

# **PROJECT MANAGEMENT PRACTICES AND PERFORMANCE OF URBAN ROADS INFRASTRUCTURE IN NAIROBI CITY COUNTY, KENYA**

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## **ABSTRACT**

**Purpose:** The study examined the effect of project management practices on the performance of urban road infrastructure projects in Nairobi City County, Kenya, specifically focusing on project planning, project monitoring, stakeholder management, and risk management.

**Statement of the Problem:** Despite heavy investment by KURA in Nairobi City County, over 68% of road projects exceed contract sums, 62% record time overruns, and poor supervision reduces expected road lifespan by up to 40%. These persistent challenges, despite adoption of project management practices, signal critical gaps in their effective application and underscore the need for empirical investigation.

**Methodology:** The study adopted a descriptive research design targeting 183 respondents, 97 project managers, 32 resident engineers, and 54 KURA officials, from which 124 were selected through stratified random sampling. Semi-structured questionnaires generated both qualitative and quantitative data, analyzed using thematic analysis and SPSS version 28 respectively, through descriptive statistics, Pearson correlation, and multiple linear regression.

**Findings:** Project planning ( $\beta = 0.270$ ,  $p = 0.023$ ), project monitoring ( $\beta = 0.263$ ,  $p = 0.000$ ), stakeholder management ( $\beta = 0.241$ ,  $p = 0.000$ ), and risk management ( $\beta = 0.157$ ,  $p = 0.011$ ) all had positive and significant effects on project performance. Collectively, the four practices explained 67.7% of variance in performance ( $R^2 = 0.677$ ,  $F = 99.161$ ,  $p < 0.001$ ).

**Conclusions:** Project management practices positively and significantly influence urban road infrastructure performance, and strengthening these practices leads to measurable improvements in project timelines, budget adherence, and quality outcomes.

**Recommendations:** Project managers should develop communication plans at project inception, adopt structured monitoring frameworks with real-time tracking tools, ensure systematic stakeholder identification and engagement, and embed proactive risk mitigation measures into all project execution plans.

**Keywords:** *Project Management Practices, Performance, Urban Roads Infrastructure, Nairobi City County, Kenya*

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## BACKGROUND TO THE STUDY

Road infrastructure projects are critical enablers of national development, enhancing connectivity, facilitating trade, and boosting economic growth across the world (Shah, Bhatti & Ahmed, 2023). Governments globally continue to invest heavily in road construction to support economic activities and improve citizens' quality of life. However, these projects have persistently underperformed, with cost overruns averaging between 20% and 45% and time overruns ranging from 30% to 70% globally (Junior & de Matos, 2021). Effective project management practices, encompassing planning, risk management, monitoring, and execution, have been identified as key interventions for improving road project performance (Unegbu & Yawas, 2022). When properly applied, these practices enable better decision-making, streamline communication, and enhance accountability, collectively minimizing disruptions and improving overall project delivery outcomes.

At the global level, project management practices have gained prominence as structured methodologies for improving infrastructure delivery. In Pakistan, Shah et al. (2023) established that poor planning, inadequate budgeting, and weak monitoring are major contributors to cost overruns in infrastructure projects, recommending adoption of proactive project management frameworks. Similarly, Mubasher, Aslam and Saeed (2024) found that organizations implementing project management practices experienced improved planning, efficient resource allocation, and stronger alignment with stakeholder expectations, leading to higher project completion rates. In China, Liu et al. (2020) demonstrated that integrating sustainability principles

into project management functions, including planning, stakeholder coordination, and performance monitoring, enhanced project transparency, operational efficiency, and long-term infrastructure value. These global findings underscore the critical role of structured project management in achieving successful and sustainable infrastructure outcomes.

Across Africa, the adoption of project management practices has been gaining momentum as governments seek to improve infrastructure performance and service delivery. In Rwanda, Iribagiza and Kirabo (2024) established that project planning, risk management, and monitoring significantly influence whether infrastructure projects are delivered on time, within budget, and to expected quality standards. In Ghana, Agyepong (2023) emphasized that resource planning, continuous monitoring, top management support, and effective communication collectively improved road construction project coordination and minimized delays. In Somalia, a case study of the Afgoi road project highlighted that weak monitoring frameworks and inefficient resource allocation hindered effective delivery, with project leaders encouraged to strengthen oversight mechanisms (Ahmed, 2024). These regional experiences demonstrate that the sustained application of project management practices is essential for addressing persistent performance gaps across Africa's infrastructure sector.

In Kenya, project management practices have been recognized as significant determinants of road construction project performance, particularly in urban settings such as Nairobi City County. Mongina and Moronge (2021) established that project planning had the most substantial effect on project implementation, followed by monitoring and evaluation, project funding, and risk management. Magagan and Ngugi (2021) similarly identified risk management, stakeholder engagement, planning, and monitoring as key practices influencing road project success in Nairobi County, promoting accountability, enhanced resource utilization, and timely completion. In Laikipia County, Kamau and Paul (2019) found that competent project teams, effective budget control, and adoption of technology improved communication and operational efficiency in construction projects. These findings collectively highlight that structured project management practices are critical for addressing the unique challenges facing Kenya's road infrastructure sector.

Urban road infrastructure projects in Nairobi City County are central to the county's economic growth and urban mobility, yet they continue to face significant performance challenges. The

Kenya Urban Roads Authority (KURA) manages construction, upgrading, and rehabilitation of key roads, including projects such as the Nairobi Expressway and the rehabilitation of the Eastern Bypass (KURA, 2023). Despite these investments, the Office of the Auditor-General (2023) reported that over 68% of sampled road projects exceeded their contract sums, while 62% recorded time overruns beyond approved completion periods. The World Bank (2022) further noted that poor supervision and weak contractor compliance reduce expected road lifespan by up to 40%. These persistent challenges, despite the adoption of project management practices, signal gaps in their effective application and underscore the need to examine how project planning, monitoring, stakeholder management, and risk management influence urban road infrastructure performance in Nairobi City County.

## **STATEMENT OF THE PROBLEM**

In Kenya, urban road projects are essential for enhancing mobility, reducing traffic congestion and supporting economic growth. To address these needs, the Kenya Urban Roads Authority (KURA) has been investing heavily in road projects in Nairobi County, focusing on expanding and upgrading urban road networks to improve connectivity and ease traffic flow (Mwita, 2020). However, many of these projects have been characterized by poor quality, cost overruns, and time overruns, leading to inefficiencies and delays in achieving their intended benefits. As observed by Kamau and Paul (2019), project managers considerably use project management practices to enhance project performance and ensure successful project delivery. Nonetheless, despite their use, poor performance in road projects is still evident, indicating gaps in the effective application and execution of these practices.

Road construction projects in Kenya continue to experience significant performance challenges in cost, time, and quality. According to the Office of the Auditor-General (2023), over 68% of sampled road projects exceeded their contract sums, while about 62% recorded time overruns beyond approved completion periods. Similarly, the Kenya National Bureau of Statistics (KNBS, 2022) reports that infrastructure projects experience cost escalations ranging between 30% and 50%, largely due to variation orders, procurement inefficiencies, and scope changes. In addition, KeNHA (2024) data indicate that nearly 60% of ongoing road projects are behind schedule due to funding delays and land acquisition challenges. The World Bank (2022) further notes that poor supervision and weak contractor compliance reduce expected road lifespan by up to 40%,

highlighting persistent quality concerns in road infrastructure delivery. It is therefore important to examine the effect of project management practices on performance of urban roads infrastructure projects in Nairobi City County.

Several studies have examined the relationship between project management practices and project performance in Kenya. For instance, Magagan and Ngugi (2021) investigated the influence of project management practices on project performance at Unilever Kenya Limited, Mavuti, Kisingu and Oyoo (2019) examined project management practices in Kenya Ports Authority-funded projects, while Kamau and Paul (2019) focused on building construction projects in Laikipia County. Although these studies established that project management practices influence project performance, they present several research gaps. Conceptually, they examined project performance in manufacturing, port, and building construction projects, with limited attention to the performance of urban road infrastructure projects, which are characterized by unique planning, monitoring, stakeholder coordination, and risk management requirements. Methodologically, the studies adopted different research designs and measurement approaches, making it difficult to generalize their findings to urban road infrastructure projects. Contextually, none of the studies focused on urban road infrastructure projects in Nairobi City County, despite the persistent challenges of cost overruns, schedule delays, and quality deficiencies in these projects. This study therefore sought to fill these gaps by examining the effect of project management practices on the performance of urban road infrastructure projects in Nairobi City County, Kenya.

## **RESEARCH OBJECTIVES**

- i. To examine the effect of project planning on performance of urban roads infrastructure in Nairobi City County, Kenya
- ii. To determine how project monitoring affects performance of urban roads infrastructure in Nairobi City County, Kenya
- iii. To assess how stakeholder management affects performance of urban roads infrastructure in Nairobi City County, Kenya
- iv. To examine the effect of risk management on performance of urban roads infrastructure in Nairobi City County, Kenya

## **LITERATURE REVIEW**

This chapter provides a comprehensive review of literature on the effect of project management practices on performance of urban roads infrastructure projects in Nairobi City County, Kenya. It is structured to begin with the theoretical framework, followed by the conceptual framework, a review of relevant empirical studies, a critique of existing literature, a summary of key insights from the literature, and identification of research gaps.

### **Theoretical Framework**

A theoretical framework provides the foundation for a study by explaining the key theories that support the relationships between variables under investigation. It helps guide the research by offering a structured perspective for interpreting findings and linking them to existing knowledge (Thielmann, Spadaro & Balliet, 2020). This study was anchored on four theories, theory of constraints, theory of change, stakeholder theory and prospects theory. The Theory of Constraints (TOC) was developed by Eliyahu M. Goldratt in 1984 as a management philosophy focused on improving organizational performance by identifying and eliminating constraints that hinder the achievement of goals (McCleskey, 2020). TOC assumes systems are composed of interdependent activities where performance is determined by the weakest link, and that constraints may be physical, such as limited machinery, or non-physical, such as poor scheduling or inadequate budgeting (Bergman & Feser, 2020). It further promotes continuous improvement, asserting that resolving one constraint reveals another. This theory directly informs the first objective, examining the effect of project planning on performance, by explaining how identifying bottlenecks such as delayed approvals, poor resource allocation, and unrealistic timelines enables project managers to prioritize critical tasks and enhance execution efficiency in Nairobi's urban road projects (Majak & Rotich, 2025).

Developed by Weiss (1995), the Theory of Change (ToC) maps logical and causal linkages between project activities, outputs, outcomes, and long-term impacts, emphasizing that change results from deliberate, planned interventions connected through a logical pathway (Reinholz & Andrews, 2020). The theory assumes that monitoring and evaluation are integral to tracking progress, detecting deviations early, and enabling timely strategy adjustments, while stakeholder engagement, institutional capacity, and resource availability significantly influence project

performance (Meyer, Louder & Nicolas, 2022). This theory anchors the second objective, determining how project monitoring affects performance, by providing a framework through which continuous tracking of urban road projects against defined indicators ensures corrective measures are promptly implemented. As Onyango and Pedo (2024) observe, ToC-informed monitoring improves decision-making, cost control, and resource allocation, ultimately contributing to timely project completion and improved road infrastructure quality in Nairobi City County.

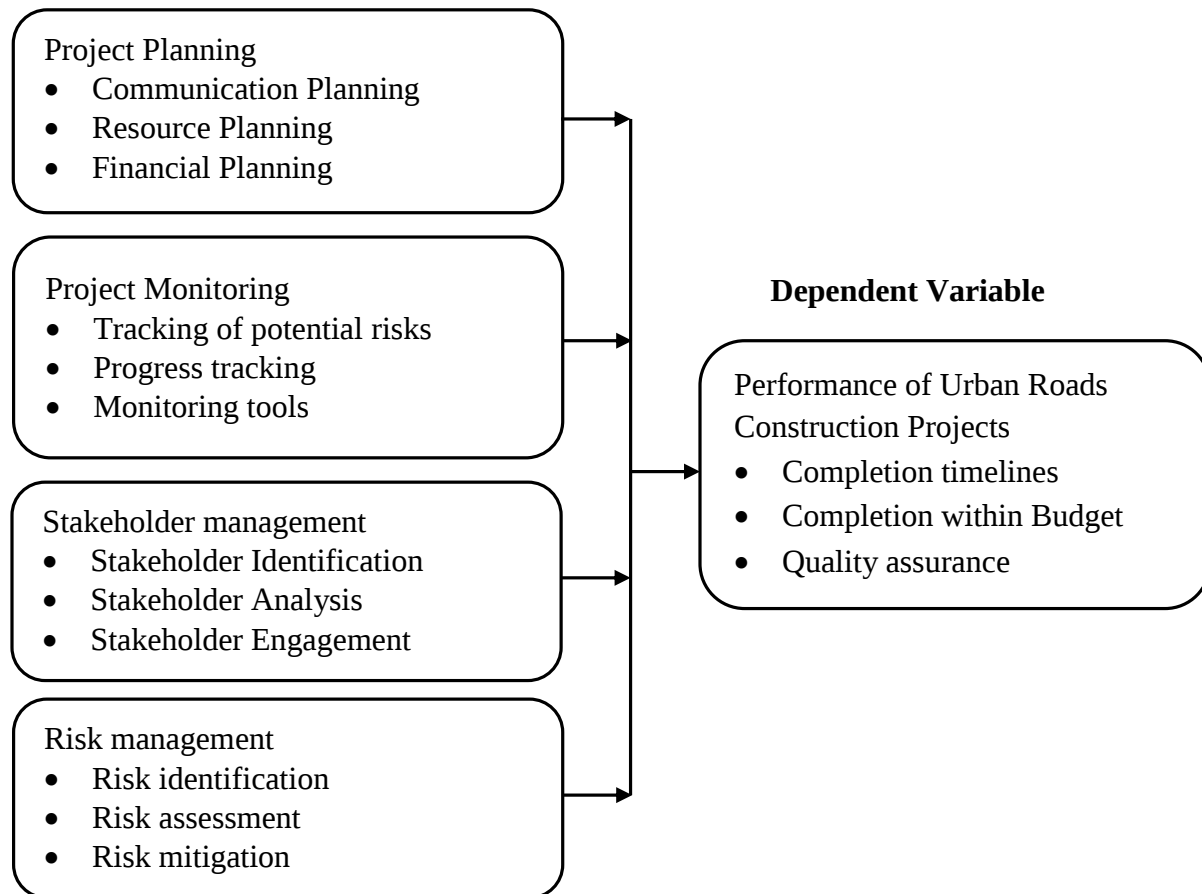
Developed by R. Edward Freeman in 1984, Stakeholder Theory asserts that organizations must consider and address the interests of all parties who can affect or be affected by their activities, including government agencies, contractors, local communities, and suppliers, to achieve long-term success (Barney & Harrison, 2020). The theory assumes that stakeholders possess diverse interests and varying levels of power requiring strategic management, that early and consistent engagement prevents resistance and conflict, and that trust and transparency are essential for building credibility throughout the project lifecycle (Vrečko, Tominc & Širec, 2023). This theory underpins the third objective, assessing how stakeholder management affects performance, by explaining how inclusive engagement of all relevant actors in Nairobi's urban road projects promotes consensus building, minimizes disputes, addresses land acquisition concerns, and ensures contractor adherence to timelines and quality standards, ultimately improving project performance outcomes (Gichimu & Mutuku, 2022).

Developed by Kahneman and Tversky in 1979, Prospect Theory provides a behavioral economics framework explaining how individuals make decisions under risk and uncertainty, positing that people perceive losses more intensely than equivalent gains and evaluate outcomes relative to a reference point rather than absolute values (Ruggeri & Folke, 2020). The theory assumes individuals are loss-averse, rely on heuristics and biases that deviate from rational decision-making, and that framing effects significantly shape behavioral responses, with risk-seeking behavior dominant in loss contexts and conservatism prevailing in gain contexts (Prietzl, 2020; Claeys & Coombs, 2020). This theory informs the fourth objective, examining the effect of risk management on performance, by explaining how stakeholders including contractors and government officials perceive and react to project risks. Effective risk management guided by Prospect Theory anticipates these behavioral responses through scenario planning, real-time

monitoring, and contingency budgeting to minimize disruptions and enhance project delivery (Kimotho, 2023).

### Conceptual Framework

Conceptual framework is a diagram that illustrates connection between independent and dependent variables (Bryman, 2022). Figure 1 depicts the link between independent and dependent variables.



### Independents Variables

**Figure 1: Conceptual Framework**

### Empirical Literature Review

Empirical evidence consistently demonstrates that project planning positively and significantly influences infrastructure project performance. In China, Lin et al. (2024) found that well-structured planning enhanced team coordination, reduced delays, and improved budget adherence in megaprojects. In Nigeria, Adeyemo et al. (2023) established that effective planning contributed to

better time management, improved resource utilization, and enhanced cost control. In Rwanda, both Gasana and Njenga (2024) and Umulisa and de Dieu Dushimimana (2023) confirmed that resource allocation, stakeholder involvement, scheduling, and risk anticipation significantly improved project performance and decision-making. In Kenya, Kyalo and Kising'u (2024) found that resource and scope planning positively influenced road construction performance in Kwale County, while Ondiek (2020) established that time, scope, cost, and risk planning minimized delays, enhanced resource allocation, and reduced cost overruns in Uasin Gishu County road projects.

Studies across multiple contexts confirm that project monitoring has a positive and significant effect on project performance. In Rwanda, Ngiruwonsanga and de Dieu Dushimimana (2024) found that timely data collection, consistent activity tracking, and stakeholder feedback mechanisms enhanced outcomes and enabled early identification of implementation gaps. In Nigeria, Okafor (2021) established that effective monitoring and evaluation enhanced goal tracking, informed timely decision-making, and ensured accountability throughout the project lifecycle. In Tanzania, Mtaki (2024) found that consistent monitoring identified implementation gaps, ensured financial accountability, and improved stakeholder confidence, contributing to quality project delivery. In Kenya, Mutua, Juma and Owuor (2020) demonstrated that monitoring enabled timely detection of deviations and improved coordination among road construction stakeholders in Kilifi County, while Gor and Mungai (2024) confirmed that systematic monitoring frameworks enhanced accountability, timeline adherence, and achievement of project objectives among NGOs in Nairobi County.

Evidence from diverse contexts demonstrates that stakeholder management positively and significantly influences project performance. In India, Srinivasan and Dhivya (2020) identified stakeholder participation, clear decision-making authority, and organizational structure as critical factors enhancing collaboration and accountability in construction projects. In Ghana, Frempong-Jnr., Ametepey and Cobbina (2023) found that improved stakeholder engagement led to better coordination, compliance with environmental standards, and reduced material wastage. In Nigeria, Alayande (2021) established that effective stakeholder identification, engagement, and communication improved project delivery, reduced conflicts, and enhanced collaboration in construction projects in Abuja, while Mbah, Ebeke and Eneiga (2025) found that regular

stakeholder communication contributed to sustained business growth and market competitiveness. In Kenya, Gichimu and Mutuku (2022) confirmed that timely stakeholder involvement, clear communication, and continuous engagement significantly improved the performance of county-funded projects in Nyeri County.

Empirical literature consistently confirms that risk management practices have a positive and significant effect on project performance across global and local contexts. In Pakistan, Kallow et al. (2023) found that proactive risk identification, assessment, and mitigation strategies contributed to timely project completion and budget adherence, with structured risk frameworks reducing disruptions and improving adaptability. In South Africa, Amoah and Pretorius (2020) identified recurring risk factors, including payment delays and labor shortages, as significant contributors to project inefficiencies, emphasizing the need for formalized risk management frameworks. In Rwanda, Sangwa and de Dieu Dushimimana (2023) confirmed that risk identification, analysis, response planning, and monitoring significantly enhanced proactive decision-making and reduced implementation disruptions. In Libya, Algremazy et al. (2023) found that effective risk identification reduced cost overruns and schedule delays, while in Kenya, Nzainga (2023) established that timely risk identification and proactive mitigation strategies significantly improved project delivery timelines and cost efficiency at KenGen.

## **RESEARCH METHODOLOGY**

This study adopted a descriptive research design, enabling the researcher to observe, record, and interpret data without altering existing conditions, thereby identifying the current state of relationships between project management practices and urban road infrastructure performance (Hall, 2020). The target population comprised 183 respondents drawn from 97 KURA road construction projects completed in Nairobi City County between 2021 and 2024, specifically 97 project managers, 32 resident engineers, and 54 KURA officials. Using Slovin's formula at a 0.05 margin of error, a sample of 124 respondents was derived. Stratified random sampling was then applied, dividing respondents into three strata corresponding to the three professional categories, ensuring proportional and representative selection from each group (Hair, Page & Brunsveld, 2020). This approach minimized sampling bias and ensured that the perspectives of all key professional categories were adequately captured.

Primary data were collected using semi-structured questionnaires combining Likert-scale closed-ended items and open-ended questions, administered through a drop-off and pick-up method over two weeks following receipt of NACOSTI research authorization. A pilot test involving 12 respondents, representing 10% of the sample, was conducted in Kiambu County to assess instrument quality (Latwal, 2020). Validity was ensured through content validity via expert review, face validity through pilot feedback, and construct validity using confirmatory factor analysis, while reliability was confirmed using Cronbach's alpha with an acceptable threshold of 0.70 (Punch, 2020). Qualitative data from open-ended responses were analyzed thematically, with findings presented narratively. Quantitative data were analyzed using SPSS version 28, employing descriptive statistics, means, standard deviations, percentages, and frequencies, alongside inferential techniques including Pearson correlation and multiple linear regression, modeled as  $Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$ .

## **RESEARCH FINDINGS AND DISCUSSIONS**

This chapter provided data analysis, presentation, interpretation and discussion of the study's findings in relation to its objective. The general aim of this study was to assess the effect of project management practices on performance of urban roads infrastructure projects in Nairobi City County, Kenya. The study examined how the effects of project planning, project monitoring, stakeholder management, and risk management influence the performance of urban roads infrastructure projects in Nairobi City County, Kenya.

### **Pilot Test Results**

The pilot test assessed validity and reliability of the research instrument across three dimensions. Content validity was enhanced through expert review by the supervisor, face validity was improved by refining ambiguous items identified during piloting, and construct validity was confirmed through confirmatory factor analysis. Average Variance Explained (AVE) values for all constructs exceeded the recommended threshold of 0.50, with project planning (0.861), project monitoring (0.884), stakeholder management (0.877), risk management (0.894), and performance of urban roads construction projects (0.903), demonstrating strong convergent validity. Reliability was assessed using Cronbach's alpha, with a threshold of 0.70 considered acceptable (Punch, 2020). All constructs surpassed this threshold, project planning (0.839), project monitoring (0.891), stakeholder management (0.877), risk management (0.874), and project performance

(0.885), confirming that the instrument demonstrated sufficient internal consistency and was therefore reliable for use in the main data collection exercise.

### Questionnaires' Response Rate

The target population was project managers in 97 road construction projects by Kenya Urban Roads Authority (KURA), 32 resident engineers and 54 KURA Officials working in Nairobi County. The responses rate was as in Table 1.

**Table 1: Questionnaires' Response Rate**

| Category                         | sample size | Responses  | Responses rate |
|----------------------------------|-------------|------------|----------------|
| Project managers                 | 45          | 40         | 88.89          |
| Resident Engineers               | 47          | 42         | 89.36          |
| KURA Officials in Nairobi County | 32          | 30         | 93.75          |
| <b>Total</b>                     | <b>124</b>  | <b>112</b> | <b>90.32</b>   |

The researcher distributed 124 questionnaires, of which 112 were duly completed and returned, yielding a response rate of 90.32%. According to Latwal (2020), a 50% response rate is generally acceptable for analysis, inference, and reporting, while a 70% rate is considered excellent. Therefore, the attained response rate of 90.32% is deemed more than sufficient for conducting analysis, drawing conclusions, and presenting findings.

### Descriptive Analysis

Descriptive statistics are a set of techniques used to summarize and highlight key features of a dataset or a population. In this study descriptive analysis include mean, standard deviation and percentages. Quantitative data was obtained from closed-ended questions and items rated on a 5-point Likert scale, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating moderately agree, 4 indicating agree, 5 indicating strongly agree. qualitative data were gathered through open-ended questions.

### Project Planning

Respondents strongly agreed that communication plans are developed and shared at project inception (mean = 4.553, SD = 0.612), consistent with Adeyemo et al. (2023), and that effective financial planning positively influences timely project completion (mean = 4.508, SD = 0.657).

Resource availability and allocation were affirmed to align with project scope and timelines (mean = 4.455, SD = 0.613), while respondents agreed that poor resource planning frequently causes delays and budget overruns (mean = 4.437, SD = 0.654), supporting Lin et al. (2024). Effective communication planning was confirmed to reduce misunderstandings and improve coordination (mean = 4.428, SD = 0.706), and financial plans are prepared and reviewed across project stages (mean = 4.410, SD = 0.623). The lowest-rated item, strict adherence to budgeting and cost estimation (mean = 4.366, SD = 0.697), was nonetheless affirmed, consistent with Ondiek (2020), indicating that project planning practices are well embedded within Nairobi's urban road construction projects.

### **Project Monitoring**

Respondents strongly agreed that structured processes exist for monitoring and addressing emerging risks during project execution (mean = 4.526, SD = 0.614), consistent with Ngiruwonsanga and de Dieu Dushimimana (2024), and that project milestones are clearly defined and regularly tracked (mean = 4.491, SD = 0.671). Risk tracking was affirmed to minimize delays and budget overruns (mean = 4.482, SD = 0.614), supporting Okafor (2021), while timely tracking of activities was confirmed to improve overall project performance (mean = 4.428, SD = 0.693), consistent with Mtaki (2024). Respondents agreed that variances between planned and actual progress are promptly addressed (mean = 4.410, SD = 0.623), and that monitoring tools provide real-time data for decision-making (mean = 4.392, SD = 0.605), aligned with Gor and Mungai (2024). The lowest-rated item confirmed that proper monitoring tools improve project delivery and accountability (mean = 4.339, SD = 0.678), collectively indicating strong adoption of monitoring practices among Nairobi's urban road projects.

### **Stakeholder Management**

Respondents strongly agreed that proper stakeholder identification contributes to smoother project execution (mean = 4.464, SD = 0.614), supporting Srinivasan and Dhivya (2020), and that regular stakeholder engagement improves trust and project transparency (mean = 4.455, SD = 0.567), consistent with Frempong-Jnr., Ametepey and Cobbina (2023). Stakeholder interests, influence, and expectations were confirmed to be systematically analyzed during planning (mean = 4.446, SD = 0.582), and stakeholders are actively involved in key decision-making throughout the project

lifecycle (mean = 4.437, SD = 0.549), aligned with Mbah, Ebeke and Eneiga (2025). Respondents further agreed that failure to identify stakeholders early causes implementation delays (mean = 4.419, SD = 0.638), supporting Alayande (2021), and that stakeholder analysis helps anticipate and manage conflicts (mean = 4.419, SD = 0.609). The lowest-rated item confirmed that effective stakeholder engagement contributes to timely project completion (mean = 4.348, SD = 0.835), indicating moderately strong stakeholder management practices across Nairobi's urban road projects.

### **Risk Management**

Respondents agreed that risk assessment improves the accuracy of project planning and forecasting (mean = 4.482, SD = 0.697), representing the highest-rated item, while practical risk mitigation measures are incorporated into project execution plans (mean = 4.419, SD = 0.679), consistent with Kallow et al. (2023). Risk mitigation strategies are regularly reviewed and adjusted in response to project changes (mean = 4.383, SD = 0.687), supporting Amoah and Pretorius (2020), and applying mitigation measures was confirmed to improve infrastructure delivery performance (mean = 4.366, SD = 0.710), aligned with Sangwa and de Dieu Dushimimana (2023). Identified risks are systematically assessed for likelihood and impact (mean = 4.357, SD = 0.708), while risks are proactively identified at early project stages (mean = 4.330, SD = 0.689), consistent with Algremazy et al. (2023). The lowest-rated item confirmed that risk assessment results guide prioritization of management actions (mean = 4.267, SD = 0.722), supporting Kallow et al. (2023), collectively demonstrating sound risk management adoption in Nairobi's urban road projects.

### **Performance of Urban Roads Construction Projects**

Respondents strongly agreed that project funds are utilized efficiently in line with approved budget allocations (mean = 4.553, SD = 0.612), representing the highest-rated performance indicator, while quality assurance procedures are implemented at every project stage (mean = 4.437, SD = 0.611), consistent with Kyalo and Kising'u (2024). High-quality construction standards were confirmed to improve user satisfaction and road longevity (mean = 4.428, SD = 0.693), supporting Gor and Mungai (2024), while delays in project execution are effectively managed to avoid long-term disruptions (mean = 4.419, SD = 0.692), aligned with Gichimu and Mutuku (2022). Timely fund disbursement was affirmed to support steady project progress (mean = 4.410, SD = 0.608),

consistent with Nzainga (2023), and poor budget absorption was confirmed to negatively impact completion and quality (mean = 4.392, SD = 0.775). The lowest-rated item indicated that projects are consistently completed within planned timelines (mean = 4.303, SD = 0.655), consistent with Sangwa and de Dieu Dushimimana (2023), collectively reflecting satisfactory performance levels across Nairobi's urban road infrastructure projects.

## Inferential Statistics

Inferential statistics involves drawing conclusions, making predictions, and generalizing results from a sample to a larger population. This approach is essential in statistical analysis and research, as it allows researchers to make inferences about a population based on data collected from a representative sample. In this study, inferential data analysis was carried out using Pearson correlation coefficient and linear regression analysis.

## Correlations Analysis

Correlation analysis is a statistical technique used to assess the strength and direction of the relationship between two or more variables. Pearson correlation coefficient (r) ranges from -1 to 1 indicating the the degree and direction of the association. The results of correlation analysis were as presented in Table 2

**Table 2: Correlations Results**

|                                                          |                        | Performance of<br>urban roads<br>construction<br>project | Project<br>planning | Project<br>monitoring | Stakeholder<br>management | Risk<br>management |
|----------------------------------------------------------|------------------------|----------------------------------------------------------|---------------------|-----------------------|---------------------------|--------------------|
| Performance of<br>urban roads<br>construction<br>project | Pearson<br>Correlation | 1.000                                                    |                     |                       |                           |                    |
|                                                          | Sig. (2-tailed)        |                                                          |                     |                       |                           |                    |
|                                                          | N                      | 112                                                      |                     |                       |                           |                    |
| Project planning                                         | Pearson                | .890**                                                   | 1.000               |                       |                           |                    |
|                                                          | Correlation            |                                                          |                     |                       |                           |                    |
|                                                          | Sig. (2-tailed)        | .000                                                     |                     |                       |                           |                    |
|                                                          | N                      | 112                                                      | 112                 |                       |                           |                    |
| Project<br>monitoring                                    | Pearson                | .859**                                                   | .190                | 1.000                 |                           |                    |
|                                                          | Correlation            |                                                          |                     |                       |                           |                    |
|                                                          | Sig. (2-tailed)        | .000                                                     | .098                |                       |                           |                    |
|                                                          | N                      | 112                                                      | 112                 | 112                   |                           |                    |
| Stakeholder<br>management                                | Pearson                | .789**                                                   | .227                | .133                  | 1.000                     |                    |
|                                                          | Correlation            |                                                          |                     |                       |                           |                    |
|                                                          | Sig. (2-tailed)        | .000                                                     | .176                | .098                  |                           |                    |
|                                                          | N                      | 112                                                      | 112                 | 112                   | 112                       |                    |
| Risk<br>management                                       | Pearson                | .727**                                                   | .169                | .091**                | .129                      | 1.000              |
|                                                          | Correlation            |                                                          |                     |                       |                           |                    |
|                                                          | Sig. (2-tailed)        | .000                                                     | .109                | .077                  | .095                      |                    |
|                                                          | N                      | 112                                                      | 112                 | 112                   | 112                       | 112                |

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

The results showed that project planning had a strong and positive relationship with the performance of urban roads construction project in Nairobi City County, Kenya ( $r=0.890$ ,  $p\text{-value}=0.000$ ). As the  $p\text{-value}$  is below the 0.05 significance threshold, the relationship is considered statistically significant. These findings align with Lin et al. (2024) observations that effective project planning enhances project performance through proper resource allocation, scheduling, and coordination of project activities. Similarly, project monitoring demonstrated a strong and positive relationship with the performance of urban roads construction project in Nairobi City County, Kenya ( $r=0.859$ ,  $p\text{-value}=0.000$ ). Since the  $p\text{-value}$  is less than 0.05, the relationship is deemed statistically significant. These findings concur with Okafor (2021) observations that effective project monitoring enhances project performance by facilitating timely tracking of progress, identifying deviations, and implementing corrective actions.

Further, stakeholder management showed a strong and positive relationship with the performance of urban roads construction project in Nairobi City County, Kenya ( $r=0.789$ ,  $p\text{-value}=0.000$ ). Given that the  $p\text{-value}$  is below the 0.05 significance level, the relationship is considered statistically significant. These findings concur with Mbah, Ebeke, and Eneiga (2025) observations that effective stakeholder management improves project performance through enhanced communication, collaboration, and stakeholder support. Also, risk management showed a strong and positive relationship with the performance of urban roads construction project in Nairobi City County, Kenya. ( $r=0.727$ ,  $p\text{-value}=0.000$ ). Since the  $p\text{-value}$  falls below the 0.05 significance threshold, the relationship is deemed statistically significant. These findings are in agreement with Amoah and Pretorius (2020) observations that effective risk management enhances project performance by minimizing uncertainties, preventing disruptions, and ensuring successful project implementation.

### **Regression Analysis**

Linear regression analysis was employed to assess the weight to which project management practices influence the performance of urban roads infrastructure projects in Nairobi City County, Kenya. The project management practices included project planning, project monitoring, stakeholder management and risk management. The R-squared (coefficient of determination) is a statistical measure that evaluates the goodness of fit of a regression model. It indicates the

proportion of the variance in the dependent variable that is explained by the independent variables. The results of the r-squared were as shown in Table 3.

**Table 3: Model Summary**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .823 <sup>a</sup> | .677     | .651              | .17451                     |

a. Predictors: (Constant), Risk management, Project planning, Project monitoring, Stakeholder management

The R<sup>2</sup> value for the relationship between the independent variables and the dependent variable was 0.677, which indicates that approximately 67.7% of the variation in the dependent variable (performance) can be explained by the independent variables- project planning, project monitoring, stakeholder management and risk management. This suggests that, the model accounts for a significant portion of the variance in the performance of urban roads construction project in Nairobi City County, Kenya.

**Table 4: Analysis of Variance**

| Model |            | Sum of Squares | df  | Mean Square | F      | Sig.              |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1     | Regression | 15.243         | 4   | 3.81075     | 99.161 | .000 <sup>b</sup> |
|       | Residual   | 4.112          | 107 | 0.038       |        |                   |
|       | Total      | 19.355         | 111 |             |        |                   |

a. Dependent Variable: Performance of urban roads construction project

b. Predictors: (Constant), Risk management, Project planning, Project monitoring, Stakeholder management

ANOVA was applied to determine whether the regression model, as a whole, is statistically significant in explaining the variability of the dependent variable. The calculated F-value (99.161) exceeded the critical F-value (3.92) from the F-distribution table. Furthermore, the p-value associated with the F-statistic was 0.000, confirming that the overall model is statistically significant. This implies that the regression model is appropriate for explaining the influence of project planning, project monitoring, stakeholder management, and risk management on the performance of urban road infrastructure projects.

**Table 5: Regression Coefficients**

| Model |                        | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig. |
|-------|------------------------|-----------------------------|------------|---------------------------|-------|------|
|       |                        | B                           | Std. Error | Beta                      |       |      |
| 1     | (Constant)             | 1.816                       | .215       |                           | 8.464 | .000 |
|       | Project planning       | .270                        | .116       | .250                      | 2.331 | .023 |
|       | Project monitoring     | .263                        | .060       | .303                      | 4.356 | .000 |
|       | Stakeholder management | .241                        | .061       | .312                      | 3.956 | .000 |
|       | Risk management        | .157                        | .060       | .168                      | 2.621 | .011 |

a. Dependent Variable: Performance of urban roads construction project

Based on the unstandardized coefficients, the regression equation was derived as:

$$Y = 1.816 + 0.270X_1 + 0.263X_2 + 0.241X_3 + 0.157X_4 + \varepsilon$$

The findings indicated that project planning had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya ( $\beta_1 = 0.270$ ,  $p = 0.023$ ). This means that a one-unit increase in project planning is associated with a 0.270 increase in project performance. Since the p-value is below 0.05, the relationship is statistically significant. These findings align with Ondiek (2020) observations that effective project planning enhances project outcomes through proper scheduling, resource allocation, and coordination of project activities. Furthermore, the findings are consistent with Kyalo and Kising'u (2024) findings that comprehensive planning improves project efficiency, timely completion, and overall performance.

In addition, project monitoring was found to have a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya ( $\beta_2 = 0.263$ ,  $p = 0.000$ ). This suggests that a one-unit increase in project monitoring leads to a 0.263 improvement in performance. Since the p-value is below 0.05, the relationship is statistically significant. These findings are in agreement with Gor and Mungai (2024) observations that project monitoring enhances project success by facilitating continuous tracking of activities, identifying deviations, and enabling timely corrective measures. The findings also agree with Mutua, Juma, and Owuor (2020) findings that effective monitoring improves accountability, efficiency, and project delivery.

Furthermore, stakeholder management was found to have a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya ( $\beta_3 = 0.241$ ,  $p = 0.000$ ). This means that a one-unit increase in stakeholder management corresponds to a 0.241 improvement in project performance. With a p-value below 0.05, the relationship is statistically significant. These findings are in agreement with Gichimu and Mutuku (2022) observations that effective stakeholder management significantly improves project implementation through enhanced communication, collaboration, and stakeholder support. The findings also conform to Alayande (2021) who observed that stakeholder involvement promotes project acceptance, reduces conflicts, and enhances overall project performance.

The results also revealed that risk management had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya ( $\beta_4 = 0.157$ ,  $p = 0.011$ ). This implies that a one-unit increase in risk management is associated with a 0.157 improvement in performance. Since the p-value is less than 0.05, the relationship is statistically significant. These findings align with Nzainga (2023) observations that effective risk management enhances project outcomes by minimizing uncertainties, preventing disruptions, and ensuring smooth project execution. Furthermore, the findings are consistent with Algremazy et al. (2023) observations that proactive risk identification and mitigation contribute significantly to project success and performance.

## **CONCLUSIONS**

The study concludes that project planning had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. Specifically, the research indicated that communication planning, financial planning, resource allocation, and budgeting were found to influence project outcomes. This implies that improvements in project planning practices would lead to enhanced performance of urban road infrastructure projects within Nairobi City County. The study also concludes that project monitoring had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study found that project monitoring in terms of structured processes, milestone tracking, risk tracking, and the use of monitoring tools has an effect on project performance. The findings implies that an improvement in project monitoring would lead to improved performance of urban road infrastructure projects in Nairobi City County, Kenya.

Further, the study concludes that stakeholder management had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study established that stakeholder management in terms of proper identification, regular engagement, systematic analysis, and active involvement in decision-making has an effect on project performance. These means that an improvement in stakeholder management would lead to improved performance of urban road infrastructure projects in Nairobi City County, Kenya. Moreover, the study concludes that risk management had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study findings revealed that risk management in terms of risk assessment, early identification, mitigation strategies, and systematic evaluation of risks has an effect on project performance. This means that an improvement in risk management would lead to improved performance of urban road infrastructure projects in Nairobi City County, Kenya.

## **RECOMMENDATIONS**

The study found that project planning had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study recommends that project managers should develop and share communication plans at the beginning of every project to improve coordination and minimize misunderstandings. In addition, urban road projects should adopt effective financial planning practices to support timely completion, ensure availability of resources, and align resource allocation with project scope and timelines. The study also recommends that adequate resource planning should be conducted before project commencement to avoid delays and budget overruns. Furthermore, strict adherence to budgeting and cost estimation processes should be maintained, while stakeholders should be regularly updated on project progress through structured communication channels to enhance accountability and performance.

The study established that project monitoring had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study recommends that project managers should adopt structured monitoring processes to track milestones and address emerging risks during project execution. In addition, progress should be tracked regularly against clearly defined milestones, with timely identification and correction of variances between planned and actual outcomes. The study also recommends that both digital

and manual monitoring tools should be utilized to provide real-time data for decision-making and accountability. Further, project teams should integrate risk tracking into monitoring systems to minimize delays and budget overruns, while ensuring that risks are identified, documented, and reviewed throughout the project lifecycle to enhance overall project performance.

The study found that stakeholder management had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study recommends that project managers should ensure proper identification of all relevant stakeholders at the initial stages of the project to prevent delays and conflicts. In addition, project teams should engage stakeholders regularly through structured communication channels to build trust and enhance transparency. The study also recommends that stakeholder interests, influence, and expectations should be systematically analyzed during project planning to guide decision-making. Similarly, stakeholders should be actively involved in key decisions throughout the project lifecycle and prioritized based on their level of impact, as this promoted accountability, minimize conflicts, and contribute to the timely completion of urban road projects.

The study found that risk management had a positive and significant effect on the performance of urban road infrastructure projects in Nairobi City County, Kenya. The study recommends that project managers should conduct comprehensive risk assessments to improve planning accuracy and forecasting. In addition, practical risk mitigation measures should be incorporated into project execution plans and regularly reviewed to align with project changes. The study also recommends that risks should be proactively identified at the early stages of projects to prevent delays and cost overruns. Further, organizations should establish formal processes for continuous risk identification and systematically assess risks based on likelihood and impact. Moreover, risk assessment results should be used to prioritize management actions, ensuring timely interventions and improved project performance.

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