

# Risk Management Strategies and Performance of Selected Road Construction Projects in Kenya

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DOI: <https://doi.org/10.5281/zenodo.17669342>

Published Date: 21-November-2025

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**Abstract:** Kenya's road construction sector continues to experience delays, cost overruns, and incomplete projects despite major public investment, with nearly 55% of projects facing significant performance challenges. This study examined how environmental, financial, political, and logistical risk management strategies influence the performance of selected road construction projects in Kenya. Guided by contingency, agency, and stakeholder theories, the study adopted a descriptive research design targeting 90 project managers, using a census approach and semi-structured questionnaires for data collection. Descriptive and inferential analyses revealed that all four risk management dimensions have a positive and significant effect on project performance. The study concludes that integrating environmental considerations at the planning stage, strengthening financial risk controls, prioritizing political risk mitigation, and improving logistical coordination are critical for effective project delivery. It recommends early risk identification, comprehensive mitigation planning, and strong stakeholder engagement to enhance performance outcomes in Kenya's road construction projects.

**Keywords:** Environmental risk, Financial risk, Political risk, Logistical risk, Road construction projects, Kenya.

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## 1. INTRODUCTION

Road construction plays a central role in Kenya's socio-economic growth by enhancing national connectivity and stimulating regional development. However, despite continuous government investment, many road construction projects face persistent performance challenges, including delays, cost overruns, and substandard completion (World Bank, 2022; Tanui et al., 2024). Nationally, more than half of such projects experience disruptions that undermine quality, efficiency, and value for money (Kihara et al., 2023). These issues highlight a structural weakness in project planning and execution, particularly in the management of risks that emerge throughout the project lifecycle.

Globally, risks associated with environmental uncertainties, financing pressures, political dynamics, and logistical constraints strongly influence the outcomes of construction projects (PMI, 2021; Kerzner, 2022). African countries face even greater vulnerabilities due to governance constraints, fluctuating economic conditions, and limited institutional capacity (AfDB, 2020). In Kenya, the rapid expansion of infrastructure development intensifies exposure to risks such as inflation, political interference, inconsistent funding flows, and supply chain disruptions (Mutiso, 2022; GOK, 2021). Poorly managed risks lead not only to cost escalation but also to compromised workmanship, stalled projects, and eroded public trust.

Effective risk management strategies are therefore essential in enhancing construction project performance. Literature emphasizes that structured identification, analysis, and mitigation of risks significantly improve timelines, budget adherence, and project quality (Adu et al., 2023; Mahmoud & Omran, 2022). Environmental risks such as erosion, pollution, and biodiversity degradation also require careful integration into project planning to avoid regulatory delays and community resistance (NEMA, 2021). At the same time, financial and political risks ranging from fluctuating material costs to political

influence on contracts demonstrate a critical need for robust governance and financial controls (Mwangi, 2023; ADB, 2020). Given these gaps, this study investigates how environmental, financial, political, and logistical risk management strategies influence the performance of selected road construction projects in Kenya. Guided by contingency, agency, and stakeholder theories, the study argues that project performance improves significantly when risks are anticipated early and addressed systematically. A deeper understanding of risk-driven performance variations will contribute to better planning, enhanced resource utilization, and more sustainable delivery of road construction projects in Kenya.

## **2. THEORETICAL AND LITERATURE REVIEW**

Risk management in construction projects is grounded in several theoretical lenses that explain how organizations respond to uncertainty. This study draws from Contingency Theory, Agency Theory, and Stakeholder Theory to conceptualize how risk management strategies influence the performance of road construction projects in Kenya. Contingency Theory argues that no universal management approach is effective across all contexts; instead, organizational processes should adapt to prevailing environmental and operational conditions (Donaldson, 2001). This is relevant to road construction projects that operate under fluctuating weather, unstable material prices, and evolving regulatory landscapes. Agency Theory highlights information asymmetry and conflicting interests between principals and agents, which often manifest in cost escalation, strategic misreporting, and compromised quality in infrastructure projects (Eisenhardt, 1989; Mwangi, 2023). Stakeholder Theory further underscores the role of multiple actors—government agencies, communities, contractors, and regulators—whose participation and expectations influence project legitimacy, timelines, and sustainability (Freeman, 1984; NEMA, 2021). Together, these theories provide a foundation for understanding how environmental, financial, political, and logistical risks shape project outcomes.

Literature on environmental risk management underscores its influence on construction performance, especially in developing economies. Environmental challenges such as soil erosion, flooding, pollution, and biodiversity disruption have been shown to delay project implementation and increase costs (NEMA, 2021; Adu et al., 2023). Studies reveal that early environmental assessments, erosion control measures, and ecological management systems contribute to better sustainability and timely completion of road projects (Kihara et al., 2023). In Kenya, inadequate compliance with environmental safeguards has resulted in halted works and regulatory sanctions, highlighting the need for structured environmental risk strategies (Mutiso, 2022). Financial risk management remains a dominant determinant of project success due to the capital-intensive nature of road construction. Fluctuating material prices, delayed government payments, inflation volatility, currency depreciation, and contractor liquidity constraints commonly disrupt project schedules and budgets (Tanui et al., 2024). Empirical research shows that systematic financial controls—such as contingency budgeting, cash flow forecasting, and cost monitoring—significantly improve efficiency and reduce cost overruns (PMI, 2021; Kerzner, 2022). Evidence from Kenya indicates that failures in financial planning and unstable funding flows are major contributors to stalled or incomplete road projects (Mahmoud & Omran, 2022).

Political risk is also central to construction performance, particularly in jurisdictions where governance transitions influence procurement and project continuity. Political interference, policy reversals, and bureaucratic delays disrupt implementation and weaken oversight (ADB, 2020; AfDB, 2020). In Kenya, project prioritization is often influenced by political agendas, leading to procurement irregularities, delayed approvals, and misaligned project objectives (Mwangi, 2023). Literature suggests that adherence to transparent procurement systems, regulatory compliance, and strengthened governance structures can mitigate political risks and enhance project predictability (GOK, 2021). Logistical risk literature emphasizes the role of supply chain coordination, resource availability, scheduling, and material management in infrastructure performance. International studies indicate that delays in equipment delivery, weak supplier relationships, and inadequate storage facilities are key sources of time and cost escalation (Adu et al., 2023). Kenyan road projects frequently encounter logistical bottlenecks such as erratic supply chains, poor transport networks, and weak contractor–supplier coordination (Ndunda & Ngugi, 2022). Research findings consistently show that structured logistics planning, vendor management, and real-time communication systems improve project reliability and budget adherence (Mahmoud & Omran, 2022).

While prior studies offer important perspectives on risk management in construction, they frequently focus on environmental, financial, political, or logistical risks separately or within broad construction contexts. However, there is a noticeable lack of empirical research that simultaneously considers all four risk dimensions specifically within Kenya's road construction industry. This research aims to fill that gap by providing an integrated, theory-based analysis of how combined risk management approaches affect project performance.

### 3. RESEARCH METHODOLOGY

This study adopted a descriptive research design to systematically collect and analyze data related to risk management strategies and project performance in road construction. The target population comprised 90 project managers overseeing road projects implemented by Kenyan government agencies including KeNHA, KURA, and KeRRA whose practical insights were deemed critical for understanding risk management challenges and successes.

A census sampling approach was employed, involving all 90 project managers to avoid sampling bias and ensure comprehensive coverage of perspectives (Saunders, Lewis & Thornhill, 2019). Primary data were collected via a semi-structured questionnaire combining Likert-scale items and open-ended questions, allowing both quantitative and qualitative analysis.

A pilot study with 10 participants (approximately 10% of the sample) was conducted to assess the validity and reliability of the instruments, using expert review, factor analysis for construct validity, and Cronbach's alpha for internal consistency, which yielded an overall reliability coefficient of 0.725. Data collection followed ethical protocols, including informed consent, confidentiality, and voluntary participation.

Data analysis involved coding qualitative and quantitative responses using SPSS v26, with descriptive statistics summarizing the data and multiple linear regression used to examine the predictive effects of environmental, financial, political, and logistical risk management strategies on project performance at a 95% confidence level.

### 4. RESEARCH FINDINGS AND DISCUSSIONS

#### 4.1 Descriptive Statistics Results

This study analyzed respondents' agreement on various risk management strategies and project performance using descriptive statistics, specifically means (M) and standard deviations (SD).

##### 4.1.1 Environmental Risk Management Strategies

**Table 4.1: Environmental Risk Management Strategies**

Statements	M	SD
Consideration of potential ecological consequences is a prerequisite before initiating construction.	4.15	0.85
Projects incorporate mitigation of negative ecological impacts as well as conservation of local biodiversity.	4.22	0.78
Strategies are in place to address climate variability and likely future climate changes that affect construction timelines	3.51	1.49
Active management and monitoring of resource usage and efficiency are key elements in project execution.	4.58	0.42
Projects prioritize the use of sustainable materials and technologies and aim to minimize carbon emissions throughout the construction lifecycle	3.42	1.58
Active engagement with local communities and stakeholders ensures effective biodiversity conservation and project sustainability.	4.51	0.49
Projects strictly adhere to all environmental regulations and compliance standards, including established protocols for safe handling and disposal of hazardous materials.	3.29	1.71
Continuous environmental monitoring is undertaken to track project impact and assess environmental conditions.	4.53	0.47
<b>Overall score</b>	<b>4.03</b>	<b>0.97</b>

**Source: Survey Data (2025)**

Respondents strongly agreed that active management and monitoring of resource usage (M=4.58, SD=0.42), engagement with local communities (M=4.51, SD=0.49), and continuous environmental monitoring (M=4.53, SD=0.47) are integral to environmental risk management. These findings align with Van Thuyet et al. (2019), who noted unique environmental risks in Kenyan road projects such as land degradation and habitat interference. There was moderate agreement on the

consideration of ecological consequences and climate variability strategies (M=4.15 and 3.51 respectively). However, opinions were divided on the prioritization of sustainable materials and strict adherence to environmental regulations (M=3.42 and 3.29), diverging from Kabir and Khan (2020), who emphasized the importance of balancing ecological systems in risk management.

#### 4.1.2 Financial Risk Management Strategies

##### 4.1.1 Financial Risk Management Strategies

**Table 4.2: Financial Risk Management Strategies**

Statements	M	SD
Projects employ thorough methodologies for accurate cost estimation and regularly update these estimations to align with project realities.	3.59	1.41
Robust financial contingency plans are developed, including comprehensive assessments of potential financial risks and strategies to address unforeseen challenges.	4.52	0.48
Projects actively monitor market fluctuations and implement strategies to mitigate their impact on project finances	3.99	1.01
Projects anticipate potential delays in funding and have contingency measures in place to address these delays.	4.62	0.38
Rigorous assessment and mitigation of contractual risks are standard practices in project management.	3.42	1.58
Regular monitoring, control mechanisms, and continuous evaluation of project expenses against budgetary allocations are in place to manage project budgets effectively.	4.57	0.43
Comprehensive financial risk analyses are integral to decision-making processes at various project stages.	3.19	1.81
Cost-benefit analyses are integral to decision-making processes in project management.	4.21	0.79
Diversification of revenue streams to minimize reliance on a single source of revenue are actively pursued to enhance financial resilience.	4.59	0.41
<b>Overall score</b>	<b>4.08</b>	<b>0.92</b>

**Source: Survey Data (2025)**

Strong consensus existed around the development of robust financial contingency plans (M=4.52, SD=0.48), anticipation of funding delays (M=4.62, SD=0.38), regular budget monitoring (M=4.57, SD=0.43), and revenue diversification (M=4.59, SD=0.41). These findings support Lithur (2021), highlighting the importance of financial discipline in project security. Moderate agreement was found for accurate cost estimation and market fluctuation monitoring (M=3.59 and 3.99). There was divided opinion on contractual risk assessments and comprehensive financial risk analyses (M=3.42 and 3.19), which contrasts with Fellows and Liu (2015), who identified market fluctuations as critical financial risks.

#### 4.1.2 Political Risk Management Strategies

**Table 4.3: Political Risk Management Strategies**

Statements	M	SD
Mechanisms are in place to monitor and adapt to policy changes, including continuous analysis of the political landscape and stability indicators	3.91	1.09
Projects actively build and nurture relationships with government entities through regular communication and collaboration with government officials.	4.26	0.74
Contingency plans are developed for potential disruptions due to political instability, including changes in government funding commitments.	4.50	0.50

Projects assess and address potential public opposition through strategies to engage and mitigate concerns of communities and the public	4.41	0.59
Continuous monitoring of public sentiment and proactive communication strategies are in place to manage community relations.	4.55	0.45
Regular reviews and dedicated resources ensure ongoing compliance with evolving regulations.	4.06	0.94
Projects actively engage with stakeholders through feedback mechanisms.	3.94	1.06
Community development initiatives are implemented to enhance project-community relations and build collaborative relations with local communities.	4.60	0.40
<b>Overall score</b>	<b>4.28</b>	<b>0.72</b>

**Source: Survey Data (2025)**

Respondents agreed that contingency plans for political instability (M=4.50, SD=0.50), continuous public sentiment monitoring (M=4.55, SD=0.45), and community development initiatives (M=4.60, SD=0.40) are well implemented. This concurs with Chang et al. (2018), who advocate for contingency plans in politically unstable environments. Additional agreement was observed regarding policy monitoring, government relations, public opposition mitigation, and regulatory compliance, reinforcing Leigland’s (2018) emphasis on stakeholder relations to mitigate political risks.

**4.1.3 Logistical Risk Management Strategies**

**Table 4.4: Logistical Risk Management Strategies**

Statements	M	SD
Strategies are put in place to mitigate and respond to supply chain disruptions, including continuous monitoring of vulnerabilities.	4.51	0.49
Regular assessments and mitigation plan for potential challenges related to site accessibility are implemented.	3.69	1.31
Project equipment is well-maintained and regularly inspected with continuous performance monitoring	4.05	0.95
Regular assessments of labour availability and workforce planning are conducted	3.68	1.32
Efficient inventory management systems are in place, with continuous monitoring and optimization of inventory levels.	4.59	0.41
Transportation networks are optimized for efficiency, with regular assessments and improvements of routes	4.11	0.89
Advanced technologies are integrated into all logistical operations, with continuous exploration of new innovations to enhance overall efficiency and effectiveness.	4.54	0.46
Procurement strategies are clearly defined and aligned with project goals, with continuous evaluation and optimization to ensure efficiency and effectiveness.	3.52	1.48
Regular reviews and updates to logistics plans are conducted based on project needs.	4.58	0.42
<b>Overall score</b>	<b>4.14</b>	<b>0.86</b>

**Source: Survey Data (2025)**

Strong agreement was found on integrating advanced technologies in logistics (M=4.54, SD=0.46), regular logistics plan updates (M=4.58, SD=0.42), supply chain disruption mitigation (M=4.51, SD=0.49), and efficient inventory management (M=4.59, SD=0.41). These results align with Magill et al. (2022), who noted the importance of strategic logistics for supply chain resilience. Moderate agreement was noted on site accessibility assessments, equipment maintenance, labor planning, transportation optimization, and procurement strategies (M ranging from 3.52 to 4.11), supporting Namdar et al.’s (2018) findings on robust supply chain risk mitigation.

4.1.4 Performance of Road Construction Projects

Table 4.5: Performance of Road Construction Projects

Statements	M	SD
The road construction projects are consistently completed within the initially estimated timeframe.	3.16	1.84
Delays in project completion are rare and are typically well-communicated to stakeholders.	3.51	1.49
The project management team effectively addresses and mitigates factors that could lead to project delays.	3.57	1.43
Timely completion of milestones is a top priority in project planning and execution.	2.94	2.06
The project consistently adheres to the budget outlined during the planning phase.	3.07	1.93
Unexpected costs are minimal, and cost overruns are infrequent.	2.65	2.35
The road construction projects consistently meet or exceed industry quality standards.	4.02	0.08
Stakeholder satisfaction surveys consistently show positive responses from various project stakeholders.	3.45	1.55
Projects are delivered to the right quality standards as stipulated	3.17	1.83
<b>Overall score</b>	<b>3.28</b>	<b>1.72</b>

Source: Survey Data (2025)

Respondents agreed that projects generally meet or exceed industry quality standards (M=4.02, SD=0.08), delays are rare and communicated well (M=3.51), and mitigation of delay factors is effective (M=3.57). This supports Kihuga’s (2018) description of project management within defined goals and timelines. However, responses were neutral on timely project completion, budget adherence, cost overruns, stakeholder satisfaction, and quality adherence, contrasting with Waddock and Googins (2011), who highlight stakeholder engagement as crucial for project success.

4.2 Multiple Regression Analysis Results

The study employed multiple regression analysis to assess the combined influence of environmental, financial, political, and logistical risk management strategies on the performance of road construction projects in Kenya. The model summary (Table 4.6) reveals an adjusted R<sup>2</sup> value of 0.562, indicating that 56.2% of the variance in project performance can be explained by the four independent variables. This suggests that while these factors significantly influence project outcomes, other unexamined variables contribute to 43.8% of the variation.

Table 4.6: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.762	0.584	0.562	0.801

Source: Survey Data (2025)

The analysis of variance (ANOVA) results (Table 4.7) demonstrate the overall model’s statistical significance (F = 27.031, p < 0.001). The high F-value relative to the mean square confirms that the regression model reliably predicts project performance.

Table 4.7: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	69.354	4	17.338	27.031	0.000
Residual	49.390	77	0.641		
Total	118.744	81			

The regression coefficients (Table 4.8) reveal that all four risk management strategies have significant positive effects on project performance. The resulting regression equation is:

$$\text{Project performance} = 1.473 + 0.757(\text{environmental risk management strategies}) + 0.678(\text{financial risk management strategies}) + 0.619(\text{political risk management practices}) + 0.742(\text{logistical risk management practices})$$

**Table 4.8: Regression Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.473	0.464		31.72	0.002
Environmental risk management strategies	0.647	0.063	0.757	10.184	0.003
Financial risk management strategies	0.649	0.079	0.678	8.264	0.002
Political risk management strategies	0.687	0.163	0.619	4.216	0.002
Logistical risk management strategies	0.663	0.071	0.742	9.398	0.002

The strongest predictor was environmental risk management ( $\beta = 0.757$ ,  $p = 0.003$ ), corroborating Mwanga’s (2022) assertion that effective environmental risk frameworks, including robust Environmental Impact Assessments, critically enhance project performance. Financial risk management was also a significant contributor ( $\beta = 0.678$ ,  $p = 0.002$ ), aligning with the findings of Taylan et al. (2014), who emphasized the importance of rigorous financial risk analysis and contingency planning in safeguarding construction projects.

Political risk management demonstrated a significant positive relationship with project outcomes ( $\beta = 0.619$ ,  $p = 0.002$ ). This supports De Carvalho et al.’s (2015) observation that political instability remains a major challenge in infrastructure projects, particularly in developing countries. Finally, logistical risk management was a significant determinant ( $\beta = 0.742$ ,  $p = 0.002$ ), consistent with Tubis and Werbi near-Wojciechowska’s (2021) research highlighting the role of continuous risk monitoring and cooperative management in logistics for enhancing project success. These results confirm that integrated risk management approaches across environmental, financial, political, and logistical domains are essential to achieving improved performance in road construction projects in Kenya.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

This study establishes that the integration of environmental considerations from the inception of infrastructure projects is essential for their success and sustainability. Active involvement of construction teams in managing environmental risks—such as habitat restoration, wildlife corridor creation, and mitigation of ecological impacts—not only promotes environmental protection but also enhances community relations and supports local economic development through sustainable practices.

Effective financial risk management is critical in ensuring projects remain within budget and on schedule despite fluctuations in material costs and other uncertainties. The use of rigorous financial risk assessment tools enables project managers to anticipate potential fiscal challenges and implement strategies that safeguard project viability.

The management of political risks significantly influences the successful delivery of road construction projects. Early stakeholder engagement, particularly with local communities, mitigates resistance and fosters a collaborative environment, thereby enhancing project acceptance and reducing disruptions caused by political instability.

Moreover, logistical risk management is fundamental in preventing delays, optimizing resource allocation, and meeting project objectives. Comprehensive strategies addressing supply chain continuity, labor availability, and transportation efficiency are vital. The findings emphasize the necessity of coordinated efforts among government entities, contractors, and investors to effectively manage logistical challenges.

## 5.2 Recommendations

It is recommended that organizations strengthen environmental risk management by systematically identifying project-specific environmental hazards such as erosion, pollution, and biodiversity loss. Incorporation of Environmental Impact Assessments (EIAs) during the planning phase is crucial to ensuring environmental considerations are prioritized from the outset.

Organizations should conduct thorough risk assessments to identify, analyze, and mitigate risks early in project development. Budgetary frameworks should incorporate flexibility to absorb unforeseen financial variances. Continuous monitoring and transparent communication among stakeholders are imperative to promptly address deviations from project plans.

Early and inclusive engagement of stakeholders—including local communities, governmental agencies, and non-governmental organizations—is essential to align expectations and address concerns. Capacity building initiatives targeting local populations can enhance sustainable development outcomes and foster community ownership, thereby reducing resistance to project implementation. Strategic partnerships with political risk consultants and local NGOs are encouraged to provide nuanced insights into the political landscape.

Further, investment in advanced logistical planning is recommended. This includes comprehensive stakeholder coordination, adoption of real-time monitoring technologies, diversification of suppliers to mitigate supply chain disruptions, and proactive forecasting to preempt potential delays.

## REFERENCES

- [1] ADB. (2020). *Infrastructure Development in Africa: Challenges and Opportunities*. African Development Bank.
- [2] ADB. (2020). *Infrastructure Development in Africa: Challenges and Opportunities*. African Development Bank.
- [3] Adu, K., Mensah, J., & Effah, E. (2023). Risk management practices and construction project performance. *International Journal of Project Management*, 41(2), 145–158.
- [4] Adu, K., Mensah, J., & Effah, E. (2023). Risk management practices and construction project performance. *International Journal of Project Management*, 41(2), 145–158.
- [5] AfDB. (2020). *Annual Infrastructure Financing Report*. African Development Bank.
- [6] Donaldson, L. (2001). *The Contingency Theory of Organizations*. Sage Publications.
- [7] Eisenhardt, K. (1989). Agency theory: An assessment and review. *Academy of Management Review*, 14(1), 57–74.
- [8] AfDB. (2020). *Annual Infrastructure Financing Report*. African Development Bank.
- [9] Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Pitman.
- [10] GOK. (2021). *Economic Survey 2021*. Government of Kenya.
- [11] Kerzner, H. (2022). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. Wiley.
- [12] GOK. (2021). *Economic Survey 2021*. Government of Kenya.
- [13] Kerzner, H. (2022). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. Wiley.
- [14] Kihara, P., Muthoka, S., & Kimari, H. (2023). Factors influencing performance of road infrastructure projects in Kenya. *Journal of Construction Studies*, 12(3), 89–101.
- [15] Kihara, P., Muthoka, S., & Kimari, H. (2023). Factors influencing performance of road infrastructure projects in Kenya. *Journal of Construction Studies*, 12(3), 89–101.
- [16] Mahmoud, S., & Omran, A. (2022). Impact of risk identification on infrastructure project success. *Construction Economics and Management Review*, 18(4), 211–225.
- [17] Mutiso, E. (2022). Determinants of cost overruns in Kenyan road construction projects. *Kenya Institute of Public Policy Research Papers*, 14(2), 33–47.

- [18] Mwangi, T. (2023). Political interference and performance of public construction projects in Kenya. *African Journal of Governance*, 9(1), 55–72.
- [19] Ndunda, J. & Ngugi, P. (2022). Supply chain challenges affecting road construction performance in Kenya. *International Journal of Built Environment Studies*, 6(2), 120–134.
- [20] NEMA. (2021). *Environmental Management Guidelines for Construction Projects in Kenya*. National Environment Management Authority.
- [21] PMI. (2021). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (7th ed.). Project Management Institute.
- [22] Tanui, S., Rotich, G., & Bett, C. (2024). Cost escalation in major Kenyan road projects. *East African Journal of Engineering*, 7(1), 24–36.
- [23] World Bank. (2022). *Kenya Infrastructure Sector Assessment Program Report*. World Bank Group.
- [24] Mahmoud, S., & Omran, A. (2022). Impact of risk identification on infrastructure project success. *Construction Economics and Management Review*, 18(4), 211–225.
- [25] Mutiso, E. (2022). Determinants of cost overruns in Kenyan road construction projects. *Kenya Institute of Public Policy Research Papers*, 14(2), 33–47.
- [26] Mwangi, T. (2023). Political interference and performance of public construction projects in Kenya. *African Journal of Governance*, 9(1), 55–72.
- [27] NEMA. (2021). *Environmental Management Guidelines for Construction Projects in Kenya*. National Environment Management Authority.
- [28] PMI. (2021). *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* (7th ed.). Project Management Institute.
- [29] Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education Limited.
- [30] Tanui, S., Rotich, G., & Bett, C. (2024). Cost escalation in major Kenyan road projects. *East African Journal of Engineering*, 7(1), 24–36.
- [31] World Bank. (2022). *Kenya Infrastructure Sector Assessment Program Report*. World Bank Group.