its validity. A sample of 10% of the study sample is sufficient for piloting the research questionnaire (Kothari, 2004). Hence, a sample of 14 respondents participated in pre-testing the research questionnaire. A pilot study will be conducted in Kericho County.

Data Analysis and Presentation

Once data was fully gathered from respondents, it was keyed into excel so that relevant checks are conducted for quality and consistency. It was then exported to Statistical Package for Social Sciences version 24 for computation. Descriptive and Regression analysis was conducted to make relevant inferences and the model was specified below;

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \varepsilon_i$$

Where Y= performance of road projects of Kenya Rural Roads Authority in Nakuru Region Kenya

B_0 = Constant

β_1 and β_2 are Coefficients

X_1= risk identification

X_2= risk mitigation

ε = error term

4. Data Analysis and Presentation

Presentation and Discussion of Descriptive Statistics

This section presents the findings on the specific objective variables of the study.

Risk Identification

Table 1: Descriptive Statistics on Risk Identification

Statements	Mean	Std. DEV
We regularly assess potential financial risks before project initiation	3.81	.681
Our budget risk identification techniques help in preventing cost overruns	3.68	.772
Our project timelines are regularly evaluated for potential delays.	3.65	.832
Our project risk identification has minimized schedule slippage in our projects	4.09	.694
We proactively identify risks related to personnel availability and skills	3.90	.819
We have effective measures in place to identify and mitigate risks related to key personnel turnover	3.91	.961
We have a systematic approach to identifying schedule risks during project planning	3.66	.964

The findings in table 1 indicate that respondents generally were in agreement that their project risk identification had minimized schedule slippage in their projects (M=4.09, SD=0.694) and that they had effective measures in place to identify and mitigate risks related to key personnel turnover (M=3.91, SD=0.961). This implies that the risk identification aspect at KeRRA roads projects generally aided in countering possibility of

slippage in the designed schedules of the projects which could be an added cost slow down project progress overtime. It can further be inferred that risk identification function provided the basis for mitigating risks linked with employee turnover at KeRRA roads projects.

The results of the study were that respondents agreed that they proactively identified risks related to personnel availability and skills (M=3.90 SD=0.819) besides regularly assessing the potential financial risks before project initiation (M=3.81, SD=0.681). The implication of this finding is that the risk identification function in the studied project was a proactive process that entailed prior assessment of the financial needs of the projects before making initial commitment of funds to the project. Thus, risk identification helped to ensure that funds are only committed in viable projects.

From Table 1, respondents were further in agreement that their budget risk identification techniques helped in preventing cost overruns (M=3.68, SD=0.772), there was a systematic approach to identifying schedule risks during project planning (M=3.66, SD=0.964) and that the project timelines were regularly evaluated for potential delays   (M=3.65, SD=0.832). The implications of these findings are that prevention of cost overruns was the motivation that informed risk identification at KeRRA roads projects. The spillover effects arising from minimization of cost overruns in turn contribute towards prevention of delays in projects against the established deliverables and timelines.

Risk Mitigation

Table 2 Descriptive Statistics on Risk Mitigation

Factors	Mean	Std. DEV
Our organization is willing to accept certain levels of risk to achieve strategic objectives.	3.71	.570
Our company regularly reviews and updates its risk acceptance criteria	3.85	.853
Our organization proactively identifies and avoids high-risk activities	3.73	.941
We invested in technologies and practices that help us avoid risks	4.03	.540
Our risk avoidance strategies are well-integrated into our overall business processes	3.64	.802
Our organization uses insurance and other financial instruments to transfer risks.	3.74	.952
We have established clear contracts and agreements to transfer risks to third parties when necessary	3.56	.887

Table 2 indicate that respondents were in agreement that they invested in technologies and practices that helped them to avoid risks (M=4.03, SD=0.540) and that their company

regularly reviewed and updated its risk acceptance criteria (M=3.85, SD=0.853). The implication of this finding is that risk mitigation efforts and practices at KeRRA roads projects were supported by latest technologies. These technologies are the ones that perhaps helped in providing timely review of the projects in place.

The findings indicated that respondents were in agreement that their organization used insurance and other financial instruments to transfer risks (M=3.74, SD=0.952), there was proactive identification and avoidance of high-risky activities (M=3.73, SD=0.941). This means that risk transfer, pro-activeness an avoidance were key activities that were undertaken by KeRRA roads projects to mitigate against exposure to risks.

There was a further agreement among respondents that their organization was willing to accept certain levels of risk to achieve strategic objectives (M=3.71, SD=0.570), the risk avoidance strategies were well-integrated into overall business processes (M=3.64, SD=0.802) and that there were clearly established contracts and agreements to transfer risks to third parties when necessary (M= 3.56, SD=0.887). This shows that some risks were generally accepted at KeRRA roads projects as a strategy to fulfill part of the goals guiding project undertakings. It can further be implied that risk avoidance and transfer enabled KeRRA roads projects to mitigate their exposure to risks in the course of their operations

Presentation and Discussion of Regression Results

In order to achieve the main objective which was to determine the effect of risk management practices on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya, regression analysis was carried out. The findings are presented in subsequent sections.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.915[a]	.838	.832	.46473

*a Predictors: (Constant), Risk Identification, Risk Mitigation

 b Dependent Variable: project performance.

The results in Table 3 indicate the value of adjusted R-square as 0.832, this means that 83.2% change in performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya can be explained by its project risk management practices that are in place. This means that there are still other additional factors that have an effect on performance of these road project aside from the risk management practices should be uncovered by further studies. The results on beta coefficients and significance as determined by p-values were determined and summarized as indicated in Table 4.

Table 4: Coefficients and Significance

	Unstandardized Coefficients		Standardized Coefficients		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	9.03	2.094		4.312	.000
Risk Identification	.756	.109	.427	6.936	.013
Risk Mitigation	.568	.102	.682	5.569	.000

Therefore, based on the findings in Table 4, the following equation is predicted between risk management practices and project performance:

$$Y= 9.03+0.756X_1+0.568X_{3+}\varepsilon$$

Where;

Y represents performance of road projects of Kenya Rural Roads Authority in Nakuru Region Kenya

X_1 represents risk identification

X_2 represents risk mitigation

Table 4 therefore indicate that while holding other factors constant, performance of road projects of Kenya Rural Roads Authority in Nakuru Region Kenya would be at 9.03 units Strengthening risk identification other things held constant would lead to 0.756 unit improve in project performance at KeRRA. A unit increase in risk mitigation other issues held constant would lead to 0.568-unit increase in project performance at KeRRA. These findings agree with correlation results where risk management practices were all identified to have positive contribution towards project performance at KeRRA.

Hypotheses Testing

H_{01}: Risk identification has no effect on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya. Thus, the study rejects H_{01}, deducing that risk identification is a significant predictor of performance of road projects. The finding is consistent with Dindar and Bilge (2018) who did a case study to investigate risk identification and assessment in highway construction projects. The study emphasized the importance of proactive risk identification and assessment for effective project management, suggesting that early risk recognition allows for the development of mitigation strategies and improved project outcomes.

H_{02}: Risk mitigation has no effect on performance of road projects of Kenya Rural Roads Authority in Nakuru Region, Kenya. From the findings, risk mitigation had p-value as p-0.000 i.e. $p<0.05$ and hence the variable was significant. Thus, it can be inferred from this finding that risk mitigation exerts significant effect on performance of road projects. This finding is consistent with Macharia (2017) who conducted a study where the risk avoidance strategy was found to have the strongest influence on performance of

construction projects since it had highest beta coefficient value while risk transfer had the lowest beta coefficient value. Ochieng (2018) established that project risk identification and project risk control were not so much a function of organizational performance but were closely related to project risk analysis hence could indirectly impact on the performance.

5. Conclusion

In conclusion, the study provides compelling evidence that risk identification is a significant predictor of the performance of road projects. This finding underscores the critical importance of proactively recognizing potential risks in the early stages of project planning and execution. By systematically identifying risks, project managers and stakeholders can anticipate challenges, allocate resources more effectively, and devise strategies to mitigate potential disruptions. Consequently, this proactive approach enhances the likelihood of achieving project goals, such as timely completion, cost efficiency, and quality outcomes.

Furthermore, the study establishes that risk mitigation exerts a significant effect on the performance of road projects. This highlights the necessity of implementing robust risk mitigation strategies to address identified risks. Effective risk mitigation not only minimizes the impact of unforeseen events but also ensures that projects remain on track, thereby enhancing overall performance. The findings suggest that organizations involved in road projects should prioritize the development and execution of comprehensive risk management plans that include both identification and mitigation strategies.

6. Recommendations of the Study

Risk Identification

In this study, risk identification was established to be a positive and significant predictor of project performance. Based on this finding, this study recommends that in order to ensure timely completion of road projects at KeRRA within established quality standards, personnel and budget as well as schedule risks should be carefully identified by the project managers.

Risk Mitigation

Regression findings on the second objective were that risk mitigation positively and significantly contributed towards performance of road projects. Hence, this study recommends that project managers working with KeRRA should optimally leverage the existing methods of risk mitigation including avoidance, transfer and acceptance depending on the prevailing circumstances in order to enhance the quality and timeliness of the road projects.

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