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Project Management Skills on Performance of Road Projects in Narok County, Kenya

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Abstract:

Purpose: *The primary objective of this study was to examine the effect of project management skills on the performance of road projects in Narok County, Kenya, with a specific focus on project risk management skills and communication skills.*
Material/methods: *The study was anchored in Contingency Theory and Stakeholder Theory. It focused on ten road projects implemented by the Narok County Government, targeting 111 respondents, including project managers, project engineers, and middle-level project staff. A census approach was adopted, incorporating all targeted respondents. Data were collected using structured questionnaires developed in alignment with the study objectives. Instrument validity was assessed using the Content Validity Index (CVI), while reliability was measured through Cronbach's Alpha. Both descriptive and inferential statistical methods were employed to analyze the data.*
Findings: *The analysis revealed that both project risk management skills and communication skills had a positive and statistically significant effect on the performance of road projects. These skills contributed to improved project planning, stakeholder coordination, and delivery timelines.*
Conclusion*: The study concludes that enhancing project management competencies—particularly in risk mitigation and communication—is critical to the successful execution of road infrastructure projects. Strengthening these skill areas improves project efficiency, effectiveness, and sustainability.*
Value: *This research underscores the importance of investing in project management capacity within county governments. It recommends the implementation of continuous training programs, structured oversight mechanisms, and the integration of modern project management technologies to optimize performance in road development initiatives.*

Keywords: *Project Management Skills, Performance of Road Projects, Project Risk Management Skills, Communication Skills*

Paper Type: *Research Article*

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1.1. Introduction

The performance of road projects plays a critical role in economic development, social integration, and improving the quality of life. Well-constructed and efficiently maintained road networks facilitate the movement of goods and people, enhancing trade and access to essential services such as healthcare and education (Murimi & Omwenga, 2024). In sub-Saharan Africa, particularly in Kenya, the performance of road projects remains a pressing concern as these projects often experience delays, cost overruns, and poor-quality outcomes (Wairimu & Ngugi, 2023). Challenges such as inadequate funding, corruption, resource mismanagement, and inefficient project planning and execution continue to impede the delivery of road infrastructure. These issues underline the importance of identifying and addressing factors that influence the performance of road projects (Munyao, 2023). A deeper understanding of these factors is essential for ensuring timely completion, cost efficiency, and the sustainability of road infrastructure.

Project management skills have been widely recognized in scholarly literature as critical enablers of improved project performance, including road projects (Ngo & Hwang, 2022; Mendoza, 2023). Studies highlight that effective project management skills risk management skills and communication skills are pivotal in addressing challenges faced by infrastructure projects. For instance, a study by Ofori (2020) on infrastructure projects in Ghana concluded that project managers with advanced planning and risk management skills significantly improved the timely delivery of road projects. In Egypt, Abdelmasseh, et al., (2022) explored the relationships between Construction Project management skills and the performance of projects in Egypt. The results of analysis propose that risk management abilities have a significant association with project cost and time performance Similarly, in Kenya, research by Kimani and Njenga (2019) revealed that technical skills in resource allocation and scheduling among project managers enhanced the quality of road construction. Another study by Mulei et al. (2021) emphasized that project management competencies, such as leadership, communication, and stakeholder collaboration, were crucial in mitigating delays and ensuring project sustainability.

Project management competencies—both soft and technical—are universally recognized as pivotal to project success, yet regional and local contexts shape their relative importance and application. In Europe, research highlights communication, leadership, and stakeholder management as critical drivers in IT and energy projects (Banionis, 2024; Pieterse et al., 2024), while across Asia, client-side leadership, problem-solving, decision-making, and teamwork are paramount in public-sector, construction, and oil-and-gas initiatives (Aldossari, 2024; Niyafard et al., 2024; Al-Nabae et al., 2023), complemented by written communication's role in risk management in Libya (Elkbuli et al., 2024). In Africa's road-project landscape, North African studies underscore the primacy of technical, political, human, and conceptual skills for cost, schedule, and quality outcomes (Elmezain, 2021), West African research calls for aligning project complexity with matching competencies and enhanced communication channels to prevent delays (Nubuor et al., 2024; Abdul-Fatawu et al., 2024), and East African findings stress investment in planning, risk management, and monitoring to avert overruns and resource waste (Kanyago et al., 2023). Locally in Kenya, effective contract, procurement, financial, and risk management skills are shown to significantly boost road-construction and youth-empowerment projects, although stakeholder management yields inconsistent effects (Chepkemoi, 2020;

Ngibu, 2023), signaling a need for tailored capacity-building initiatives that reflect Narok County's specific challenges.

Road infrastructure plays a crucial role in linking rural areas to major trade hubs, boosting agricultural productivity, and enhancing access to vital services. Over the last five years, Narok County has witnessed several road construction projects under the management of the Kenya Rural Roads Authority (KeRRA), aimed at improving its rural road network. For the 2024/2025 financial year, road development has been prioritized by the Narok County Government. Despite these initiatives, many road projects in the county have been stalled or abandoned, even after the devolved unit allocated billions toward development. According to Controller of Budget Margaret Nyakang'o, Narok County was ranked as the leading spender on development expenditure among Kenya's 47 counties, utilizing KSh 1.3 billion, or 30% of its annual development budget, between July and September 2023. However, an oversight inspection revealed numerous issues, including stalled and abandoned road projects, poor workmanship, and delays in project completion. Examples include the Ngong-Suswa road and several roads in Narok Town.

One notable project, the 20-kilometer Ololulunga–Olmekenyo road, was part of five roads launched by KeRRA for construction in Narok County. The project, valued at KSh 644 million, was awarded to Trans-Nile Enterprises Limited under KeRRA's supervision. Despite being scheduled for completion years ago, construction remains incomplete, raising concerns about the contractor's project management skills (Salaton, 2021; Kekanae, 2019). Similarly, the 22-kilometer stretch of the same road, initiated in 2016, is still unfinished, highlighting persistent challenges in road construction under KeRRA's oversight. This raises critical questions about whether contractors possess adequate project management skills to effectively execute such projects. Local studies have highlighted various project management skills and their impact on project performance. Nyaga (2014) examined the role of construction project management skills in the performance of construction projects within Mombasa-based firms. The study revealed that inadequate planning skills constrain projects, as effective planning requires diverse skill sets for successful implementation and management. Similarly, Chepkemoi (2020) investigated the influence of project management skills on the performance of road construction projects in Machakos County. The findings indicated that contract management, procurement management, and financial management skills had a significant positive impact on road project performance in the county. However, these studies were not conducted in Narok County and failed to address essential project management skills such as communication and risk management. To bridge this gap, the current study explored the influence of these project management skills on road projects performance in Narok County, Kenya. The study sought answer the following questions.

1. *What is the effect of project risk management skills on performance of road projects in Narok County, Kenya?*
2. *How does communication skills affect performance of road projects in Narok County, Kenya*

1.2. Theoretical Review

The Contingency Theory, originally advanced by Fred Fiedler in the 1960s, asserts that there is no one-size-fits-all approach to leadership or project management; rather, the

effectiveness of any strategy hinges on contextual variables such as task complexity, organizational structure, and external conditions (Fiedler, 1964). In the realm of risk management, this perspective implies that generic, standardized methodologies may falter when confronted with unique project challenges. Empirical work—such as Marcelino-Sádaba et al. (2014)—confirms that risk management approaches tailored to a project's complexity yield superior outcomes, reinforcing Fiedler's assertion that situational alignment is key. Applied to road projects in Narok County, Kenya, Contingency Theory underlines the necessity for project managers to diagnose local environmental constraints, resource availability, and stakeholder dynamics before selecting and adapting risk mitigation techniques, thereby maximizing the likelihood of on-time, on-budget delivery.

Stakeholder Theory, introduced by R. Edward Freeman in 1984, complements this by emphasizing that organizational success derives from proactively managing the interests of all parties affected by a project—clients, contractors, local communities, regulators, and beyond (Freeman, 1984). Central to this theory is the role of clear, inclusive communication: studies by Mitchell et al. (1997) and Aaltonen and Kujala (2010) illustrate that transparency and dialogue not only build trust and reduce conflict but also drive better resource allocation and project performance. In the specific context of Narok County's road construction initiatives, where delays and cost overruns often stem from misaligned expectations, Stakeholder Theory highlights that equipping project managers with robust communication skills is critical. By engaging stakeholders through consistent updates, participatory decision-making, and responsive feedback loops, managers can align diverse interests, preempt disputes, and foster a collaborative environment conducive to successful project completion.

1.3. Conceptual Framework

The conceptual framework depicted in Figure 1 provides a diagrammatic representation of the hypothesized relations between the independent variables of project management skills and communication skills, and the dependent variable, performance of road projects in Narok County, Kenya. This framework serves as a visual representation of the proposed interactions and associations between these key components, offering a structured approach to understanding how project management skills may influence performance of road projects in Narok County, Kenya.

Independent Variables **Dependent Variables**

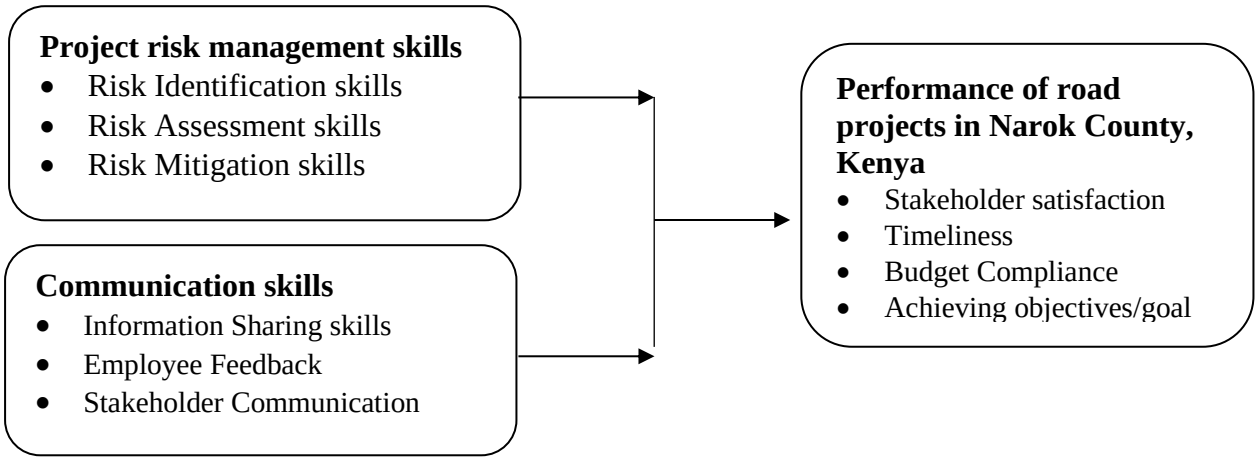

Figure 1: *Conceptual framework*

2.1. Empirical Review

Project Risk Management Skills and Performance of Road Projects

Mendoza (2023) conducted a study to examine the impact of project management skills on operational excellence among construction project managers in private construction services. The respondents included 215 professionals such as engineers, architects, technical staff, and document controllers. The findings revealed that construction project managers demonstrated a high level of risk management and quality management skills. Zuhrohtun et al. (2024) explored the relationship between risk management competence and job readiness among students in Yogyakarta. The study employed random sampling for data collection and analyzed the data using Warp PLS path analysis. The findings indicated that process risk management alone does not directly influence job readiness but can do so indirectly through the mediation of soft skills.

Elkbuli et al. (2023) identified factors influencing managerial soft skills in Libya's oil and gas sector, focusing on implementing risk management principles to enhance efficiency. Using SmartPLS 3 and structural equation modeling (SEM), the study demonstrated that improving managerial soft skills enhances continuous risk management practices, contributing to better project outcomes in the oil and gas sector.Gichohi et al. (2024) investigated the impact of project risk management on the performance of road construction projects in Kenya. With a sample of 248 respondents, regression analysis revealed a significant and positive relationship between project risk management practices and the performance of road construction projects.

Communication Skills and Performance of Road Projects

Sheta (2024) examined the role of adaptive communication in the success of IT projects, analyzing its effects on metrics such as completion rates, budget adherence, and stakeholder satisfaction. A mixed-methods approach was used, combining surveys, interviews, and secondary data. The findings highlighted the importance of tailoring communication strategies to suit diverse audiences, which was significantly correlated with improved project outcomes.Ding et al. (2023) studied the effects of communication skills on the performance of construction project teams in Sarawak. Data was collected from 350 construction companies, developers, and consulting firms. The study found that six out of eight communication-related skills demonstrated medium to strong positive correlations with team effectiveness, emphasizing the importance of maintaining effective communication for smoother project delivery.

Suleiman et al. (2023) investigated the causes and effects of poor communication in Jordan's construction industry using a questionnaire covering 32 causes and 21 effects. Key issues included differing education levels, lack of communication plans and procedures, cultural diversity, and slow information flow. The study highlighted the need for improvements in communication to enhance project outcomes.Gichohi et al.

(2023) assessed the influence of project communication on road construction project performance in Kenya. The study, targeting 695 respondents, concluded that project communication had a significant positive impact on the performance of road construction projects.

3.1. Methodology

The study adopted an explanatory research design, which aligns primarily with a positivist approach rooted in positivist research ontology and epistemology. This approach utilizes quantitative techniques drawn from the natural sciences to explore social phenomena (Hammersley, 2013). Explanatory research relies on existing hypotheses and theories to explain the dynamics behind a specific phenomenon (Cooper and Schindler, 2011). In this context, the study utilized established theories and hypotheses to investigate the relationship between variables related to project management skills and performance of road projects in Narok County, Kenya.

3.1.1. Sampling

The study focused on 10 road projects managed by the Narok County Government. the target 111 project managers, project engineers and project middle level employees. These individuals have been selected due to their critical roles in overseeing project implementation and their extensive knowledge of the key factors under investigation. As decision-makers and leaders, they are uniquely positioned to provide valuable insights that are directly relevant to the study's objectives. All 111 respondents were surveyed, making use of a census approach. Israel (2012) underscores that while cost considerations typically render the census technique unfeasible for large populations, it becomes highly advantageous and practical for smaller populations like the one in this study. Conducting a census survey ensures that every individual in the target population is included, providing a comprehensive understanding of the entire group without the need for sampling or estimation.

3.1.2. Data Collection Instrument

A structured questionnaire, grounded in the study's objectives and research questions, will be used to collect primary data via closed-ended, five-point Likert-type items—an approach noted for yielding high response rates, uniform coding, and nuanced measurement of respondent opinions (Saunders et al., 2019; Cohen et al., 2018). To ensure clarity and relevance, a pilot test involving nine respondents (5 % of the target population) from Kajiado County road projects was conducted, with participants excluded from the main study to prevent bias. Reliability was assessed through Cronbach's alpha, with coefficients above 0.70 deemed acceptable for internal consistency (Tavakol & Dennick, 2011). Content validity was established through expert review in collaboration with the supervisor (Mugenda & Mugenda, 2003; Kang et al., 2021), while construct validity was evaluated via Component Factor Analysis to confirm the questionnaire's factor structure (Field, 2021). Feedback from the pilot, as recommended by Arafat et al. (2021), informed refinements to enhance item clarity before full-scale administration.

Data Analysis and Presentation

Data analysis allows one to use logic to interpret the obtained data in order to identify comparable forms and summarize the essential components revealed in the research.

The completed questions were processed and examined for consistency. The coded surveys then be placed into the computer program Statistical Packages for Social Scientists (SPSS) for analysis. The research will evaluate and display data in the form of tables, means, and charts using descriptive statistics. Additionally, at a 5% significance level, inferential statistics was used to assess the study hypotheses. The theories were put to the test in the following ways: The following regression model was used to investigate effect of project management skills and performance of road projects in Narok County.

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon_1$$

Where

Y is performance of road projects in Narok County; β_0 = constant (coefficient of intercept); , X_1=project risk management skills, X_2= communication skills, ε =Error Term; B_1, B_2, B_3, B_4 = regression coefficient of four variables

4.1. Findings and Discussions

This section details the study's data analysis and findings, aligning them with the research objectives and hypotheses. Of the 111 distributed questionnaires, 94 valid responses were returned, yielding an 84.7% response rate—well above the 60% threshold deemed acceptable for social science research (Cooper & Schindler, 2014)—due to proactive strategies such as site visits, follow-up calls, and a drop-and-pick-later approach. Data were screened, cleaned, and checked for missing values before being subjected to both descriptive and inferential statistical techniques. The analysis sequence comprised background profiling, descriptive statistics, reliability and validity assessments, Pearson correlations, and multiple regression, Tabular presentations facilitated clear interpretation, and the robust response rate underpins the reliability and credibility of the study's conclusions.

4.1.1. Descriptive Statistics

Table 1 presents the descriptive statistics on project risk management skills among employees involved in road projects in Narok County. Descriptive analysis of project risk management skills among Narok County road-project employees revealed moderate overall proficiency (Mean = 3.25), albeit with considerable variability across competencies. The strongest capability was prioritizing risks (M = 3.73, SD = 1.40), followed by identifying potential risks during planning (M = 3.63, SD = 1.32) and documenting and categorizing risks (M = 3.51, SD = 1.34), indicating solid awareness and initial risk-assessment skills. Competence in evaluating the impacts of risks on timelines and costs was more variable (M = 3.17, SD = 1.50), while developing and implementing mitigation strategies (M = 2.80, SD = 1.22) and continuously monitoring and updating those strategies (M = 2.64, SD = 1.47) were notably weaker. The high standard deviations across several items underscore the uneven distribution of risk-management capabilities, suggesting a clear need for targeted training—particularly in dynamic mitigation planning and ongoing risk monitoring—to strengthen comprehensive risk-management practices on road projects.

***Table 1**: Descriptive Statistics for Project risk management skills*

	Mean	Std. Dev
I am confident in identifying potential risks at the planning phase of road projects.	3.63	1.32
I am skilled in documenting and categorizing risks that may arise during road project execution.	3.51	1.34
I effectively evaluate the likelihood of risks impacting road project timelines and costs.	3.17	1.50
I am proficient in prioritizing project risks based on their potential severity and probability.	3.73	1.40
I am capable of developing and implementing effective risk mitigation strategies for road projects.	2.80	1.22
I consistently monitor and adapt mitigation plans to address new or changing risks in road projects.	2.64	1.47
Project risk management skills	**3.25**	**1.10**

Descriptive analysis indicated that communication skills among road-project staff in Narok County were moderately developed, with an overall mean of 3.42 (SD = 0.93). Proficiency was highest for the use of appropriate communication tools and channels (M = 4.12, SD = 1.33) and clear, timely sharing of project information (M = 3.67, SD = 1.39). Skills in actively seeking and incorporating feedback were moderate (M = 3.33, SD = 1.14), as was the ability to provide constructive feedback (M = 3.16, SD = 1.41). Transparency of stakeholder communication across the project lifecycle was comparatively weaker (M = 2.96, SD = 1.20), and the capacity to address stakeholder concerns and align them with project objectives exhibited considerable variability (M = 3.30, SD = 1.52). The elevated standard deviations across several items highlighted uneven communication competencies, underscoring the need for more structured feedback loops and enhanced stakeholder-engagement mechanisms.

***Table 2:** Descriptive Statistics for Communication skills*

	Mean	Std. Dev
I ensure clear and timely sharing of project-related information with relevant team members.	3.67	1.39
I am skilled in using appropriate tools and channels to disseminate critical information effectively.	4.12	1.33
I regularly seek and incorporate feedback from employees to improve project processes.	3.33	1.14
I communicate constructive feedback to employees to enhance their performance and project outcomes.	3.16	1.41
I maintain open and transparent communication with stakeholders throughout the project lifecycle.	2.96	1.20
i am effective in addressing stakeholder concerns and ensuring alignment with project goals.	3.30	1.52
Communication skills	**3.42**	**0.93**

Descriptive analysis of road project performance in Narok County revealed generally positive outcomes across most dimensions: meeting stakeholder expectations (M = 3.56, SD = 1.33), stakeholder satisfaction with quality (M = 3.59, SD = 1.58), project

timeliness (M = 3.86, SD = 1.00), and minimized delays (M = 3.57, SD = 1.36). Achievement of project objectives also scored favorably (M = 3.66, SD = 1.23). However, budget adherence lagged behind, registering a lower mean of 2.62 (SD = 0.98), indicating concerns over financial planning and expenditure control. The overall performance mean of 3.48 (SD = 0.75) suggests that while timelines and objectives are largely met, enhanced budget management and cost-efficiency strategies are needed.

Table 3: *Descriptive Statistics for Performance of Road Project*

	Mean	**Std. Dev**
The road projects meet the expectations of key stakeholders.	3.56	1.33
Stakeholders are satisfied with the quality of the completed road projects.	3.59	1.58
Road projects are completed within the planned timelines.	3.86	1.00
Delays in road project completion are effectively minimized.	3.57	1.36
The road projects are completed within the allocated budgets.	2.62	0.98
The road projects achieve their intended objectives and goals.	3.66	1.23
Performance of Road Project	**3.48**	**0.75**

4.1.2. Correlation Analysis

Correlation analysis, as presented in Table 4.11, examines the relationships between the dependent variable (Performance of Road Projects) and the independent variables: project risk management skills and communication skills. The findings in Table 4.11 show that project risk management skills are positively and significantly associated with the performance of road projects ($r = .441$, $p < 0.01$). This suggests that higher levels of risk management competence among project teams contribute to better project outcomes, such as adherence to timelines, cost control, and goal achievement. Communication skills also show a positive and significant correlation with project performance ($r = .328$, $p < 0.01$), implying that effective communication channels and stakeholder engagement play a key role in enhancing the execution and quality of road projects.

Table 4: *Correlation Analysis*

		Project performance	Project risk management skills	Communication skills
Project performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	148		
Project risk management skills	Pearson Correlation	.441**	1	
	Sig. (2-tailed)	0.0000		
	N	148	148	
Communication skills	Pearson Correlation	.328**	0.101	1
	Sig. (2-tailed)	0.000	0.222	
	N	148	148	148

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

4.1.3. Regression Analyses

Multiple regression analysis was performed to assess the combined effect of selected project management skills—namely project risk management skills, communication skills, technology integration skills, and project monitoring and evaluation skills—on the performance of road projects. Table 4.11 presents the model summary, followed by ANOVA and regression coefficients. The model yielded an R Square (R^2) value of 0.647, indicating that 64.7% of the variation in road project performance can be explained by the combined influence of the four project management skills. This reflects a strong explanatory power of the model. The Adjusted R Square value of 0.637 accounts for the number of independent variables and sample size, suggesting that after adjustment, the model still explains 63.7% of the variation in performance. The small difference between R^2 and Adjusted R^2 (0.01) indicates that the included variables contribute significantly and the model is not overfitted.

The ANOVA results indicate that the regression model is statistically significant with an F-value of 65.627 and a p-value of .000, which is well below the conventional alpha level of 0.05. This confirms that the combined project management skills have a statistically significant impact on the performance of road projects. The high F-statistic and corresponding significance level suggest that the model provides a good fit to the data. Therefore, the variation in road project performance can be reliably explained by the set of predictor variables representing project management competencies.

The findings show that project risk management skills have a positive and statistically significant effect on road project performance ($\beta = 0.334$, $p = 0.000$). This implies that strengthening risk identification, assessment, and mitigation competencies among project teams can lead to enhanced delivery outcomes. Mendoza (2023) observed that

construction project managers with strong risk and quality management skills contributed positively to project success. Similarly, Gichohi et al. (2024) found a significant association between risk management practices and the performance of road construction projects. Elkbuli et al. (2023) also confirmed that proper risk assessment contributed to better outcomes in the oil and gas sector. However, Zuhrohtun et al. (2024) noted that risk management influences project readiness indirectly through other soft skills, highlighting the importance of integrated capabilities.

Communication skills were also found to significantly influence road project performance ($\beta = 0.214$, $p = 0.000$). Effective communication facilitates information flow, stakeholder engagement, and coordination, all of which are critical to project success. Sheta (2024) emphasized the value of adapting communication strategies to different stakeholder groups to improve outcomes. Ding et al. (2023) revealed that most communication-related competencies have strong correlations with team effectiveness and project success. Suleiman et al. (2023) highlighted common communication barriers—such as education disparities and lack of formal communication plans—as key hindrances to project efficiency. In alignment, Gichohi et al. (2023) reported that enhanced communication practices significantly improved performance in road construction projects.

Table 5: *Multiple Regression*

	Unstandardized Coefficients		**Standardized Coefficients**		
	B	**Std. Error**	**Beta**	**t**	**Sig.**
(Constant)	3.751	0.216		17.383	0.000
Project risk management skills	0.334	0.035	0.477	9.548	0.000
Communication skills	0.214	0.038	0.286	5.601	0.000
Model Summary					
R	0.805				
R Square	0.647				
Adjusted R Square	0.637				
ANOVA for goodness of fit					
F	65.627				
Sig.	0.000				

a Dependent Variable: Performance of Road Project

5.1. Conclusions and Recommendation

Based on the findings of the study, it is concluded that project risk management skills play a vital role in enhancing the performance of road projects in Narok County. Effective identification, assessment, and mitigation of project risks contribute to smoother project execution, fewer delays, and better resource utilization. The study further concludes that communication skills are essential for improving project performance. Clear, timely, and structured communication among stakeholders enhances coordination, reduces misunderstandings, and supports efficient decision-making throughout the project lifecycle. In addition, the study finds that technology integration skills significantly influence the performance of road projects. When project

teams possess the necessary competencies to adopt and use digital tools effectively, project outcomes improve. However, the positive impact is dependent on adequate training, change management, and user support.

Based on the conclusions of the study, it is recommended that concerted efforts be made to strengthen project risk management skills among professionals involved in road infrastructure development in Narok County. Project stakeholders should invest in comprehensive training programs focused on risk identification, analysis, and mitigation. Equipping project teams with practical tools such as risk registers, contingency plans, and early warning systems will improve their capacity to anticipate and manage uncertainties that could derail project timelines and outcomes. To improve communication skills, it is essential to enhance both interpersonal and organizational communication practices within project teams. Project managers and team members should receive training in effective communication techniques, including active listening, structured feedback, and stakeholder engagement. Emphasis should also be placed on developing communication protocols that facilitate timely and accurate information sharing. This would help minimize misunderstandings, delays, and conflicts, ultimately leading to smoother project implementation.

5.2. Recommendations for Further Studies

This study provided empirical evidence that project risk management and communication skills significantly enhance the performance of road projects in Narok County, but its focus on ten local sites limits the generalizability of the findings to other regions or infrastructure types. By examining only four specific skill dimensions, it offers a constrained view that excludes other critical competencies—such as stakeholder engagement, budgeting, scheduling, leadership, and conflict resolution—and omits potential moderating factors like organizational culture, funding, political interference, regulatory frameworks, and staff motivation. Future research should therefore replicate the study across a broader array of road networks, incorporate a wider range of management skills, and integrate contextual moderators to more fully understand how these capabilities interact with environmental conditions to drive project success.

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