PROJECT PLANNING PRACTICES AND PERFORMANCE OF ROAD CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA

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DECLARATION

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DEDICATION

I dedicate this work to my ancestry, my lineage, and my cherished friends, whose unwavering support made this journey possible. My profound gratitude also extends to my professors and peers, whose knowledge and insights profoundly shaped this work.

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OPERATIONAL DEFINITIONS OF TERMS

Budget Utilisation Refers to the efficiency and effectiveness with which allocated financial resources are applied to project activities to achieve the intended objectives. It measures how well the project adheres to financial plans while ensuring value for money and timely delivery of outputs. Indicators include budget expenditure rate; alignment of expenditure with work progress; resource allocation efficiency; variance between planned and actual spending; financial control and monitoring mechanisms; timeliness of fund disbursement and utilisation.

Conflict Resolution Communication Refers to the structured and purposeful exchange of information aimed at identifying, addressing, and resolving disagreements or misunderstandings among project stakeholders or team members. It emphasises open dialogue, transparency, and mutual respect to maintain collaboration and ensure project continuity. Measures include conflict identification and reporting; openness and transparency in dialogue; use of mediation and communication channels; timeliness of resolution communication; collaborative problem-solving mechanisms; post-conflict relationship restoration.

Cost Budgeting Involves the process of estimating, allocating, and controlling financial resources to ensure that project activities are completed within the approved budget. It provides a structured financial plan that guides spending, monitors expenditures, and helps achieve cost efficiency throughout the project lifecycle.

	Indicators include budget estimation accuracy; budget allocation efficiency; expenditure monitoring; budgetary compliance; financial control mechanisms; stakeholder awareness of budget.
Cost Control	Refers to the systematic process of regulating project expenditures to ensure that the project remains within the approved budget. It involves monitoring costs, comparing actual performance against the budget, and implementing corrective measures to prevent or minimise overruns. Indicators include Budget compliance; corrective action efficiency; cost performance analysis; expenditure monitoring and control mechanisms; stakeholder reporting and awareness.
Cost Management	Involves the disciplined coordination and efficient use of financial resources to ensure that project activities are completed within predefined budget constraints while achieving the desired scope and quality outcomes. This is measured by budget planning and estimation accuracy; cost control and monitoring; resource allocation efficiency; adherence to budget limits; financial reporting and transparency; cost performance index (CPI).
Cost Overrun	Refers to the extent to which actual project expenditures exceed the initially approved or budgeted costs. It serves as a key indicator of financial performance and cost control efficiency in project execution. This is a quantification of budget deviations using [(Actual Cost − Budgeted Cost) / Budgeted Cost] × 100,

	segmented by materials, labour, and equipment, where >10 per cent signifies critical variance.
Cost Tracking & Monitoring	Involves the continuous observation, recording, and evaluation of project expenditures to ensure alignment with the approved budget. This practice helps identify variances early, enables corrective actions, and supports overall financial control throughout the project lifecycle. Measures include Frequency of cost monitoring; variance analysis; corrective action implementation; cost reporting accuracy; integration with project management tools; stakeholder awareness and engagement.
Environmental Compliance	This is a verification of ecological safeguards through erosion control (percentage of stabilised area), spoil recycling (tons), and tree replanting ratios, aligned with ISO 14001 and local EPA standards.
Project Communication Tools	Refer to the structured methods, platforms, or systems used to facilitate the effective exchange of information among stakeholders throughout a project's lifecycle, ensuring timely, accurate, consistent communication to support decision-making, coordination, and accountability. Such tools include reports, updates, emails, minutes, meetings, digital platforms, etc.
Project Completion Rate	This is the percentage of planned road segments (in kilometres) completed within the scheduled timeframe, calculated as (Completed km / Planned km) × 100, with thresholds of ≥95 per

	cent (on-track) and <85 per cent (delayed), sourced from Gantt charts and as-built records.
Project Designing	Constitutes the operational framework for evaluating project activities, defining technical requirements, and allocating essential resources necessary to achieve the objectives of roadway construction initiatives. It ensures that the project's scope, specifications, and implementation strategies are clearly articulated and aligned with performance expectations. Indicators include quality of design documentation; alignment with objectives; resource allocation adequacy; stakeholder involvement; compliance with standards; design change management.
Project Planning Practices	Refer to the systematic approaches used to define, structure, execute, and manage a project throughout its initiation, implementation, and closure phases. These practices ensure that project objectives are clearly articulated, resources are efficiently allocated, timelines are realistic, and control mechanisms are established to achieve desired outcomes. Measures include well-documented project scope, a work breakdown structure, detailed project timelines, number of identified risks with mitigation plans, frequency of planning meetings, existence of monitoring tools, frequency of progress reviews, and responsiveness to deviations.
Project Scheduling	Refers to the systematic process of planning, organising, and controlling the timing of project activities to ensure that tasks

	are completed within the designated timeframes. Effective scheduling ensures optimal sequencing of activities, resource allocation, and timely project completion. Indicators include, development of project schedule; milestone planning and adherence; critical path identification; resource scheduling and optimisation; time monitoring and control; stakeholder communication on schedule.
Project Team Communication:	Refers to the systematic exchange of information, ideas, and feedback among members of the project team to coordinate tasks, make decisions, and solve problems effectively. It ensures that team members remain informed, aligned, and collaborative in achieving project goals. Measures include clarity and completeness of information; communication frequency and responsiveness; use of communication tools and platforms; information sharing and accessibility; feedback and coordination mechanisms; team cohesion and interpersonal relationships.
Quality Deliverables	Refer to the extent to which the project outputs (products, services, or works) meet the predefined technical standards, client specifications, and regulatory requirements. It reflects the effectiveness of quality assurance and control measures implemented throughout the project lifecycle. Indicators include conformance to specifications and standards; defect rate and rework frequency; compliance with regulatory and safety

	requirements; client and stakeholder satisfaction; inspection and testing results; durability and functionality of completed works.
Risk Assessment	Is the systematic process of analysing identified project risks to determine their likelihood of occurrence and potential impact on project objectives. It provides a basis for prioritising risks and developing appropriate mitigation or response strategies to enhance project success. Measures include probability and impact evaluation; risk prioritisation; use of analytical tools and techniques; integration with project planning; stakeholder involvement; documentation and reporting of risk assessments.
Risk Identification	Is the systematic process of recognising, documenting, and categorising potential events or conditions that could adversely affect project objectives. It forms the foundation of project risk management by enabling proactive planning and mitigation strategies. Indicators include comprehensiveness of risk register; frequency of risk assessments; stakeholder involvement; use of risk identification tools; categorisation and prioritisation of risks; documentation and communication of risks.
Risk Management	Refers to the methodological approach of predicting and evaluating potential risks, then determining resources and procedures needed to handle their arising.
Risk Monitoring	Refers to the continuous process of tracking identified risks, reassessing their status, and evaluating the effectiveness of mitigation strategies throughout the project lifecycle. It ensures

	that emerging risks are detected early and that response plans remain effective and aligned with project objectives. Indicators include frequency of risk reviews; tracking of mitigation actions; identification of emerging risks; performance of risk indicators; communication and reporting; evaluation of mitigation effectiveness.
Road Construction Projects	Refer to the planning, designing, and construction of infrastructure projects aimed at building, upgrading, repairing, or expanding roads. Indicators include project type and scope; project scale and budget size; duration and complexity; stakeholder involvement; compliance with standards and regulations; geographical and environmental context.
Stakeholder Communication	Refers to the structured process of generating, sharing, and managing project information to ensure that all stakeholders are informed, engaged, and aligned with project objectives. It promotes transparency, reduces misunderstandings, and enhances collaboration among project participants. Indicators include communication planning and strategy; frequency and timeliness of communication; information accuracy and completeness; use of communication channels and tools; stakeholder feedback mechanisms; stakeholder engagement and satisfaction.
Time Contingency Planning	Refers to the proactive identification of potential schedule risks and the allocation of buffer time to critical project activities. Its purpose is to minimise the impact of unforeseen delays and

	ensure that project objectives are achieved within the planned timeframe. Indicators include Identification of schedule risks; allocation of contingency time; integration with project schedule; effectiveness of contingency execution; stakeholder awareness and approval.
Time Estimation Accuracy	Refers to the degree to which the initially planned duration for project activities aligns with the actual time taken for their completion. It serves as an indicator of scheduling effectiveness and project control efficiency. Measures include planned vs. actual duration; adherence to milestones; schedule variance (SV); critical activity timing; stakeholder satisfaction with time estimates.
Timely Completion	Refers to the extent to which a project or its components are completed within the planned or contractual schedule without unnecessary delays. It reflects the effectiveness of project planning, scheduling, monitoring, and control in meeting time-related objectives. Measures include adherence to project schedule; deviation from planned duration; achievement of milestones; effectiveness of schedule control; resource availability and allocation; stakeholder satisfaction with project timeliness.

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank.
ANOVA	Analysis of Variance.
CAGR	Compounded Annual Growth Rate.
CAK	Competition Authority of Kenya.
CDF	Constituency Development Fund.
CPM	Critical Path Method.
CRBC	China Road and Bridge Corporation.
DOTs	Departments of Transportation.
EDA	Exploratory Data Analysis
ERM	Enterprises Risk Management.
EXIM	Export – Import.
FHWA	Federal Highways Administration.
GDP	Gross Domestic Product (Nominal).
GFIP	Gauteng Freeway Improvement Project.
GoK	Government of Kenya.
ICED	Infrastructure & Cities for Economic Development.
ICT	Information Communications Technology.
IT	Information – Communication Technology.
KAM	Kenya Association of Manufacturers.

KeNHA	Kenya National Highways Authority.
KeRRA	Kenya Rural Roads Authority.
KES	Kenya Shillings.
KNBS	Kenya National Bureau of Statistics.
KPIs	Key Performance Indicators.
KPMG	Klynveld Peat Marwick Goerdeler.
KRB	Kenya Roads Board.
Kshs	Kenya Shillings.
KURA	Kenya Urban Roads Authority.
LAPSSET	Lamu Port South Sudan – Ethiopia Transport.
LSE	Least Squares Estimator.
NACOSTI	National Commission for Science, Technology and Innovation.
NCA	National Construction Authority.
NCC	Nairobi City County.
NGO	Non-Governmental Organisation.
NHC	National Housing Corporation.
NMS	Nairobi Metropolitan Services.
OLS	Ordinary Least Square.
PCA	Principal Component Analysis.
PCU	Passenger Car Unit.

PERT	Programme Evaluation and Review Technique.
PMBOK	Project Management Book of Knowledge.
PMI	Project Management Institute.
PMPs	Project Management Professionals.
PPP	Public – Private Partnership.
PSM	Project Scope Management.
RBV	Resource-Based View.
ROI	Return on Investment.
SDH	State Department of Housing.
SEM	Structural Equation Modelling.
SMCEs	Small and Medium Construction Enterprises.
SMEs	Small – to – Medium Enterprises.
SPSS	Statistical Package for the Social Sciences.
TOC	Theory of Constraints.
USD	United States Dollars.
VIF	Variance Inflation Factor.
VRIN	Valuable, Rare, Imperfectly Imitable, Non-Substitutable.

ABSTRACT

Despite the substantial funding that the Government consistently allocates to road infrastructure initiatives, an estimated 55 per cent of all road development initiatives in the City County of Nairobi encounter cost overruns and fail to meet the required quality benchmarks. This study examined how project planning methodologies affect the execution outcomes of Nairobi City County's road infrastructure development sector. The research specifically set out to investigate the contribution of the project budget management, project risk management, project communication management, and project schedule management to the performance of road construction in Nairobi City County. The analysis was structured around the theory of constraints, the cybernetics theory, the enterprise risk management theory, and the resource allocation theory. An explanatory research framework was implemented to explore directional relationships between planning methodologies and performance outcomes. The sampling technique used was a Non-Probability, Purposive Sampling technique, specifically a combination of Judgmental and Criterion-Based sampling. This investigation identified 21 road construction projects within Nairobi City County's jurisdiction as the finite population for this investigation. The research utilised complete enumeration, securing participation from the entire population of 63 qualified respondents. Before the main study, a pilot study was conducted on two road projects in Kiambu County, surveying six randomly selected managers to test and validate the research instruments for validity and reliability. Semi-structured questionnaires served as the principal research tool, enabling comprehensive data acquisition from the entire sample population. Data analysis was conducted in SPSS v.22, producing descriptive summaries and inferential test results. The analytical approach comprised both descriptive statistics methods, including percentages, frequency distributions, means, and standard deviations, and inferential methods, including Pearson correlation coefficients and multiple linear regression analysis. Based on a comprehensive study of road construction projects, the findings reveal strong positive outcomes and effective planning practices: 82.76 per cent of participants reported projects staying within budget, 87.94 per cent confirmed schedule adherence, and 89.66 per cent affirmed meeting quality standards. The implementation of core planning practices received widespread endorsement, with 84.48 per cent agreeing that budget approaches were thorough, 89.66 per cent confirming accurate schedule estimation frameworks, 87.93 per cent expressing confidence in risk documentation, and 86.21 per cent reporting frequent stakeholder communication. Overall performance scored a mean of 3.83 alongside a planning practices mean of 3.68, demonstrating successful implementation across all domains, though standard deviations of 1.08 to 1.25 indicated some variation in participant perspectives. Derived from the empirical analysis of road construction projects in Nairobi City County, this study confirms that four core planning practices—schedule, risk, budget, and communication management—significantly enhance project performance. Regression results identify schedule management as the strongest predictor, followed by risk, budget, and communication management, all with statistically significant effects. To optimise outcomes, the study recommends that project teams adopt advanced scheduling tools, enforce rigorous financial controls, implement continuous risk monitoring, and use dedicated digital platforms for stakeholder communication. It further advises policymakers to develop enforceable regulatory frameworks that standardise these practices. This research provides actionable guidance for project teams, practical insights for clients, and a foundation for future academic work.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Problem

In contemporary discourse, the building and maintenance of diverse infrastructure systems have been widely recognised as fundamental to sustaining economic investments and fostering long-term growth (Usukhbayar & Choi, 2020). Elsayegh and El-adaway (2021) recognised that undertakings and programmes constitute roughly half of all tasks carried out and, as a result, are regarded as the means for implementing growth across all institutions. The building and construction sector exerts considerable influence on worldwide systems of economic organisation and developmental pathways (Khadija & Ogohi, 2020). Alaloul et al. (2021) indicate that, on average, the building and construction sector wields significant influence on as much as 5-7 per cent of the total Gross Domestic Product (GDP) of the world.

According to Infrastructure and Cities for Economic Development [ICED] (2018), this sector worldwide employed 273 million persons in the year 2014 in construction, maintenance, demolition, consultancy, and supply of materials. This accounted for 8.6 per cent of the international working-age population engaged in employment. Building and construction of road works are generally vital infrastructure development programs that require a significant amount of time allocation and resource investment for successful implementation. They are considered fundamental as they generate both immediate and downstream economic impacts. Consequently, the inefficient implementation of such projects represents a significant missed opportunity. This problem is particularly severe in countries termed as developing, where rural areas are documented to have severely deteriorated road infrastructure systems (Mohammed, 2021).

The northern regions of the United States of America have demonstrated exemplary execution of roadway infrastructure projects by employing productive and streamlined procedures that oversee the attainment of developmental objectives worldwide (Levy, 2018). However, many roads in regions like Alaska, North Dakota, and Minnesota face unique challenges due to their harsh winters, which lead to road damage and deterioration. As a result, federal and state governments have considered incorporating sustainable and resilient infrastructure practices in response to climate change and environmental concerns. They have also allocated substantial funding for these projects, intending to enhance connectivity, reduce congestion, and improve overall road conditions (Smith, 2020).

Moreover, road construction projects in Spain have a focus on maintaining and upgrading this infrastructure to meet modern standards and promote tourism, trade, and economic growth, which rely heavily on efficient transportation (Alaloul et al., 2021). According to Acerete et al. (2019), road projects such as the AP-9 highway in Galicia, the Castelldefels Tunnel in Barcelona and the O-12 dual carriageway in Teruel are examples of projects that involved thorough project planning and designing, through application of quality construction supplies and a skilled workforce to guarantee long-lasting road infrastructure. Additionally, in Asian countries like Japan and India, with geographical diversity and challenging terrains, investment in innovative engineering solutions has ensured road construction projects remain operational and resilient even in the face of natural disasters, such as typhoons and monsoons (Lombardo & Maetzke, 2019).

On the other hand, the implementation of public-private partnership (PPP) frameworks for road infrastructure development initiatives in France, like the A1 motorway, has

showcased effective contracting and procurement strategies involving private sector expertise and financing (Irina & Veronica, 2022). This demonstrates that, while acknowledging the presence of strong government support to improve road infrastructure, private sector participation in financing and construction is also a key driver in ensuring road construction projects reach completion. In China, specialised government agencies exercise regulatory authority over roadway infrastructure development projects (Gong, 2019).

However, in certain countries classified as developed by the IMF/World Bank, such as the United Kingdom, the construction of roads that end up exceeding budgetary estimates and experiencing delays is a prevalent occurrence, and that poses significant worries within the construction sector (Olawale & Sun, 2017). Similarly, initiatives that are performed by the southern states of the United States of America, such as the Louisiana Coastal Protection and Restoration Project, faced challenges of designing and building infrastructure that demonstrates resilience against severe climatic conditions, coastal flooding, and the preservation of coastal ecosystems (Bordat et al., 2017). Thus, this makes it essential to construct roads that can withstand extreme weather events and minimise environmental impact.

In Africa, regardless of collective attempts to enhance outcomes in road building and construction ventures, they have yet to be fully resolved, as they persistently have an adverse effect on project outcomes. The associated difficulties are fairly widespread, resulting in a roadway engineering project budget overshoot being documented in 9 out of 10 projects, particularly in developing nations (Flyvbjerg et al., 2017). Evidence suggests that construction budgets sometimes run over by up to 183 per cent compared to initial projections (Odeck, 2018; Love et al., 2018).

Soderland et al (2018) observed that despite a generally satisfactory performance in the highway building and upgrading initiatives across South Africa, a significant number of these projects carried out by contractors from both Britain and China failed to properly accommodate the needs and concerns of local communities during project planning. For instance, the Gauteng Freeway Improvement Project (GFIP) in Johannesburg faced challenges related to public opposition and community engagement due to the introduction of tolling, which required careful communication and stakeholder involvement. The project also experienced cost overruns that were incurred when developing the e-tolling system, and thus resulted in financial strain on both the government and road users (Khatleli, 2019).

Elong (2020) pointed out that a significant portion of road projects in progress in Uganda faced challenges such as scope changes, ecological concerns, and insufficient funding, which often resulted in abandonment. The lack of proper scope management was identified as the leading factor behind these projects' unsuccessful completion. It should also be noted that Berg et al. (2020) determined the main factors contributing to project delays in countries like Mozambique, Nigeria, and Tanzania to be design and scope changes, late disbursement of contractor payments, and challenges in compensating landowners along proposed road pathways.

In Kenya, the advancement of endeavours in the construction of roads holds great importance and constitutes one of the primary catalysts for development and economic progress in pursuit of Vision 2030 (Nyika, 2017). According to Hussein and Kisimbii (2019), the key drivers for the expansion of road construction projects have included the government's commitment to enhancing infrastructure to boost economic growth and regional connectivity, especially in remote and underserved areas. Njuguna (2019)

also highlighted that innovation and technology have played a role in project efforts to improve construction practices and streamlining project management. Additionally, partnerships with development organisations and financing institutions have provided critical funding for road construction projects, ensuring their successful completion.

Nevertheless, project issues related to corruption and governance have led to the misallocation of funds in most project budgets and resulted in project delays. Environmental conservation and wildlife protection pose complexities, especially when projects cross ecologically sensitive areas, often triggering controversies and legal battles (Kokkola, 2021). Funding constraints, fluctuating budgets, and issues with land acquisition have also been recurrent hurdles in project implementation. Thus, Kenya's road project performance reflects the critical balance between aspirations for infrastructure developments and the need to address governance, environmental, and financial barriers hindering the effective execution of such projects (K'Akumu & Gateri, 2023).

1.1.1 Performance of Projects

Project performance is fundamentally a continuous review process for assessing the efficiency and effectiveness of a project in meeting its predefined objectives (Akali, 2018; Mandala, 2018). The traditional metrics for gauging this performance are the completion of projects within budget, on schedule, and according to specified quality standards (Gitau et al., 2018; Project Management Institute, as cited in Densford et al., 2018). In contemporary project management literature, these core parameters have been expanded to include stakeholder satisfaction as a critical indicator of success (Ingle & Mahesh, 2020; Unegbu et al., 2022). This analysis examines the status of road

construction project performance across developed, developing, and local contexts, highlighting the distinct challenges and success factors prevalent in each.

In developed nations, road project performance is often supported by sophisticated control mechanisms yet challenged by complex regulatory and socio-economic environments. Empirical investigations, such as one conducted in the United States, demonstrate that the application of advanced technology and collaborative approaches can significantly enhance performance outcomes (Haghshenas et al., 2018). Similarly, in China, the government employs comprehensive, data-driven performance evaluation systems to meticulously track project advancement and optimise resource allocation (Ma et al., 2017). Despite these advanced frameworks, significant impediments persist. Research by Brady et al. (2022) identifies complex regulatory processes and intricate stakeholder coordination as major challenges in other developed economies. In the United Kingdom, performance is further complicated by macro-economic uncertainties, such as the impact of Brexit on infrastructure investment, a persistent skills shortage within the construction sector, and growing imperatives to integrate sustainable practices (Huang et al., 2022).

The performance of road construction projects in developing countries is frequently constrained by foundational issues of governance and institutional capacity. A central focus in these contexts is on overcoming systemic inefficiencies. In Nigeria, for example, efforts to augment performance are directly targeted at improving project monitoring and evaluation processes to curb corruption and mismanagement (Olaopa & Oyodele, 2022). The scholarly work of Kubanza and Simatele (2020) in South Africa reinforces this, highlighting that effective project governance, proactive stakeholder engagement, and robust risk mitigation strategies are indispensable for achieving superior infrastructure delivery. Here, performance is less about technological

advancement and more about establishing basic institutional integrity and effective oversight.

The performance landscape within Kenya presents a dichotomy, illustrating both the potential for success and the prevalence of chronic challenges. Notable successes, such as the Thika Superhighway and Nairobi Expressway, are often attributed to significant support from private contractors who rigorously enforce quality adherence and safety standards, thereby ensuring the longevity of the infrastructure (Mugweru & Muchelule, 2022; Njeru & Kirui, 2022). However, these high-profile achievements contrast sharply with the performance of many other local projects. Official reports, such as those from the Kenya Urban Roads Authority (KURA, 2021), indicate that pervasive issues including limited resources, an inability to adhere to established timelines and budgets, and resultant stakeholder dissatisfaction continue to plague the sector. This contrast underscores that performance is highly variable and directly linked to specific management practices and resource availability, even within a single national context.

Therefore, the status of road construction project performance is not uniform but exists on a spectrum defined by a region's economic and institutional maturity. Developed countries, while equipped with advanced technological and data-driven systems, face performance challenges rooted in regulatory complexity and socio-economic pressures. Developing nations, conversely, are primarily engaged in a struggle to overcome foundational governance weaknesses and institutional challenges that directly impede project efficiency and effectiveness. The local Kenyan context serves as a microcosm of this global disparity, demonstrating that even within a single country, performance can range from exemplary to deficient, heavily dependent on the specific implementation framework. Ultimately, these comparative findings affirm that while the core metrics of performance are universal, the strategies for achieving success must

be context-specific, addressing the distinct institutional, economic, and managerial hurdles inherent to each environment.

Based on the comparative analysis, this study adopts a multi-dimensional framework to evaluate project performance, integrating both traditional and contemporary metrics. The primary measures selected are cost (adherence to budget), time (adherence to schedule), and quality (conformance to specifications and standards). These foundational metrics are universally recognised as the core indicators of project efficiency and are directly aligned with the Project Management Institute's body of knowledge. Further, recognising the evolving understanding of project success, stakeholder satisfaction is included as a critical fourth performance measure. This composite framework is adopted for its robustness and relevance. It allows for a holistic assessment that captures operational efficiency (through cost, time, and quality) while also accounting for the project's ultimate value and acceptance by its end-users and community (through stakeholder satisfaction). This approach is particularly suited to the context of road construction projects, where long-term public utility and community impact are as critical as initial construction performance.

1.1.2 Planning Practices in Projects

Project planning practices constitute a critical domain within project management theory, representing the systematic and methodical processes employed to develop an integrated strategic framework for project implementation (Wanjira & Ngari, 2018). Scholars universally acknowledge this phase as foundational, serving as the primary mechanism for aligning stakeholder expectations, project scope, temporal parameters, resource allocations, and deliverable specifications (Naeem et al., 2018). The scholarly consensus posits that the rigour and comprehensiveness of planning practices exert a deterministic influence on project outcomes and ultimate success, establishing them as

principal independent variables in performance research. Within the specific context of infrastructure development, project planning operationalises as the procedural architecture for task sequencing and optimal resource distribution to achieve predefined objectives in road construction projects (Njuguna, 2019). A robust project plan, characterised as a dynamic document, must encapsulate the entirety of the project's scope and implementation details, while remaining amenable to iterative refinement throughout the project lifecycle (Gitau et al., 2018; Ukwishaka & Mulyingi, 2017). Furthermore, contemporary theoretical frameworks emphasise the imperative of prospective risk identification and mitigation strategising during planning, coupled with explicit role delineation among stakeholders to preempt implementation conflicts (Alqahtani et al., 2015).

The academic literature delineates several discrete planning practices that collectively form the independent variables influencing project performance. The corpus of research identifies five primary domains: scope definition, which establishes project boundaries, deliverables, and quality parameters (Julius, 2020); resource and financial management, encompassing the systematic identification of requirements and fiscal governance throughout the project lifecycle (Mahamid, 2017; Dagba & Dagba, 2019); temporal scheduling, which provides the sequential framework for execution through milestone establishment and critical path analysis (Muchelule, 2018; de Andrade et al., 2019); risk governance, comprising the methodical processes of identification, analysis, and mitigation of project vulnerabilities (Carvalho & Rabechini, 2019); and communication management, involving the structured development of information dissemination protocols among stakeholders (Sanghera & Sanghera, 2019). These empirically validated practices represent the core independent variables that scholarly research has established as determinants of project performance outcomes.

For this investigation, the research framework incorporates four specific planning practices as independent variables: budget management, schedule management, risk management, and communication management. This selective conceptualisation is theoretically justified by their established primacy in overcoming the most pervasive challenges in road construction contexts. Budget management ensures fiscal discipline and optimal resource allocation; schedule management provides the temporal architecture for project execution; risk management facilitates proactive contingency planning; and communication management ensures stakeholder alignment and information fidelity. This focused approach enables a precise examination of the individual and collective contributions of these fundamental planning dimensions to project performance metrics, while providing a parsimonious yet comprehensive theoretical model for empirical validation.

1.1.3 Road Construction Projects in Nairobi City County

Nairobi City County has completed multiple road construction projects targeting improvements to the city's transit framework. These projects aim to address the growing traffic congestion and the need for improved road networks. The Thika Superhighway is an 8-lane road construction project that transformed the main highway connecting Nairobi to Thika town, an urban area in Kiambu County (Maina, 2021). The project aimed to alleviate traffic congestion, improve connectivity, and boost economic activities along the route. The road expansion also attracted more private investments and led to the development of residential and commercial properties along the corridor. The key challenges that were encountered during the planning and implementation included land acquisition issues, environmental concerns, and disruptions of existing businesses along the road (Mugweru & Muchelule, 2022).

The Outer Ring Road Project aimed to upgrade and expand the road network in Nairobi's eastern suburbs, connecting strategic mobility arteries including the Mombasa Road (A109), Nairobi-Thika Highway (A2), and Nairobi's international airport (JKIA). The project involved the construction of a new interchange at the junction of Outer Ring Road and Thika Road, and the installation of pedestrian walkways and street lighting along the road (Maina, 2021). This project also sought to improve traffic flow and reduce congestion in the densely populated area, particularly in Embakasi and Makadara constituencies. It also opened up previously underserved areas for development, attracting commercial and residential investments (Kiende et al., 2023).

The Southern Bypass (southern segment of Nairobi's orbital road network) functions as another notable ring road project commencing at the signalised convergence of the Nairobi–Mombasa Highway (A109) and Likoni Road (B8), situated to the southeast of the city centre (Nyongesa, 2019). It then encircles the southwestern neighbourhoods of Nairobi, encompassing the anthropogenic edge of Nairobi National Park's ecosystem, bordering Uhuru Gardens' heritage site, Lang'ata's urban expansion, and Dagoretti's mixed-use suburbs. This project has reduced the pressure on the city's road network by offering an alternative route for long-distance and transit traffic. This has eased motor vehicle traffic gridlock in the commercial district areas and provided a more efficient route for cargo transportation.

The three projects were jointly financed by the Kenyan government and private investors, who, among others, were the African Development Bank (AfDB), the Export-and-Import Bank of China (Exim Bank of China), together with other stakeholders (Taherpour, 2023). The responsibility for oversight falls under the Kenya National Highways Authority (KeNHA), and execution was carried out by different contractors, including China Wu Yi Company Ltd, Sinohydro, Shengli Engineering, and China Road

and Bridge Corporation (CRBC). Documented evidence confirms the role of these projects in achieving substantial improvement of the transport infrastructure under the Nairobi County Government's purview; however, construction delays stemming from inadequate and delayed funding, and coordinating and managing traffic flow during construction were some of the main challenges that delayed the successful execution of these undertakings, compared with allocated time for the implementation (Kiende et al., 2023).

Njeru and Kirui (2022) additionally noted that selected road infrastructure developments in Nairobi were not finalised within the allocated funding requirements, primarily due to inadequate planning and impractical preliminary specifications. Another investigation conducted by Gitonga (2022) also observed that project surveillance, adequate planning, contractor competencies, and protracted decision cycles were some of the determinants of delays in Road infrastructure developments under the Nairobi City County jurisdiction. Mugweru and Muchelule (2022) also expressed concerns that, despite the substantial funding that the Government consistently allocates to road infrastructure initiatives, an estimated 55 per cent of all road development initiatives in the City County of Nairobi encounter cost overruns and fail to meet the required quality benchmarks. This inquiry systematically examined the effectiveness of project planning methods in these and other projects, particularly their role in shaping performance during the construction and implementation phases.

1.2 Statement of the Problem

Road construction undertakings in the City County of Nairobi have faced scrutiny over time due to inefficiencies in resource allocation, cost control, and time management during project execution, impacting their overall performance and completion. Most of the completed projects have been reported to have encountered financial overruns,

timeline extensions, quality deficiencies, worksite risks, and beneficiary grievances (Macharia, 2019). This has resulted in the straining of allocated budgets and diversion of resources that could have been utilised for other critical infrastructural or societal needs. Delayed timelines for these projects have also contributed to increased societal inconvenience, heightened road congestion, and immediate fatal risks to road users (Gathoni & Karanja, 2019).

According to the KPMG (2019) report, the majority of operational road projects in Kenya exceeded both their allocated budgets and scheduled completion timelines. One representative example is the development of the Thika Superhighway, which was estimated to cost Kshs 26.44 billion, but the final reported cost increased to Kshs 34.45 billion, a 30 per cent increase. In addition, substantial completion occurred years behind baseline, with the initial completion date of July 2015 being revised to July 2017 (Wanjira & Ngari, 2018). Taking a heterogeneous standpoint, Kiende et al. (2023) documented that the delayed completion of the Outer Ring Road project was attributed to insufficient funds; the project was originally funded by the African Development Bank. This resulted in Kenya securing a loan of Kshs 6.4 trillion in sovereign financing from Korea's export credit agency for the successful completion of building the priority corridors for high-throughput transport and increasing the corridor's passenger car unit (PCU) capacity.

Additionally, the Kenya Urban Roads Authority (KURA) project progress report (2019) recognised that five (5) out of twenty-four (24) road infrastructure projects undertaken within the jurisdiction of Nairobi City County had extended past the approved project timeline due to land acquisition challenges, lack of skilled competency and stakeholder engagement. Thus, such challenges that are directly linked to deficiencies in project

planning have considerably hindered the effectiveness of the execution and outcomes of road development initiatives in Nairobi City County.

Further, current research on road project planning and performance reveals gaps in conceptual frameworks, contextual applicability, and scope definition. For instance, studies by Julius (2020), Ondiek (2020), Kabiti and Kikwatha (2022), and Wangai and Musembi (2023) had scope gaps as they evaluated the implementation of road infrastructure in counties other than Nairobi City County. This shows that studies concerning the performance metrics following the adoption of road development strategic interventions across Nairobi City County are still not adequate.

Additionally, studies by Mandala (2018), Matu et al. (2020), and Nyangoto and Nyang'au (2022) were limited to a few infrastructure planning frameworks, including stakeholder involvement, staff competency, and management support, and this presents a knowledge gap on the other key planning methodologies impacting project outcomes of road projects. Kisavi and Ngugi (2021) and Njeru and Kirui (2022) had studies that also focused more on the implementation, monitoring, and evaluation approaches that impact outcomes for road transport infrastructure. However, these practices are not as comprehensive compared to assessing the wide scope of project planning practices. Therefore, the present study aimed to provide a more detailed discussion of the correlation linking planning protocols and project performance metrics on road infrastructure initiatives in Nairobi City County.

1.3 Objectives of the Study

1.3.1 The General Objective

The primary objective of this study was to assess the impact of key project planning practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya.

1.3.2 The Specific Objectives

To achieve the primary research aim, four focused study objectives were established:

i. Delineate the bearing of project budgetary management practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya.
ii. Analyse the contribution of project schedule management practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya.
iii. Establish the role of project risk management practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya.
iv. Elucidate the implications of project communication management practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya.

1.4 Research Questions

i. How do risk management practices influence the performance of road construction projects in the City County of Nairobi, Kenya?
ii. What role do communication management practices have on the performance of road construction initiatives in the City County of Nairobi, Kenya?

iii. How do scheduling management practices impact the performance of the construction of road infrastructure projects in Nairobi City County, Kenya?

iv. To what extent do project budget management practices contribute to the performance of road infrastructure construction projects in Nairobi City County, Kenya?

1.5 Significance of the Study

This study sought to advance a scholarly understanding of the correlations linking project planning methodologies with performance outcomes in the road construction sector. It would help in relating project planning elements such as risk management, communication management, project scheduling, and project budget management to performance. This is of benefit to clients, end users, and management teams that are in charge of projects. This study will contribute to scholarly discourse and advance knowledge within project management practice and related areas by carrying out more research.

The research's findings will help both the Kenyan Government and the Nairobi City County Government better plan for subsequent projects carried out within the County. Going by the significant number of projects that end up stalling or in unsatisfactory completion, the research would help contribute towards improvement in this area. The research's findings would be of importance with regard to the formulation of better policies for managing projects for state institutions and business enterprises, within both decentralised and centralised governance structures.

1.6 Scope of the Study

The primary focus of this investigation was to evaluate the contribution of the project planning methodologies on the execution and outcomes for road infrastructure development ventures in the City County of Nairobi, Kenya. In contemporary times, Nairobi City County has documented accelerated city development and sprawling road infrastructure to support increased mobility, trade, and economic activities. Therefore, comprehending the relationship between planning frameworks and infrastructure project performance is vital to ensure that the growing city's infrastructure needs are met efficiently. The analysis focused on understanding how risk management, communication management, budget management, and project scheduling practices impact the outcomes of the construction of road infrastructure projects within the City County of Nairobi.

The geographical area of this research is centred on roadway development initiatives across Nairobi County as its primary study area. The projects that were considered for review are the completed road projects in Nairobi City County. Projects like the Thika Superhighway, Outer Ring Road, and Southern Bypass were included as case studies to provide a wholistic view. The research methodology utilised a qualitative exploratory framework focusing on quantitative research approaches. The period of this research was between 2023 and 2024, allowing for comprehensive information acquisition, evaluation, and reporting.

1.7 Limitations of the Study

Considering the substantial quantity of roadway infrastructure initiatives implemented in the City County of Nairobi, a sampling approach was adopted rather than attempting a comprehensive census. This study utilised the exclusion criteria of sampling road projects that were completed in the past fifteen years, on analysis of paved infrastructure

projects under the Nairobi City County jurisdiction. The researcher may not have been allowed to collect data without the appropriate and authorising research approvals. To mitigate this constraint, the investigator obtained official authorisation from both the university and an official research permit issued by Kenya's science regulatory body, NACOSTI (National Commission for Science, Technology and Innovation).

Some of the targeted respondents might have been cautious about sharing any information concerning the projects they had carried out. To compensate for this limitation, the phenomenological examiner gave assurances to the targeted survey recipients that the acquired data were purposefully structured solely for scholarly research and educational objectives. The researcher also informed participants to complete the questionnaires without providing any personally identifiable information, and instead, data codes would be used to identify the participants. Supplementing these findings, the investigation had a restricted schedule and financial boundaries. To remediate this shortcoming, the researcher prioritised resource reallocation to enable comprehensive data collection, including the use of research assistants to assist in data collection.

1.8 Organisation of the Study

This study is organised per the subsequent outline: Chapter One presents the research background, problem statement, aims, scholarly contribution, methodological boundaries, and projected constraints. The second chapter constitutes a comprehensive review of literature, incorporating theoretical foundations, critical analysis of empirical studies, thematic synthesis, identified knowledge gaps, and the conceptual framework. The subsequent chapter delineates the methodological approach, including design of the research and eligible population parameters, sample size and participant selection

methodology, research data collection tools, preliminary study, research data gathering procedures, analytical methods, and presentation of findings.

Further, the fourth analytical unit contains the research results and discussion, which are mainly categorised into participant response ratio, demographic information, exploratory data analysis, diagnostic examinations, and inferential statistics. The final chapter synthesises key findings, offers conclusive interpretations, provides actionable recommendations, and identifies potential avenues for subsequent research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, scholarly endeavours are analysed regarding the key variables, project planning methodologies, and their influence on project outcomes. The discussion includes an examination of the theoretical underpinnings, the proposed conceptual framework, and a critical review of prior research aligned with the study's objectives.

2.2 Theoretical Review

2.2.1 Resource Allocation Theory

Bower's (1970) seminal work established the theoretical foundations of resource allocation. The fundamental idea of the theory entails the distribution and management of limited resources to meet various needs and objectives effectively. The theory assumes that resources, whether they are financial, human, time, or natural, are scarce and must be allocated efficiently to maximise final outcomes. It also assumes that organisations have objectives and goals that guide resource allocation decisions (Bower, 2018). Decision-makers begin by weighing the trade-offs when allocating resources to various objectives. That is, allocating resources to one goal may come at the expense of another. Decision-makers are also believed to often have imperfect information about available resources and their future needs. Thus, developing a good project plan may be essential to clearly define and document information on project implementation and understand future expectations (Korpi-Tassi, 2019).

Bower (2018) also argues that organisations should be flexible in their resource allocation so as to adapt to changing circumstances. For instance, organisations that heavily rely on external resources may be vulnerable to the actions and decisions of resource providers. This sometimes limits their capability to accomplish the defined

goals while adhering to budgetary and scheduling constraints. Reducing dependency on external sources is a strategic goal where organisations aim to enhance their stability and effectiveness by exerting control over external resource providers or by diversifying their resource base. Additionally, other firms often form networks, alliances, and partnerships to share resources, reduce dependence, and collaborate to achieve common goals (Mula & Chandra, 2019).

Moreover, McGahan (2021) criticised this theory, arguing that the theory places excessive emphasis on reducing resource dependency and may overlook the potential value of external partnerships and collaboration. The exclusive focus on efficiency in resource allocation may lead to neglect of other important factors, such as equity and social considerations. Nevertheless, the application of this theory has continued to widen in various domains, including supply-chain management, healthcare management, project management, etc. A study by Cooper (2019) applied this theory's principles to examine resource allocation practices in new product development projects. The study assessed how organisations prioritise and allocate resources across multiple projects to achieve the best return on investment.

The theoretical approach was further utilised by Unegbu et al. (2022) in their analysis of the nexus between resource allocation strategies and project performance metrics within manufacturing organisations. The research measured the influence of fiscal resource apportionment on the achievement of project objectives. Additionally, Tumusiime (2022) utilised this theory to examine the allocation of resources across a portfolio of construction projects.

Resource Allocation Theory provides a critical lens for this study, as the fundamental challenge of project management is the optimal distribution of finite resources—

including capital, personnel, time, and equipment—to achieve project objectives. The theory posits that performance is maximised when scarce resources are allocated efficiently and strategically among competing tasks and demands. The study investigated how organisations manage resource dependencies and resource allocation obstacles facing the building sector. This theoretical framework was consequently retained for its direct relevance to the present investigation, as it provides critical insights into the resource allocation strategies enacted by project managers and organisational leadership operating within multi-faceted constraints—including financial, temporal, human, and equipment-related limitations—in road construction projects. The framework thereby facilitates a structured analysis of how strategic resource optimisation under such conditions contributes to the maximisation of project success and the achievement of targeted organisational outcomes..

2.2.2 Theory of Constraints

Goldratt (1984) first proposed a Theory of Constraints (TOC) as a managerial paradigm focusing on identifying and addressing system bottlenecks. The theory is based on a systematic approach to identifying, managing, and optimising the constraints or bottlenecks that limit the performance and success of an organisation or industry (Goldratt, 2020). It emphasises the idea that in any complex system, there is typically one or a few critical constraints that hinder the overall effectiveness of the system; therefore, improving on these constraints can lead to significant performance enhancements. It also assumes that constraints are the limiting factors that impede a system's ability to achieve its goals (Urban & Rogowska, 2018). Accordingly, among the theory's core propositions is the systematic identification of limiting factors, exploiting them to the fullest, subordinating all other processes to these constraints,

elevating the constraints when necessary, and preventing the constraints from recurring in the future (Urban & Rogowska, 2019).

Mishra (2020) also outlines that if a constraint is found to still impede the overall system performance after exploitation, TOC suggests elevating it by investing in additional capacity or making process improvements. After the constraint is resolved or improved, the process is repeated by identifying and addressing the new constraint in the system. On the other hand, Franssen et al. (2018) criticised this theory by arguing that TOC's primary goal is often seen as cost reduction, which may not align with all organisations' broader objectives. He also contends that TOC's exclusive focus on monetary goals (profits) may neglect other important aspects of firms, such as social and environmental responsibility.

This theoretical construct demonstrates explanatory power for the present investigation, as cost reduction through the employment of project cost management practices is a key objective considered in examining the determinants that impact the operational efficacy of roadway infrastructure development initiatives within Nairobi City County. Thus, the theory’s emphasis on cost reduction through exploiting and preventing future occurrences of constraints functions as a pivotal mechanism for streamlining a full spectrum of scheme implementation, optimising efficiency, and resource allocation (Mabin & Balderstone, 2020). Additionally, by applying TOC principles in project management, project professionals can augment their capability to meet project deadlines and refine resource management strategies for optimal performance. The theory’s approach allows for a more dynamic and adaptable management style, which is especially valuable in complex and fast-changing project environments (Mishra, 2020).

The Theory of Constraints (TOC) provides a powerful and focused justification for this study, as it identifies that the performance of any complex system, like a construction project, is limited by a very small number of bottlenecks, or constraints. The core premise of TOC, that systematically identifying and elevating these system constraints is the key to improved performance, directly aligns with and rationalises the study's empirical recommendations. Consequently, it aims to prevent common project delays and overruns by prioritising critical success factors that substantially influence project delivery timelines.

2.2.3 Enterprise Risk Management Theory

McShane (2018) defines Enterprise Risk Management (ERM) as a strategic framework that emphasises organisation-wide risk assessment and coordinated mitigation, instead of a siloed risk handling. Its core purpose is to consolidate disparate risk management functions into an integrated system. The ERM framework requires active participation from both senior leadership and staff throughout the risk management lifecycle, encompassing the analysis and addressing diverse organisational risks (Lechner & Gatzert, 2018). This principle promotes organisation-wide participation in risk governance processes, rather than just a select few individuals.

The ERM also underscores the importance of structured procedures and guidelines to address risks properly. McShane (2018) further establishes that organisations may enhance their capacity for risk management by adopting official regulations that outline their risk tolerance, strategic objectives, and standardised workflow for identifying, analysing, and mitigating risks. The theory further highlights the importance of fostering a risk-aware organisational culture where all stakeholders have both the authority and capability to manage risks. Saeidi et al. (2019) posit that adopting Enterprise Risk Management (ERM) frameworks yields three strategic benefits: strengthened market

competitiveness, increased stakeholder confidence, and improved organisational sustainability.

Although ERM is typically applied at the organisational level, its principles can be effectively extended to project management to enhance risk mitigation and control practices (Yang et al., 2018). ERM emphasises the systematic identification of risks, where project management involves systematically evaluating threats that may compromise project deliverables, scope parameters, schedule adherence, and financial constraints. These risks can include unforeseen site conditions, economic and financial risks, contractual risks, security risks, etc. In addition, ERM focuses on developing strategies to mitigate, transfer, or accept risks (Jankensgård, 2019).

Similarly, project risk management also involves planning for risk responses by developing contingency plans for specific risks, allocating resources, or investing in risk mitigation measures. It also entails continuous monitoring and reporting of risks through regular risk assessments and reporting mechanisms that ensure potential issues are identified and addressed promptly (Shad et al., 2019).

Considering the above, this theoretical framework demonstrates strong relevance to the present study, given its examination of how risk management protocols affect operational outcomes in Nairobi's urban road construction initiatives. The use of the ERM Theory is highly justified for this study, as it provides a holistic and integrated framework that aligns perfectly with the interconnected nature of the recommendations. Unlike siloed risk management, ERM advocates for a proactive, organisation-wide approach to identifying, assessing, and managing risks across all activities.

2.2.4 Theory of Cybernetics

Cybernetics theory, Ashby and Wiener (1960), examines mathematical frameworks for control systems and information exchange via feedback mechanisms. This theoretical framework posits that desired system outcomes emerge through positive feedback mechanisms, whereas delayed responses correlate with negative feedback loops. In addition, feedback mechanisms serve as critical components in assessing the efficacy of diverse communication methods, both past and present (Mulder et al., 2017). The theory also emphasises the use of feedback loops to monitor and adjust a system's behaviour. Thus, project managers can use such feedback mechanisms to assess progress, recognise deviations promptly and recalibrate in real time, to stay on schedule (Von Glasersfeld, 2019).

Krivý's (2018) theory holds particular relevance for this investigation, as it underscores communication's pivotal importance in project execution and demonstrates how feedback mechanisms drive developmental progress. The findings underscore the imperative for project managers to master and leverage established communication channels effectively, especially when conveying information concerning revised compliance standards and enhancements for an enterprise’s structures so that the personnel can be informed and actively participate in all relevant matters (Dubberly & Pangaro, 2019). Furthermore, the theoretical framework offers evidence-based strategies for enhancing the performance of construction projects through systematic feedback implementation to disseminate project objectives, status updates, and changes. The mechanism ensures comprehensive information dissemination, enabling stakeholders to make judicious decisions and implement contextually appropriate measures.

The selection of the Theory of Cybernetics is powerfully justified for this study, as it provides a robust theoretical lens through which to conceptualise project management not merely as a set of discrete practices, but as a dynamic, goal-oriented system of communication and control. The central problem this research addresses—systemic failures in budgetary adherence, schedule compliance, and stakeholder communication—can be fundamentally reframed as breakdowns in the project system's regulatory feedback loops. Cybernetics directly illuminates how information on project performance, for instance, cost reports, schedule variances, stakeholder feedback, etc, must be continuously monitored, compared against predefined objectives (the budget, timeline, quality standards), and used to initiate corrective actions to steer the project back on course.

Therefore, this theoretical framework is not merely illustrative but foundational to the investigation. It posits that the efficacy of project planning practices—in budget management, scheduling, risk mitigation, and communication—is contingent upon their capacity to establish and maintain these critical control mechanisms. By applying a cybernetic model, the study is equipped to diagnose the precise points of failure within these loops and analyse how enhancing the quality, speed, and clarity of information flow and corrective responses can directly rectify the performance deficits observed in road construction projects within Nairobi City County.

2.3 Empirical Review

2.3.1 Project Budget Management and Project Performance

An in-depth examination by Ahmadabadi and Heravi (2019) concentrated on pinpointing the essential determinants shaping the success of highway development initiatives in Iran, especially those funded under a public-private partnership. The study used an opinion survey that targeted project managers of the main highway projects.

The results showed that optimal resource allocation and regular cost monitoring during the project planning phase are crucial factors in the operational performance of the project. Findings additionally indicated that privately held capacity directly shapes project success in the construction phase, while government capability significantly contributes to project effectiveness during the operational stage. This study consists of a methodological gap as its focus was only on highway projects that are financed under public-private partnerships; hence, these findings cannot be generalised to those that are only government-sponsored.

The Dagba and Dagba (2019) study examined the relationship between strategic procurement and financial management in Ghana's road infrastructure performance. A phenomenological documentation design, utilising survey methods, was employed, and the examination targeted 110 project team members. Primary data was gathered utilising dual methodologies: structured questionnaires and semi-structured interviews. Research outcomes established that efficient procurement strategies can result in cost efficiencies and timely completion of projects, nevertheless, poor procurement strategies negatively affect project success as they hamper the ability to plan project activities effectively. In addition, effective cost management practices were also positively associated with better quality outcomes of the road construction projects. This study has a conceptual gap since the cost management practices assessed were more inclined to the procurement strategies which are typically employed in the project's nascent planning stages.

Shan et al. (2020) examined key determinants of successful green building project execution by small-scale contractors in Singapore's construction sector. The research methodology comprised preliminary expert interviews, followed by structured questionnaire distribution to 30 small-scale contractors operating within Singapore's

construction sector. Data analysis employed Model-independent analytical methodologies, specifically Pearson's χ^2 (Chi-square) test for categorical association analysis combined with Spearman's ρ for monotonic relationship assessment. The study discovered that elements such as cost management, continual engagement of subcontractors, and efficient procurement procedures are critical success determinants for small-scale contractors implementing sustainable construction projects. The results further indicated that when a comparative analysis of micro, small, and medium enterprises (MSMEs) and large-scale contractors was conducted, the latter were found to have a higher capability in terms of effective budgeting, resource allocation, and time management of projects. This, in turn, demonstrated a statistically significant positive impact on project execution metrics. However, this investigation showed a scope gap as it involved green building construction projects in an industrialised nation, where research outcomes may lack a generalised application for road projects in a developing country like Kenya.

Gitonga's (2022) research, focusing on Kenyan metropolitan roadway developments, sought to determine whether financial managerial strategies and project Key Performance Indicators (KPIs) show a statistically significant association. The investigation utilised a descriptive survey research methodology, focusing on construction professionals accredited by the Roads Authority in charge of urban infrastructure projects. A purposive sample of 202 qualified project managers was obtained. The empirical evidence derived from the questionnaires collected revealed a substantively positive and statistically valid linkage connecting effective cost-control methodologies to project outcomes. The study also established that rigorous cost control practices demonstrate a positive correlation with enhanced project performance metrics, such as meeting budget targets, staying on schedule, and delivering quality road

infrastructure. The findings also demonstrate that efficient cost management is linked to optimal resource allocation and utilisation.

2.3.2 Project Schedule Management and Project Performance

Muchelule (2018) investigated how work breakdown structures, scheduling methodologies, and planning processes influence ICT project implementation within Kenyan state-owned enterprises. This investigation employed a implemented a non-experimental research methodology, utilising a convergent methodological triangulation design featuring empirical measurements alongside phenomenological insights. A study population comprising 45 state corporations was used, where a selection of 45 project managers, 90 organisational staff members, and project management personnel were considered. Primary data was gathered through self-reported questionnaire instruments. The dataset underwent both descriptive statistical examination and regression modelling. Research findings were visualised through graphical representations, including pie charts and trend analyses. The investigation demonstrated significant associations ($p<0.05$) between project performance outcomes and four factors: scheduling precision, work decomposition quality, accurate estimation, and risk mitigation practices. There is a contextual gap, as this investigation specifically examined information and communication technology project rollout, and their project planning practices vary from those of road projects. This is due to the fact that this investigation's parameters were deliberately confined to roadway infrastructure projects within Nairobi City County's boundaries.

An investigation by Ingle and Mahesh (2020) analysed critical performance dimensions influencing project outcomes pertaining to infrastructure developments across India. The examination used a structured survey instrument for empirical data acquisition regarding industry experts' perspectives regarding the identified domains. The

systematically captured data were subjected to structural equation modelling (SEM) followed by principal component analysis (PCA). The outcomes of the analysis unveiled ten performance domains crucial to evaluating project outcomes, and time management was one of them. The results also found that projects with robust time management practices tend to adhere to their schedules more closely, and this ensures that milestones and project deadlines are met. The research exhibits methodological limitations due to its reliance on PCA and SEM in data analysis, while the present investigation employed the Pearson correlation and LSE regression models.

A study by Mbonabihama (2022) investigated how project management methodologies affect schedule adherence in Rwandan construction projects. The research's outcomes underscored that implementing a strategic project governance framework centred around adhering to schedules can significantly enhance success and bolster the organisation's capability to meet long-term project milestones as planned. Moreover, frequent transitioning between projects adversely affects the productivity of departmental team members as they juggle multiple assignments. Fundamentally, deficient scheduling practices of resources hinder the company's overall capacity to successfully execute programmes. This study has a conceptual gap as it measured the performance of construction projects with timely completion, leaving out the other measures for project performance.

2.3.3 Risk Management and Project Performance

Urbański (2019) investigated the mediating contribution of risk governance on the planning-success nexus in highway construction projects in both Pakistan and Britain. The data was gathered through a structured research instrument. The desired sample consisted of 152 managers in charge of the projects, with an equal representation of 76 managers from each economy. The statistical examination was conducted using the

partial least squares approach to structural equation modelling. The research demonstrated that both project planning and risk management had a statistically significant contribution to project achievement and demonstrated a statistically significant moderating contribution to the connection between preparatory phases and achievement of objectives within the infrastructure development sector, notwithstanding operating in two distinct economic environments. However, the investigation highlights a knowledge gap resulting from its exclusive emphasis on risk mitigation as a moderating factor. This empirical exploration examined the direct association between risk control measures and performance efficiency. The geographical area of the study was also too large, as it examined a case of two different countries.

Rwingo and James (2021) administered a systematic inquiry examining risk management frameworks and project execution outcomes in the county of Makueni's construction sector. This study adopted a descriptive research approach, identifying 24 construction industry projects finalised in Makueni County between 2018 and 2019. The sample consisted of 72 individuals, with representation from both project supervisors and contractors working in the undertakings, across the different projects. Data collection was conducted through a framework-based approach with emergent flexibility surveys in the investigation. The information gathered was examined employing statistical methods encompassing descriptive and inferential statistics. The study outcomes indicated that the resource allocation and control risks, budget control risks, and litigation risks positively affected the performance metrics of Makueni County's construction projects. However, this study reveals a lack of conceptual alignment in existing literature as it focused on construction projects in Makueni County that were completed by the financial year 2018/2019, while the present investigation

concentrated on newly completed road infrastructure developments in Nairobi City County. Thus, providing more updated information on road construction projects.

Wideman (2022) performed a study examining risk mitigation approaches for Information and Communication Technology (IT) certified Project Management Professionals (PMPs) within the United States of America jurisdiction. The inquiry employed semi-structured interviews and compiled organisational risk registers along with associated risk management records. The sample consisted of 7 intentionally selected IT project management professionals who implement risk mitigation strategies to achieve successful Information and Communication Technology project outcomes. The study outcomes indicated that implementing the synergistic combination of knowledge management, development of an affirmative risk culture, application of institutional risk management structures, and maintenance of risk-focused discourse were the primary strategies employed to enhance IT performance. The research identifies a significant gap in the conceptual framework, specifically the unaddressed connection between risk governance protocols and project performance metrics. An important corollary is that it has a methodological gap as it solely relies on qualitative data, whereas the present study concentrates on quantitative data.

Wangai and Musembi (2023) conducted a study analysing the association of risk mitigation approaches coupled with execution success factors in the construction of road projects in Nakuru County. A phenomenological investigation framework was empirically adopted in this investigation, while the research data were gathered from a target population of 107 construction ventures undertaken in Nakuru by KeRRA. Data acquisition was achieved through the administration of questionnaires. The analysis revealed that the predominant portion of risk identification and risk analysis protocols demonstrated a statistically meaningful enhancement in outcomes metrics of road

infrastructure initiatives, and these variables exhibited a substantial impact on project outcomes. However, a theoretical gap persists, as prior research has concentrated on the construction of road infrastructure in Nakuru County, while the current investigation limited the examination scope to roadway infrastructure development implemented in Nairobi County jurisdiction, which is more developed than in Nakuru County.

2.3.4 Communication Management and Project Performance

Nsanzimana and Mulyungi (2018) analysed the effects of contractual governance approaches on the operational outcomes of roadway infrastructure undertakings in Kigali, Rwanda. This investigation embraced a descriptive methodological architecture, utilising a census sampling approach encompassing all 62 registered project contractors within the target population. The correlation results revealed that excellent communication in contract agreements demonstrated a meaningful positive correlational linkage to project outcomes. Additionally, the regression results demonstrated that a contractor’s quality compliance positively and significantly influences project efficacy. Thus, that research recommended that project owners and managers intensify their efforts in closely monitoring contractors' adherence to quality standards. This work identifies an unresolved theoretical discontinuity wherein the findings on communication management practices were limited to project contractors, leaving out other key stakeholders in road infrastructure development undertakings.

Research by Muute and James (2019) explored the contribution of preparatory phases to practices on public works project execution within Nairobi's urban development framework in Kenya. The researchers implemented a phenomenological investigation design approach and specifically addressed 21 project managers. The investigation combined quantitative and qualitative methodologies, incorporating complementary empirical data harvesting and phenomenological documentation methodologies. The

study demonstrated that effective project communication is fundamental to achieving project objectives. The empirical evidence, additionally, demonstrated that projects implementing robust communication experience fewer instances of miscommunication or misunderstandings among project stakeholders. Effective communication practices were also linked to faster and more efficient problem resolution. There is a conceptual deficiency as this research sought to focus generally on urban infrastructure development initiatives within Nairobi's metropolitan jurisdiction, while the present investigation centres on road infrastructure building initiatives, particularly in the City County of Nairobi.

Lubis (2021) conducted research assessing the role pertaining to information flow governance in determining construction project managers' performance outcomes in Indonesia. The study employed a qualitative investigative framework, in particular, focus group discussions. The findings indicated that effective management of communication dynamics constitutes a vital requirement for construction project managers to deliver successful development of infrastructure projects. However, this study exhibits both conceptual and contextual limitations, as its performance analysis was confined to productivity metrics and internal team dynamics between project managers and personnel, omitting broader organisational and environmental factors. This implies the wider scope of performance of the assessed projects was not well captured.

In research, Mengistu and Mahesh (2020) went on a journey to evaluate the enhancement of construction management approaches in the Ethiopian road construction sector. The investigation was conducted using an explanatory research framework to establish cause-effect relationships through statistical measurement techniques. The research focused on a study population comprising 214 project team

members who responded to the administered questionnaires. The study revealed limited implementation of optimal construction management methodologies within Ethiopia's building sector, with particular deficiencies observed in communication protocols, knowledge/risk mitigation systems, and stakeholder coordination frameworks. A dual limitation emerges in the study's scope: while it assesses advancements in construction management approaches, it does not investigate how these practices functionally influence key performance indicators like cost efficiency or timeline adherence.

A study by Kimutai (2020) systematically evaluated the relationship between resource allocation, project planning, communication processes, and performance metrics in Nairobi's residential construction sector. The research implemented a survey investigative framework with an observational-analytical approach, and utilised a probability sampling method, ensuring unbiased participant selection to select a total of seventy-nine residential property infrastructure projects included in the study cohort. The questionnaires were deployed to project management professionals, with collected data undergoing rigorous analysis to extract meaningful insights that have a combination of observational and analytical statistical techniques. The outcomes revealed a notable interdependence between communication in the implementation of projects and their impact on performance metrics. The research also found that involving key stakeholders through clear and consistent communication channels positively impacts project performance. However, there is a differing focus on residential vis-à-vis road construction, highlighting a scope gap, enabling further research for new insights into project dynamics.

2.4 Literature Review: Summary of Literature and Research Gaps

Table 2.1: Synthesis of Literature and Knowledge Voids

Author(s) & Year	Focus of the Study	Key Findings	Research Gaps	How to Address the Research Gaps
Ahmadabadi & Heravi (2019)	Essential determinants for success of highway PPP projects in Iran.	Optimal resource allocation & cost monitoring in planning are crucial. Private capacity shapes construction success; government capability affects operational success.	Methodological Gap: Focus only on PPP highways; findings are not generalisable to purely government-sponsored projects.	The current study focuses on road projects regardless of the funding model to enhance generalizability.
Dagba & Dagba (2019)	Relationship between strategic procurement and financial management in Ghana's road infrastructure.	Efficient procurement leads to cost savings and timely completion. Effective cost management improves project quality.	Conceptual Gap: Cost management practices were assessed narrowly, inclined only towards procurement strategies in early planning.	This study adopts a broader conceptualisation of cost management, encompassing the entire project lifecycle.
Shan et al. (2020)	Key determinants for successful green building projects by small-scale contractors in Singapore.	Cost management, subcontractor engagement, and procurement are critical. Large contractors have higher capabilities in budgeting, resource allocation, and time management.	Scope Gap: Focus on green buildings in a developed nation; it lacks generalisability for road projects in a developing context like Kenya.	The present research is scoped to road infrastructure projects within Nairobi, Kenya.
Gitonga (2022)	Association between financial	Effective cost-control methodologies	*(No specific gap was highlighted for this study in the*	*(This study's context and findings are*

	strategies and KPIs in Kenyan metropolitan roadway projects.	have a positive, statistically significant link to project outcomes (budget, schedule, quality). Efficient cost management is linked to optimal resource allocation.	*provided text, but it serves as a key foundational study for the current research context.)*	*directly aligned with and support the current investigation.)*
Muchelule (2018)	Influence of work breakdown structures, scheduling, and planning on ICT projects in Kenyan state corporations.	Scheduling precision, work decomposition, accurate estimation, and risk mitigation are significantly associated with project performance.	Contextual Gap: Focus on ICT projects, whose planning practices differ from those of road construction.	The current investigation is deliberately confined to roadway infrastructure projects within Nairobi City County.
Ingle & Mahesh (2020)	Critical performance dimensions for infrastructure project outcomes in India.	Identified ten key performance domains, including time management. Robust time management ensures schedule and milestone adherence.	Methodological Gap: Relied on PCA and SEM for data analysis.	The present investigation employed Pearson correlation and LSE regression models for data analysis.
Mbonabihama (2022)	Effect of project management methodologies on schedule adherence in Rwandan construction.	Strategic governance focused on schedule adherence enhances success. Frequent project transitioning and poor resource scheduling	Conceptual Gap: Measured project performance solely with timely completion, omitting other performance measures like cost and quality.	This study will employ a multi-dimensional measure of project performance, including time, cost, and quality metrics.

		hinder performance.		
Urbański (2019)	Mediating role of risk governance on the planning-success nexus in highway projects in Pakistan and Britain.	Risk management has a significant moderating contribution to the relationship between project planning and success.	Conceptual/Knowledge Gap: Focuses on risk mitigation as a moderating factor. The geographical scope (two different countries) is too large.	The present investigation assesses the direct influence of risk mitigation on project performance and is geographically confined to Nairobi County, Kenya.
Rwingo & James (2021)	Risk management frameworks and project outcomes in Makueni County's construction sector.	Resource allocation risks, budget control risks, and litigation risks positively affect project performance metrics.	Conceptual/Contextual Gap: Focused on projects completed by 2018/2019, providing outdated information.	The present research focuses on newly completed road infrastructure developments in Nairobi City County, providing more updated information.
Wideman (2022)	Risk mitigation approaches for IT Project Management Professionals (PMPs) in the USA.	Key strategies: knowledge management, affirmative risk culture, institutional risk structures, and risk-focused discourse.	Conceptual Gap: Lacks empirical evaluation of how risk mitigation impacts project outcomes. Methodological Gap: Relies solely on qualitative data.	The current study utilises quantitative data collection methods to examine how risk mitigation protocols influence project outcome metrics.
Wangai & Musembi (2023)	Association of risk mitigation approaches with success factors in road projects in Nakuru County.	Risk identification and analysis protocols significantly enhance the outcome metrics of road projects.	Theoretical/Contextual Gap: Prior research concentrated on Nakuru County, which is less developed than Nairobi County.	The current investigation limits its scope to roadway infrastructure development in Nairobi County, a more developed context.

Nsanziman a & Mulyungi (2018)	Effects of contractual governance on operational outcomes of road projects in Kigali, Rwanda.	Excellent communication in contracts and contractor quality compliance significantly influence project efficacy.	Theoretical Gap: Findings on communication were limited to project contractors, omitting other key stakeholders.	This study will consider the communication practices of all key stakeholders involved in the road projects.
Muute & James (2019)	Contribution of preparatory phases and practices to public works project execution in Nairobi, Kenya.	Effective project communication is fundamental to achieving objectives, reducing misunderstandi ngs, and enabling efficient problem-solving.	Conceptual Gap: Focused generally on urban infrastructure, not specifically on road infrastructure.	The present investigation centres specifically on road infrastructure building initiatives in Nairobi.
Lubis (2021)	Role of information flow governance in determining construction project managers' performance in Indonesia.	Effective management of communication dynamics is vital for project managers to deliver successful infrastructure projects.	Conceptual & Contextual Gap: Performance analysis was confined to productivity and internal team dynamics, omitting broader factors.	The present investigation utilises more definite and broader measures of project performance (time, cost, quality) beyond just team productivity.
Mengistu & Mahesh (2020)	Enhancemen t of construction management approaches in the Ethiopian road construction sector.	Limited implementation of optimal management methodologies, with deficiencies in communication , risk mitigation, and stakeholder coordination.	Scope Gap: Assessed advancements in management approaches but did not investigate how they functionally influence KPIs like cost or timeline adherence.	This research will directly investigate the functional influence of specific management practices on key performance indicators.
Kimutai (2020)	Relationship between	A notable interdependenc	Scope/Contextual Gap: Its focus on	The present research

	resource allocation, planning, communication, and performance in Nairobi's residential construction.	e exists between communication and performance. Involving stakeholders through clear communication positively impacts performance.	residential construction creates a gap for insights into road project dynamics.	centres on recently concluded road projects in Nairobi, delivering timely and context-specific results.

Source: survey data (2024)

2.5 Conceptual Framework

Conceptual frameworks are theoretical constructs or models that systematically organise and explain the interrelationships among key predictors and outcomes in statistical analysis (Varpio et al., 2020). In this examination, the researcher utilised the conceptual framework to graphically illustrate the theoretical model, showing how work breakdown structures significantly determine the success metrics of the development of road infrastructure initiatives in the City County of Nairobi, Kenya. This is presented in Figure 2.1.

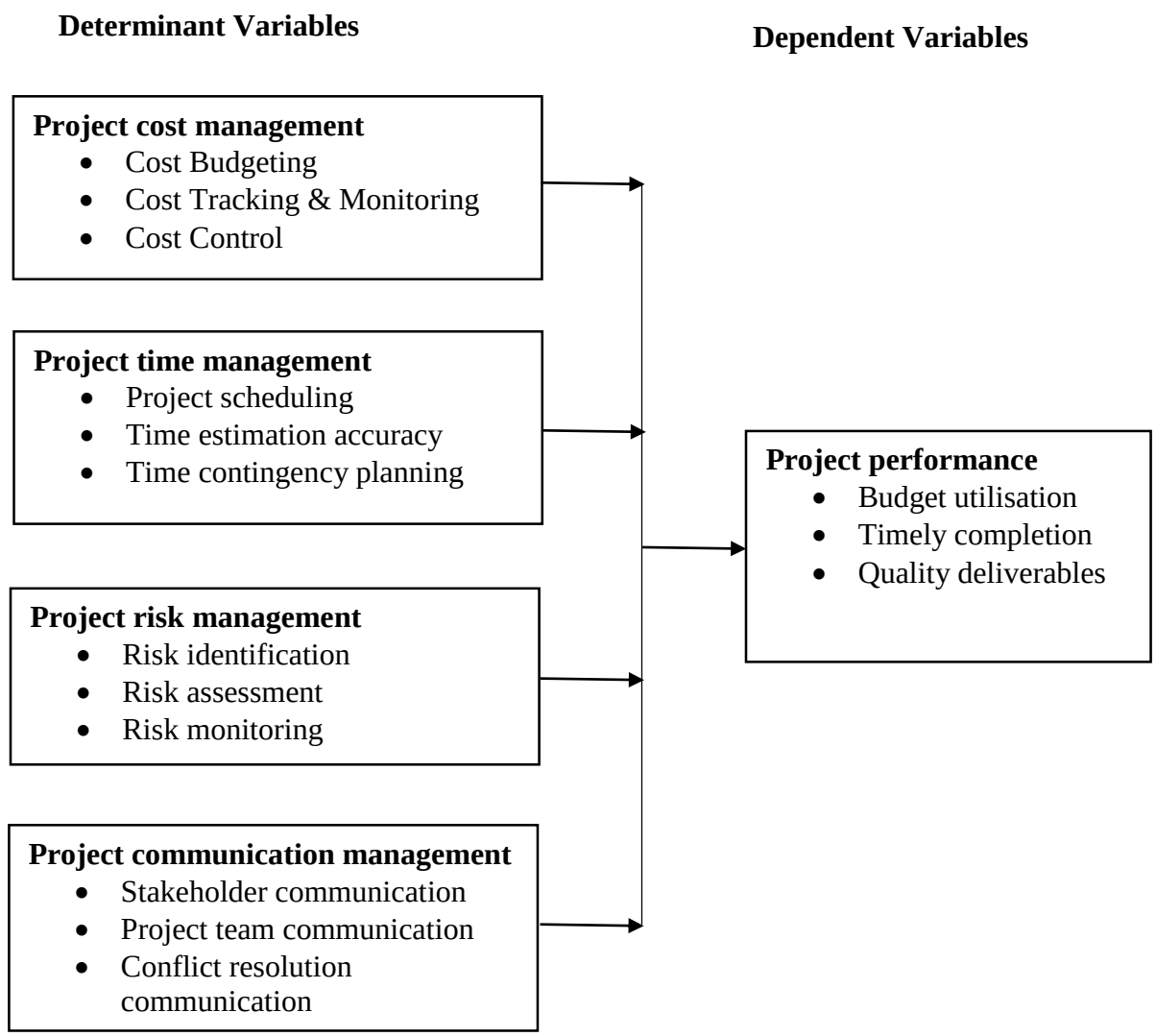

Figure 2.1: Conceptual Framework
Source: Researcher (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three delineates the research design and methods utilised in this investigation, specifically addressing study design, target population, sampling strategy, data collection instruments (with validity and reliability assessments), procedures for gathering and analysing data, and ethical safeguards.

3.2 Research Design

A research design constitutes the overarching architectural framework that integrates the conceptual, methodological, and analytical components of an investigation to systematically address its central research inquiries (Sileyew, 2019). This study adopted an explanatory research design, a structured approach specifically aimed at identifying and understanding cause-and-effect relationships between independent and dependent variables (Asenahabi, 2019). This design is characterised by its capacity to facilitate a thorough examination of how variations in one parameter—specifically, the implementation of project planning practices—produce corresponding changes in another—namely, project performance metrics.

The explanatory design was selected for two primary reasons. First, it is directly aligned with the study's core objective of moving beyond mere description to empirically determine the causal influence of planning practices on the efficiency of roadway infrastructure development in Nairobi City County. Second, this design provides the logical foundation for employing quantitative methodologies, which rely on empirical evidence and statistical analysis to test hypotheses, explore relationships, and draw generalisable conclusions, thereby reducing susceptibility to interpretive bias (Asenahabi, 2019).

To enhance the robustness of the inquiry, the study incorporated a form of methodological triangulation, concurrently integrating hermeneutic analysis of contextual literature with parametric statistical testing. This approach enabled a more comprehensive and nuanced examination of the phenomena under study by leveraging both qualitative contextualisation and quantitative rigour (Othman et al., 2020). Ultimately, the rigorous application of an explanatory design was chosen to yield findings that possess wider applicability and provide insights that extend beyond the immediate research context, contributing actionable knowledge to the field of project management (Parra, 2023).

3.3 Target Population

A population represents a complete group of cases, individuals, or elements sharing defined characteristics that are the focus of a research study (Stratton, 2021). The research examined a defined target population comprising 21 road construction projects within the boundaries of Nairobi City County. Road construction projects served as the observational units, with analytical attention directed toward their respective project managers, risk managers, and monitoring & evaluation officers of the Nairobi City County. Since 21 road projects were considered, with one respondent selected from each of the three categories, the study consisted of a total of 63 participants.

Table 3.1: Research Population

Participants	Target Population	% of the Target Population
Project Managers	21	33.33
Risk Managers	21	33.33
Monitoring & Evaluation officers	21	33.33
Total	**63**	**100**

Source: Survey data (2024)

3.4 Sample Design

Sampling denotes the methodological process of selecting a representative subset of participants or elements from an established sampling frame for research purposes (Taherdoost, 2016). In this investigation, a census approach was deployed rather than a sample, encompassing the entire target population in the study. This methodological decision was predicated on the manageable size of the population, which comprised fewer than 200 eligible participants. According to Mugenda and Mugenda (2003), a census represents an effective methodological approach when an investigation's eligible participant universe is sufficiently limited to permit complete enumeration. By employing a census, the study eliminated sampling error and ensured comprehensive data collection from all relevant stakeholders within the target population, thereby enhancing the validity and generalisability of the findings within the specific research context of road construction projects in Nairobi City County.

3.5 Data Collection Instruments

Per Taherdoost's (2019) conceptualisation, data collection instruments encompass both physical tools and procedural techniques designed to acquire empirical evidence. There are two research data gathering techniques: primary collection of research data via direct measurement, observation, or solicitation, while the collection of secondary data entails the extraction and synthesis of information from previously collected datasets in documentary sources, published reports, and institutional records. This research project utilised structured questionnaires for first-hand data collection from selected research subjects. These survey instruments incorporated both structured and unstructured question formats where section A which is on demographic information, had multiple choices while sections B-F which consisted of statements in line with the research objectives, used a five-level Likert scale; items were rated on an agreement spectrum

from 1 (Strongly disagree) to 5 (Strongly agree), midpoint 3 = Neither agree nor disagree. This ensured consistency in participants' responses.

Aithal (2022) further asserted that the structured format of questionnaires ensures that respondents are provided with clear and well-defined questions, reducing the risk of misinterpretation. It also enhances the confidentiality of sensitive information disclosed by respondents, which can lead to obtaining more honest and candid responses. Questionnaires are also cost-effective when obtaining data from respondents in diverse geographical locations (Shrestha, 2021).

3.6 Pilot Study

As documented by Mohajan (2017), the instrument validation phase involves trial research implementation with a small participant group sharing characteristics with those intended for the subsequent survey. The core purpose of conducting the pilot test is to serve as a guide to assess particular features of the research and determine whether the chosen guidelines will function as intended. Essentially, the exploratory phase is conducted to examine the clarity and comprehensibility of lines of inquiry, ensuring they produce the expected results. Andrade (2018) agrees that pilot testing serves dual purposes: identifying methodological flaws in study design and implementation, and providing provisional data in lieu of a formal probability sample. A preliminary study representing five per cent to ten per cent of the full study participants provides sufficient data for instrument refinement while remaining resource-efficient (Idris & Chan, 2017). The pilot test participant group was therefore 10 per cent of the sample size. Caution was also taken to systematically ascertain that participants were not from the study cohort, to avoid participants' fatigue (Robertson and Evans, 2020). Therefore, it was conducted in 2 construction projects in the roads sector in the neighbouring Kiambu County. Survey instruments were delivered to 2 risk managers, 2 project managers, and

2 monitoring & evaluation officers that got randomly selected from the 2 road construction projects.

3.6.1 Instrument Validation

Andrade (2018) denotes that validity is the congruence between an instrument's measurement outcomes and its purported theoretical domain. It evaluates both the precision of the instrument's measurements and the extent to which findings can be extrapolated to wider populations or contexts. Instrument validation requires assessing multiple validity types. The key validity types in research methodology include: content validity, construct validity, and face validity. This study established instrument validity through face and content validation procedures. Face validity involves a preliminary, intuitive assessment of whether an instrument, on its face, shows congruence between operational measures and theoretical definitions (Cohen & Morrison, 2017). Content validity evaluation determines the magnitude by which scale items sufficiently sample all facets of the construct being measured. It involves assessing whether the instrument items represent the full scope of the construct and if they are relevant to the research question (Clark & Watson, 2019). To ensure measurement validity, the researcher solicited input from qualified supervisors to evaluate the instrument's surface relevance (face validity) and comprehensive coverage (content validity), in reviewing the empirical documentation materials. The researcher then took into consideration the guidance and suggestions provided by the supervisors when refining the survey instruments to improve their psychometric properties in terms of reliability and validity.

3.6.2 Instrument Reliability Assessment

Reliability denotes an assessment tool's capacity to yield reproducible and dependable results across repeated administrations (Mohajan, 2017). Reliability analysis via Cronbach's alpha coefficient evaluated the questionnaire's measurement consistency.

The study adopted these psychometric standards for internal consistency interpretation: Excellent: $\alpha \geq .90$, Good: $.80 \leq \alpha < .90$, Acceptable: $.70 \leq \alpha < .80$, Questionable: $.60 \leq \alpha < .70$, Poor: $.50 \leq \alpha < .60$, Unacceptable: $\alpha < .50$. The study adopted the conventional reliability standard of $\alpha \geq 0.7$ for instrument acceptance. To maintain sample independence, the researcher put in place exclusion criteria to ensure that individuals serving as participants in the exploratory research phase testing were intentionally excluded from the comprehensive study recruitment pool.

3.6.3 Reliability Results of the Questionnaire

Following the Cronbach's alpha assessment approach, administered to establish the measurement tool's reliability indices, the findings in Table 3.2 demonstrated that the Cronbach's alpha coefficient for every one of the study parameters exceeded a recommended minimum standard of 0.7. This implies that the constructs of the questionnaire provided consistent and dependable results across the various data analyses carried out.

Table 3.2: Reliability Results of the Questionnaire

Variables	Cronbach's Alpha Value	Number of Items	Reliability Interpretation
Project budget management	0.859	6	Good
Project schedule management	0.953	6	Excellent
Project risk management	0.957	6	Excellent
Project communication management	0.911	6	Excellent
Project performance	0.813	6	Good

Source: Survey data (2024)

3.7 Data Collection Procedures

Following institutional protocols, the scholar acquired an official research license from the National Commission for Science, Technology, and Innovation (NACOSTI) prior to commencing field information acquisition, in compliance with national research regulations. Additionally, in adherence to institutional requirements, departmental

clearance was secured before any engagement with research respondents. Subsequently, the researcher distributed the questionnaires, accompanied by a letter giving an explicit delineation of the primary goals of the study.

The standardised data collection instruments were systematically administered using a drop-off/pick-up later approach to enhance response rates. The researcher saw to it that enough copies of the questionnaires were printed and then double-checked to ensure they were clear, well-organised, and easy to understand. The researcher then engaged the research assistants in handing out copies of the questionnaires to each participant and then gave clear instructions on how to complete the questionnaire. They then gave assurances that responses would maintain data protection compliance while serving research purposes exclusively for the study's academic goals, with no personal identifiers required. They then established mutual understanding with study participants about the appropriate date, timeframe, and location to gather completed survey responses.

3.8 Data Analysis and Presentation

The collected qualitative dataset was processed using content analysis, which involved systematically analysing content within texts obtained from targeted participants to discern meaningful correlations, themes, meanings, and correlations across data points. Emergent themes from the qualitative findings were structured to mirror the predefined research objectives. Quantitative findings, on the other hand, underwent statistical analysis, including using SPSS 22 version. Raw data were cleaned to remove inconsistencies, coded thematically according to research aims, categorised for pattern identification, and subsequently analysed using SPSS, which assisted in generating inferential and descriptive statistics.

Descriptive statistical methods employed mean, percentage responses, and standard deviations, while statistical analyses included Pearson's r correlations and multiple regression findings. Pearson's r correlation coefficient was calculated to quantify the magnitude and directionality of linear relationships between variables. The research employed multivariable linear regression to quantify how explanatory variables collectively predicted the criterion variable. The research findings were visualised through tabular and graphical formats to facilitate a clear interpretation of respondents' perspectives regarding how project preparation methodologies influence road infrastructure development initiatives in the City County of Nairobi.

The following multiple regression model was administered to illustrate the data scientifically:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Whereby:

Y = Project performance

X1 = Project budget management

X2 = Project schedule management

X3 =Project risk management

X4 = Project communication management

β1 to β4 = regression weights

ε = the error term

β0 = the constant term

3.9 Diagnostic Examinations

In order to detect instances of non-compliance regarding the assumptions of the multiple regression model, this study conducted three statistical tests.

3.9.1 Normality Test

Normality testing evaluates the alignment of empirical findings with theoretical normal distribution properties through statistical computation of the exact degree to which a random variable influences the data set's ability to adequately follow a normal distribution (Osborne & Waters, 2019). This investigation applied the Shapiro-Wilk evaluation technique in a check for normalcy. Using a correlation between the organised findings values and the corresponding predicted realisations of a normally distributed random variable, a test statistic is calculated. This is the chance of detecting the data if it were sampled from a normal distribution is indicated by the p-value that the test produces (Khatun, 2021). The null hypothesis posits no deviation from the normal distribution. The test statistic falls within the acceptance region, maintaining the null hypothesis (H_0), which indicates that the data has a bell curve if the test statistic's observed significance level exceeds the predetermined alpha level ($p=0.05$). Conversely, the default statistical assumption of no effect/difference is rejected when the obtained p-value is less than the predetermined alpha level criterion, signifying a substantial departure from normalcy in the data (Elkin et al., 2021).

3.9.2 Multicollinearity Test

When multiple predictor variables collectively display a strong correlation with one another, this is referred to as multicollinearity (Tamura et al., 2019). Regression model problems, such as unstable coefficient estimates, exaggerated standard errors, and trouble identifying the individual effects of the variables, may be caused by this statistical issue (Shrestha, 2020). This research tested for the multicollinearity issue using the Variance Inflation Factor (VIF) technique. The degree of multicollinearity for every determinant variable is measured by the VIF. It systematically determines the proportion in which multicollinearity increases the spread of the calculated regression

coefficient (Oke et al., 2019). Multicollinearity is present to some extent if the VIF value is larger than 5, with higher values indicating more severe multicollinearity (Ullah et al., 2019).

3.9.3 Heteroscedasticity Test

Heteroscedasticity signifies the breach of the homoscedasticity assumption in regression analysis, characterised by non-constant variability of errors (residuals) for different magnitudes of the explanatory variables (Wilcox, 2019). This statistical issue can compromise the reliability of statistical inferences and the precision of regression coefficient estimations (Rice et al., 2020). This research employed the Breusch-Pagan test to identify heteroscedasticity. This entails estimating an auxiliary regression where the squared residuals (e^2) from the primary model are regressed on the independent variables, then deriving a chi-square-distributed test statistic from this regression (Đalić & Terzić, 2021). When the probability value corresponding to the calculated statistic is less than the chosen alpha threshold ($p = 0.05$), it signifies the existence of heteroscedasticity; conversely, if $p > 0.05$, it shows the lack of heteroscedasticity (Martin, 2023).

3.10 Ethical Considerations

The researcher upheld the highest standards of research integrity by ensuring all participants were treated with dignity, respect, and strict confidentiality throughout the study. Participants in this study were required to maintain anonymity during all research activities. This procedural measure served the dual purpose of securing participant privacy and bolstering respondent confidentiality. Moreover, the investigator implemented rigorous protocols to prevent data from being associated with specific individuals by substituting names with conceptual labels. This ensured the preservation

of the anonymity of the participants, shielding them from any potential harm or embarrassment, therefore augmenting the maintenance of participant anonymity.

Moreover, in adherence to ethical guidelines, the researcher implemented protocols ensuring all engagements were voluntary and consensual. The respondents were asked to sign a voluntary participation agreement form as evidence of their non-coercive involvement in the research. Moreover, the investigator guaranteed the observation of the respondents' human rights and public relations by adhering strictly to the established protocols. The researcher explicitly guaranteed all participants that their data would be handled with strict confidentiality protections, ensuring their identities remained anonymous. Furthermore, participants received full disclosure beforehand that the collected participant information shall serve only the stated objective of educational/investigation goals.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSIONS

4.1 Introduction

This chapter systematically provides and analyses the study results, commencing with the response rate metrics and pilot study outcomes, followed by participant demographics, descriptive statistics, diagnostic testing results, and concluding with inferential statistical analyses.

4.2 Analysis of Response Rate and Descriptive Statistics

The research team disseminated 63 research questionnaires to obtain the required research data, as shown in Table 4.1. Out of the 63 questionnaires, 58 completed questionnaires yielded a response dataset that reflected a completion rate of 92.06 per cent, whereas 5 survey instruments remained unreturned (7.94 per cent). Mugenda and Mugenda (2003) established that response rates exceeding 70 per cent are considered statistically viable for research analysis. Thus, the response rate of 92.06 per cent was deemed satisfactory for the investigation.

Table 4.1: Response Rate

Response Rate	**Frequency**	**Percentage**
Returned Questionnaires	58	92.06
Unreturned Questionnaires	5	7.94
Total	**63**	**100**

Source: survey data (2024)

4.3 Demographic Information

This segment outlines the demographic characteristics of the participants, including their education level, job position, and professional experience.

4.3.1 Level of Education

Figure 4.1 shows that the most common highest educational qualification among managers was a Master's degree (37.93 per cent), followed by a Bachelor's degree

(31.03 per cent), 18.97 per cent had a postgraduate degree, and 12.07 per cent had a diploma. This suggests that the road construction sector supports the trend toward a highly educated workforce in managerial positions with higher qualifications, who may contribute to better decision-making, leadership, and strategic thinking. In addition, the educational diversity among managers can facilitate a dual-focused paradigm integrating systematic problem analysis with evidence-based strategy actualisation in the sector.

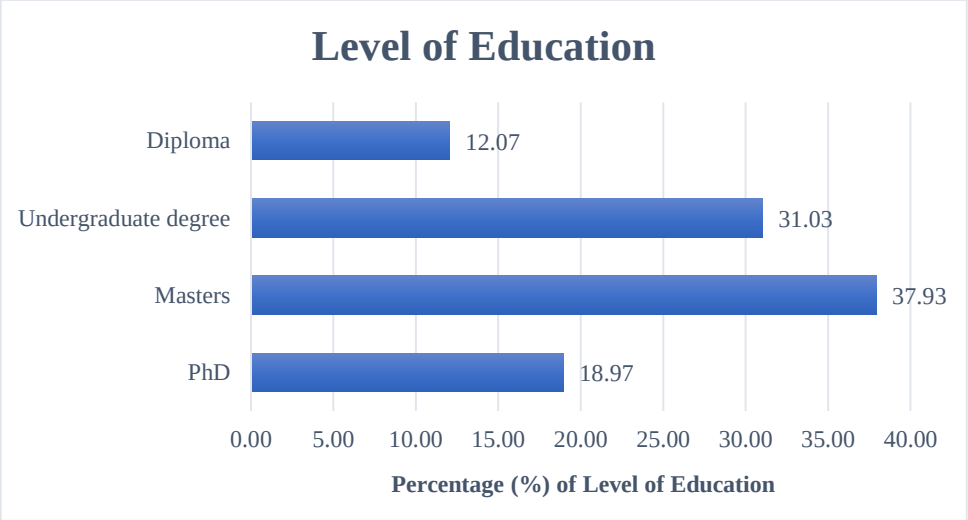

Figure 4.1: Level of Education
Source: survey data (2024)

4.3.2 Job Position

The findings in Figure 4.2 demonstrated that 48 per cent of the participants were project managers, 29 per cent were monitoring and evaluation officers, and 23 per cent were risk managers. This reflects the pivotal function that project managers play in overseeing project execution, resource allocation, and meeting deadlines. In addition, this distribution underscores the sector's balanced approach to project management, progress evaluation, and risk control, which are all fundamental to the success of road-building projects.

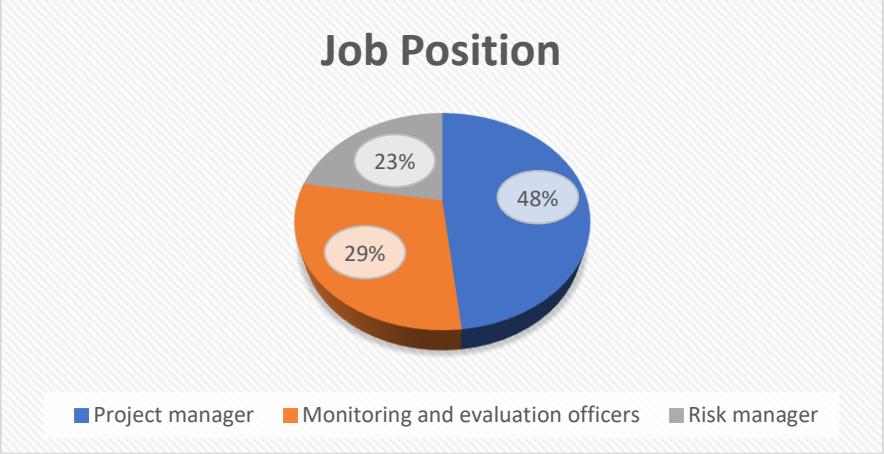

Figure 4.2: Job Position
Source: survey data (2024)

4.3.3 Professional Experience

The findings of Figure 4.3 disclosed that 36.21 per cent of the selected managers had held their current position for 6-10 years, 22.41 per cent had been working for 11-15 years, 20.69 v had worked between 1 and 5 years, 12.07 per cent had been employed for over 15 years, while 8.62 per cent had a prior experience of under 1 year. These results suggest that the participants have considerable experience in their current roles as well as enhanced comprehension of institutional operations, industry trends, and potential challenges, which can elevate decision-making and leadership effectiveness.

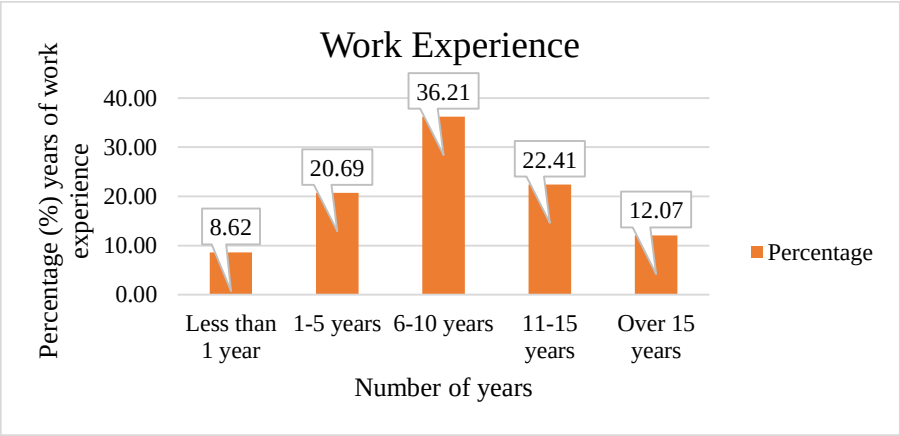

Figure 4.3: Work Experience
Source: Survey data (2024)

4.4 Inferential Analysis

This part outlines a summarised and concise general view of the responses to the questionnaire through percentage distributions, sample means, and standard deviations. It also presents a detailed discussion of the descriptive results regarding project budget management, project risk management, project schedule management, communication management, and project outcome metrics of road infrastructure building within the City County of Nairobi, Kenya.

4.4.1 Inferential Analysis Results for Project Budget Management

The descriptive outcomes, indicated in Table 4.2, showed that 34.48 per cent of participants agreed, 27.59 per cent somewhat agreed, and 22.41 per cent firmly supported the notion that the budgeting approaches are thorough and correctly anticipate project costs. On the contrary, 12.07 per cent revealed disagreement and 3.45 per cent indicated substantial dissent regarding this argument. On average, participants' responses were 3.6, indicating that the prevailing feedback from participants (84.48 per cent) corroborated the expression of views, while the variability of their dispersion of replies is measured by a standard deviation of 1.08. These results demonstrated that 29.31 per cent of participants agreed, 25.86 per cent definitively aligned with, and 24.14 per cent tentatively accepted that projected expenditures tend to be often revised to accommodate changes and uncertainties that may occur throughout the project. Nonetheless, 12.07 per cent and 8.62 per cent expressed disagreement and extreme disagreement, respectively, with this assertion. The average response of 3.52 demonstrated that most participants (79.31 per cent) concurred with the assertion, yet their views varied, as seen by a dispersion measure of 1.25.

The results indicated that 37.93 per cent of participants concurred, 29.31 per cent strongly agreed, and 20.69 per cent moderately endorsed the view that cost monitoring

and control are consistently performed during the building phase of road projects to ensure compliance with financial estimates. Of the respondents, 8.62 per cent empirically refuted and 3.45 per cent disagreed with this statement. The average survey response of 3.76 indicates that a substantial proportion of respondents (87.93 per cent) concurred with the statement, while the variability of replies is shown in the dispersion measure of 1.17. The survey concluded that 32.76 per cent of participants expressed agreement, 31.03 per cent firmly endorsed, and 24.14 per cent somewhat agreed that the project team used advanced tracking and monitoring systems to swiftly discover and rectify budget discrepancies. As a consequence, 6.9 per cent expressed dissent, and 5.17 per cent indicated significant contention with this expression of views. The average response of 3.78 indicated that most of the respondents (87.93 per cent) concurred with this statement, with a dispersion measure of 1.12 exemplifying the fluctuations in their replies.

Furthermore, the outcomes concluded that 27.59 per cent of participants strongly and somewhat agreed, while 25.86 per cent endorsed the view that the expenditure management strategies used in the organisation assist in managing unforeseen cost fluctuations and achieving financial targets. In contrast, 12.07 per cent expressed disagreement, whereas 6.9 per cent firmly contended with the remark. The average response of 3.55 demonstrated that most of the respondents (81.04 per cent) concurred with the proposition, and the variability of their replies was reflected in a dispersion measure of 1.22. The results demonstrated that 36.21 per cent of participants agreed, 22.41 per cent unreservedly supported, and a moderate percentage concurred that the project team proactively discovers and executes cost-saving strategies to avert budget overruns and elevate return on investment (ROI). Thirteen-point seventy-nine per cent disagreed, and five-point one-seven per cent strongly disagreed with this assertion.

Aggregated responses averaged 3.57, showing that most of the participants (81.03 per cent) concurred with this proposition, whereas the variability of replies is reflected in the dispersion measure of 1.14. The aggregate mean of 3.63 showed that participants concurred that project budget management methods were efficiently executed in road-building projects. The standard deviation of 1.16 pointed to pronounced heterogeneity, suggesting that although most respondents had similar opinions, there were notable variations in their replies.

In the qualitative findings, the respondents mentioned the other project budget management practices that are employed, including formulating a clear cost baseline, to more precisely track financial utilisation of other project resources. Some of the participants also indicated that they conduct frequent budget revisions, which guarantee that any disparities in finances or new issues are found and fixed without further ado. Analysing cost variances by comparing actual costs with the budgeted amounts also helped them identify areas of concern early. In addition, some of the project managers outlined that allocating a contingency budget for unforeseen events helps in managing unexpected costs without compromising the project's financial health. They also take advantage of the bulk supply of construction materials by negotiating for lower prices, thus reducing costs. Additionally, most of the respondents agreed that all of these mentioned and outlined practices improved the performance of their road infrastructure construction projects.

These descriptive outcomes were consistent with those of Ahmadabadi and Heravi (2019), with empirical evidence indicating that efficient resource distribution and consistent cost monitoring during the project planning stage are critical components of project performance. They can also be linked with those of the Shan et al. (2020) study,

which argued that large contractors in construction projects were better at allocating resources, managing project schedules, and creating appropriate budgets.

Table 4.2: Exploratory Data Analysis Results for Project Budget Management

Statements	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std Dev
Project cost estimates are comprehensive and accurate.	3.45%	2.07%	27.59%	34.48%	22.41%	3.6	1.08
Budgets are updated routinely for project changes and uncertainties.	8.62%	12.07%	24.14%	29.31%	25.86%	3.52	1.25
Costs are tracked throughout construction to ensure adherence to the budget.	8.62%	3.45%	20.69%	37.93%	29.31%	3.76	1.17
The team uses advanced tools to promptly identify and address budget deviations.	5.17%	6.90%	24.14%	32.76%	31.03%	3.78	1.12
The organisation's cost controls mitigate financial surprises and ensure objectives are met.	6.90%	12.07%	27.59%	25.86%	27.59%	3.55	1.22
To prevent overruns, the team actively identifies and implements cost-saving initiatives.	5.17%	13.79%	22.41%	36.21%	22.41%	3.57	1.14
Overall Average						**3.63**	**.16**

Source: survey data (2024)

4.4.2 Inferential Analysis Results for Project Schedule Management

The results, shown in Table 4.3, demonstrated that 81.03 per cent of survey-takers collectively endorsed that the organisation implement Gantt charts, scheduling systems, and software to assess real-time progress and forecast schedule deviations in road-building projects, whereas 18.97 per cent dissented. The mean response of 3.67 suggests widespread agreement among participants with the proposition, while the dispersion measure of 1.22 reflects the spread of participant responses. The results demonstrated

that 84.48 per cent of a statistically significant majority endorsed that systematic schedule adherence checks have facilitated the project team to recognise and rectify delays against the baseline schedule, while 15.52 per cent disagreed with this assertion. The arithmetic mean of feedback of 3.64 indicated that survey-takers overwhelmingly affirmed the claim, with a standard deviation of 1.17 reflecting the variability of the replies.

The outcomes showed that 89.66 per cent of responses indicated a shared belief that the establishment used accurate and trustworthy schedule estimation frameworks, whilst 10.35 per cent dissented. The measure of central tendency of 3.74 indicated that most participants concurred with this assertion, while the variability of their replies is evidenced by a dispersion measure of 1.04. Furthermore, 77.58 per cent of respondents concurred that project teams consistently utilise expert judgment and historical data analysis to enhance the precision of time estimations for road-building operations, in contrast to 22.41 per cent who opposed this assertion. The average response of 3.47 indicates that the majority of respondents concurred with this proposition, as demonstrated by a standard deviation of 1.23.

Moreover, 79.31 per cent of respondents endorsed the need for reserve time planning to aid the project team in completing projects within the established timelines, whereas 20.69 per cent disagreed with this assertion. The typical participant reply of 3.55 indicates that most participants endorsed this assertion, while the statistical volatility of 1.24 captures the dispersion of perspectives. Moreover, 89.65 per cent of respondents endorsed time contingencies, with built-in schedule cushions regularly incorporated to accommodate unanticipated setbacks. On the contrary, 10.34 per cent challenged this proposition. The data fluctuation range of 3.97 demonstrated that most participants concurred with this statement, as evidenced by a statistical volatility of 1.08, which

captures the dispersion of perspectives. The aggregate mean of 3.67 indicates that respondents concurred that project schedule management procedures were well executed in road-building projects. The dispersion measure of 1.16 demonstrated a considerable degree of dispersion, suggesting that although most respondents had similar opinions, there were notable variations in their replies.

Qualitative data analysis deepened their comprehension of complementary schedule management methodologies employed across projects they have undertaken, including guaranteeing timely resource allocation and preventing idle time or bottlenecks caused by resource shortages. They stressed the value proposition of using the longest duration path (zero-float path) analysis method as a key time estimation method, which allows project managers to focus on key mandatory milestone dependencies. Some of the managers also revealed that before they undertake their project, they develop a baseline schedule at the start of the project. This enables comparison with actual performance throughout the construction process. They also outlined that they have a formal process for handling changes to the project scope or design, ensuring that schedule impacts are thoroughly evaluated. Upon evaluating the activities that they believed would best improve project performance, a greater share of participants endorsed the view that the practices highlighted in the questionnaire were more effective.

These descriptive results correspond with the research by Ingle and Mahesh (2020), which revealed that projects with established time management procedures tend to follow the project schedules more strictly, which guarantees that project deadlines and milestones are accomplished. They were also in line with the study by Mbonabihama (2022), which discovered that putting in place a schedule-driven approach to project management can greatly improve outcomes and increase the organisation's capacity to accomplish long-term project milestones on time. Additionally, staff members'

productivity is negatively impacted by frequent project transitions as they juggle various duties.

Table 4.3: Descriptive Results for Project Scheduling Practices

Statements	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std Dev
Project scheduling tools are used to monitor progress and identify potential delays.	6.90%	12.07%	17.24%	34.48%	29.31%	3.67	1.22
Monitoring project schedules allows the team to identify and correct timeline deviations.	6.90%	8.62%	24.14%	34.48%	25.86%	3.64	1.17
The company's time estimation methods reliably predict project durations.	3.45%	6.90%	27.59%	36.21%	25.86%	3.74	1.04
Teams employ expert judgment and historical data to enhance time estimation accuracy.	8.62%	13.79%	22.41%	32.76%	22.41%	3.47	1.23
Contingency time planning supports on-schedule project delivery.	8.62%	12.07%	20.69%	32.76%	25.86%	3.55	1.24
Schedule buffers are integrated to account for unforeseen delays.	1.72%	8.62%	22.41%	25.86%	41.38%	3.97	1.08
Overall Average						**3.67**	**1.16**

Source: survey data (2024)

4.4.3 Inferential Analysis Results for Project Risk Management

According to Table 4.4, among surveyed participants, 81.04 per cent acknowledged and 18.96 per cent disagreed that the project team regularly examines and updates the risk registers to make sure that new risks are detected as the project progresses and conditions change. The S.D. of 1.17 indicates that responses exhibited significant heterogeneity, but the mean of 3.55 additionally demonstrated that most participants endorsed this position. Quantitative findings highlighted risk-management approaches for road-building infrastructure projects, indicating that 87.93 per cent of the survey

data confirmed stakeholder confidence in risk documentation practices. However, 12.07 per cent of the data showed significant disagreement with this position. The largest segment of survey-takers agreed with this statement, per the arithmetic average of participant answers of 3.67; notwithstanding, the S.D. was 1.05.

The findings also revealed that 81.04 per cent of the participants affirmed that the organisation's risk management protocols classify threats by probability of occurrence and possible impact on road-building projects. Eighteen-point nine-six per cent, however, dissented from this conclusion. The S.D. of 1.32 indicates that the participant's answers reflected a broad spectrum of views, while the average of 3.67 suggests that a large proportion of respondents endorsed this assertion. Furthermore, 81.04 per cent of respondents concurred that risk assessments are adequately empirically verified to support proactive risk response planning and mitigation. 18.96 per cent, on the other hand, disagreed with this assertion. In addition to the S.D. of 1.27, the mean of these replies, 3.64, further indicated that a large proportion of participants affirmed this assertion.

Additionally, while 24.13 per cent of respondents dissented from this position, 75.86 per cent agreed that the project team routinely monitors the identified risks in order to track their status and evaluate their influence on project objectives. Participant responses indicated prevailing agreement with this view, according to the average of their responses (3.53); however, 1.34 of them demonstrated heterogeneous opinions. Furthermore, compared to 13.79 per cent of respondents who disagreed, 86.22 of respondents agreed that risk surveillance metrics are systematically communicated to bolster the timely deployment of risk countermeasures and monitoring systems, informed decision-making. The S.D. of 1.11 indicates that the replies were differentiated, and the average of 3.76 responses further demonstrates statistically

significant agreement with this position. The respondents agreed that project risk management techniques were successfully applied in road-building projects, as demonstrated in the overall average of 3.64. Although the preponderance of research participants had similar impressions, there were some variances in replies, as demonstrated by the dispersion measure of 1.21, which suggested a moderate amount of dispersion.

In qualitative findings, some of the respondents stated other project risk management practices they have ever utilised to improve project performance, including conducting scenario planning exercises or simulations that help them prepare for various risk events, such as delays, cost overruns, or environmental hazards. This practice enables them to test their response strategies in a controlled environment, improving their ability to manage risks when they arise. Two of the risk managers also highlighted on properly allocating risks through contracts, which ensures that parties assigned to the project, such as contractors and suppliers, are informed of their responsibilities in managing specific risks. Clear contractual terms regarding risk sharing and liability also reduce the likelihood of disputes and ensure risk is managed effectively across the project. In addition, one of the risk managers also revealed that they invest in ensuring that their project teams are trained in risk management practices, as it is critical for fostering a risk-aware culture. Similarly, in this case, the dominant response pattern indicated that the practices highlighted in the questionnaire were more effective in their project performance.

These descriptive results were in agreement with research by Rwingo and James (2021), which highlighted that adequate oversight of resource risks, budgetary risks and legal risks positively contributes to the execution of construction ventures in Makueni County. They also concurred with Wideman's (2022) research, which showed that the

main tactics used to improve project outcomes were creating a risk-positive culture, making use of an established risk management system, and communicating about risks.

Table 4.4: Descriptive Results for Project Risk Management

Statements	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std Dev
The team periodically audits and updates risk logs for emerging risks.	5.17%	13.79%	27.59%	27.59%	25.86%	3.55	1.17
Effective risk documentation enables proactive management of project uncertainties.	5.17%	6.90%	24.14%	43.10%	20.69%	3.67	1.05
The company's risk assessment prioritises risks by potential impact and frequency.	10.34%	8.62%	18.97%	27.59%	34.48%	3.67	1.32
Risk assessments are well-documented to facilitate proactive mitigation.	10.34%	8.62%	15.52%	37.93%	27.59%	3.64	1.27
Project leadership systematically tracks risks to assess their impact on objectives.	10.34%	13.79%	18.97%	25.86%	31.03%	3.53	1.34
Risk monitoring results are reported to enable informed decisions and timely responses.	5.17%	8.62%	18.97%	39.66%	27.59%	3.76	1.11
Overall Average						**3.64**	**1.21**

Source: survey data (2024)

4.4.4 Inferential Analysis Results for Project Communication Management

According to the findings in Table 4.5, 77.58 per cent of the research cohort agreed that the organisation regularly updates project stakeholders on project status and any modifications in road-building projects using a variety of communication channels. 22.41 per cent, however, disagreed with this assertion. The average distance from the mean of 1.29 demonstrates that collected responses were variable, but the mean of 3.45

demonstrates that most of the participants affirmed this proposition. Additionally, the findings showed that 86.21 per cent of the participants concurred that the business has frequent meetings to plan and discuss the feedback and critical issues raised by all involved parties. Thirteen point seven-nine per cent, conversely, challenged this claim. The preponderance of research participants endorsed this assertion, as indicated by an average value of 3.72 replies, and perspectives exhibited marked differentiation based on the S.D. of 1.14.

Additionally, 65.52 per cent of respondents to the investigation agreed that the project working group should communicate often to keep team members informed about duties, responsibilities, and project progress in road construction projects. 34.48 per cent, however, disagreed with this assertion. The S.D. of 1.36 indicates that the answers were quite variable, while the central tendency measure of 3.28 demonstrates that survey results revealed prevailing agreement with this statement. Furthermore, 84.48 per cent of participants affirmed—compared with 15.52 per cent dissenting respondents—that the organisation has frequent project team meetings and discussions in order to promote cooperation, resolve problems, and reach prompt project decisions. The dominant response pattern indicated concurrence with this proposition, as demonstrated in the average response of 3.72, while the S.D. of 1.24 showed that the replies varied.

Additionally, 79.31 per cent of respondents agreed that the organisation promotes a courteous and open communication atmosphere where all project participants may express their opinions. However, 20.69 per cent of respondents didn't agree with this assertion. The S.D. of 1.27 demonstrated that the replies were differentiated, and the average of 3.59 indicated that the dominant response pattern agreed with this proposition. Furthermore, compared to 18.96 per cent who disagreed with this statement, 81.03 per cent of respondents agreed that the organisation uses a problem-

solving approach to any disputes encountered in the project operations. The S.D. of 1.2 indicates that the replies were diverse, while the average of 3.59 indicates that the survey results revealed prevailing agreement with this assertion. The participants agreed that project communication management protocols were successfully used in road-building projects, as demonstrated in an overall average of 3.56. Although the preponderance of research participants had similar impressions, there were some variances in replies, as shown by the dispersion measure of 1.25, which showed a moderate amount of dispersion.

The qualitative findings further indicated other project communication management practices that were effective in their project performance, including leveraging digital communication platforms so as to easily share real-time information and promote collaboration. These tools streamline communication, allowing teams to share updates, documents, and feedback instantly, improving overall project coordination. They also utilise structured reporting that is accurate, concise and tailored to different audiences, so as to ensure that critical information is conveyed effectively to all stakeholders. One of the monitoring and evaluation officers disclosed that they have established a centralised system for managing project documents, such as contracts, designs, permits, and meeting minutes, to guarantee that every project stakeholder has access to the latest records. Additionally, most of the respondents agreed that all of these practices mentioned and outlined yielded measurable improvements in their road infrastructure construction ventures.

These descriptive results were in line with Muute and James (2019) research results, which demonstrated that projects with effective communication management witness an overall reduction in miscommunication or misinformation among project stakeholders. In addition, quick and more effective troubleshooting has also been

attributed to effective communication techniques. They were also in agreement with the research by Lubis (2021), which noted that successfully managing communication dynamics is essential for construction project managers to guarantee the achievement of infrastructure development objectives. However, they also differed from a study by Mengistu and Mahesh (2020), which established that the Ethiopian construction industry has not been adequately adopting construction management methods, particularly in the area of communication management.

Table 4.5: Descriptive Results for Project Communication Management

Statements	Strongly disagree	Disagree	Moderately Agree	Agree	Strongly agree	Mean	Std Dev
Stakeholders receive consistent updates through multiple channels on project progress and changes.	10.34%	12.07%	25.86%	25.86%	25.86%	3.45	1.29
Regular meetings address stakeholder concerns and feedback.	5.17%	8.62%	24.14%	32.76%	29.31%	3.72	1.14
The team maintains consistent communication to share knowledge on progress, tasks, and responsibilities.	10.34%	24.14%	18.97%	20.69%	25.86%	3.28	1.36
Regular team meetings facilitate collaboration, address issues, and enable timely decisions.	8.62%	6.90%	20.69%	31.03%	32.76%	3.72	1.24
The company maintains a respectful culture where all team members can voice their opinions.	8.62%	12.07%	20.69%	29.31%	29.31%	3.59	1.27
The company addresses project conflicts with a constructive, problem-solving approach.	8.62%	10.34%	17.24%	41.38%	22.41%	3.59	1.2
Overall Average						**3.56**	**1.25**

Source: survey data (2024

4.4.5 Inferential Analysis Results for Project Performance

The outcomes, as shown in Table 4.6, demonstrated that 82.76 per cent of research participants concurred that budget utilisation in all of their projects closely matched the original budget predictions, whilst 18.74 per cent disagreed. The S.D. of 1.2 indicated that the answers were variable, but the average of 3.83 revealed that the dominant response pattern indicated agreement with this proposition. The outcomes also evidenced that 86.21 per cent of the participants affirmed that using the budget for all of their projects saves money and ensures that projects are successfully executed without budget overruns. Thirteen point seven nine per cent, however, disagreed with this assertion. The preponderance of research participants agreed with this declaration, as shown by the average response of 3.71, and their replies differed according to the dispersion measure of 1.03.

The data analysis revealed that 87.94 per cent of participants held a unified view that their tasks on the road projects were completed on schedule and within the allotted period. On the other hand, 12.07 per cent disapproved of the assertion. The S.D. of 1.08 indicates that the replies were diverse, while the mean of 3.71 indicates that this proposition garnered predominant support across the sample. According to the survey, 89.65 per cent of participants agreed that timely project delivery has increased stakeholder satisfaction and guaranteed the community would get the promised benefits and services. Ten-point three-five per cent, however, disagreed with this assertion. According to the S.D. of 1.01 and the average of 3.84 replies, the majority of respondents seemed to agree with this assertion.

Additionally, 10.35 per cent of participants registered opposition against the assertion that their projects meet and exceed the quality criteria for road projects, compared to 89.66 per cent who agreed. The S.D. of 1.06 indicates that the answers were variable,

with the central tendency measure of 3.97 suggesting that the largest proportion of participants expressed alignment with this declaration. Furthermore, 89.66 per cent of the participants concurred that their projects are safe, long-lasting, and need little maintenance and repair expenses. 10.34 per cent, on the other hand, disagreed with this assertion. The S.D. of 1.08 indicates that the responses varied, while the average of 3.91 demonstrates that the largest proportion of participants concurred with this assertion. In terms of budget usage, timely completion, stakeholder satisfaction, and quality standards, respondents generally thought that project performance in road building projects was good, as evidenced by the overall mean of 3.83. Although many respondents had similar opinions, there were some discrepancies in how they perceived adherence to budgets, project timeframes, and the long-term durability of finished road projects, according to the S.D. of 1.08, which demonstrated a considerable range in replies.

These discoveries were congruous with the results of Njeru and Kirui (2022), who realised that performance evaluations and capacity building improved road construction project performance through staff feedback meetings, goal-setting, reviews, and sufficient project team resources. In addition, they were also in agreement with a study by Wangai and Musembi (2023), which found that the timely completion of projects, within a specific set budget and attaining set objectives, is favourably influenced by project planning practices.

Table 4.6: Exploratory Data Analysis Results for Project Performance

Statements	Strongly disagree	Disagree	Moderately agree	Agree	Strongly agree	Mean	Std Dev
Budget utilisation consistently matches initial estimates.	5.17%	12.07%	13.79%	32.76%	36.21%	3.83	1.2
Effective budget utilisation delivers cost savings and on-budget completion.	3.45%	10.34%	18.97%	46.55%	20.69%	3.71	1.03
Our projects consistently meet their deadlines.	5.17%	6.90%	24.14%	39.66%	24.14%	3.71	1.08
On-time delivery increases stakeholder satisfaction and ensures community benefits are realised as planned.	3.45%	6.90%	17.24%	46.55%	25.86%	3.84	1.01
We deliver road projects that exceed quality standards.	3.45%	6.90%	15.52%	37.93%	36.21%	3.97	1.06
We deliver durable, safe projects with minimal maintenance costs.	5.17%	5.17%	15.52%	41.38%	32.76%	3.91	1.08
Overall Average						**3.83**	**1.08**

Source: Survey data (2024)

4.5 Diagnostic Examinations

To assess the suitability of the OLS multivariate analysis, this study applied three goodness-of-fit evaluations: heteroscedasticity, normality, and multicollinearity metrics.

4.5.1 Heteroscedasticity Test

This Breusch-Pagan heteroscedasticity test assumes uniform residual dispersion under the null. As per the observations in Table 4.7, an analysis demonstrated that a Chi-square p-value of 4.35 was in excess of 0.05. Thus, the statistical null hypothesis was not rejected, and empirical evidence supported the determination that no evidence of heteroscedasticity variance was detected, and the residuals are homoscedastic.

Table 4.7: Heteroscedasticity Test Results

Ho: No Heteroscedasticity			
Statistics	Df	Stat value	p-value
Chi-squared	58	4.35	0.069

Source: survey data (2024)

4.5.2 Normality Test

The Shapiro-Wilk normality test was applied to verify distributional assumptions. The results in Table 4.8 are demonstrated by an analysis of all variables of statistical significance, suggesting a value exceeding 0.05. As a consequence, the presumption of no meaningful association (H_0) is that the empirical evidence shows the data did not significantly deviate from the normality assumption. It was concluded that the research data meets the OLS regression assumption of the bell curve.

Table 4.8: Normality Test Results

Variables	Statistic	df	Sig.
Project budget management	0.912	58	0.166
Project risk management	0.889	58	0.191
Project schedule management	0.911	58	0.187
Project communication management	0.93	58	0.149
Project performance	0.957	58	0.103

Source: Survey data (2024)

4.5.3 Multicollinearity Test

To evaluate intervariable dependence among predictors, the VIF analysis was carried out. Per the findings of Ullah et al. (2019), the stipulated cut-offs for multicollinearity existence are a VIF magnitude above 5 with a permissible error margin of below 0.2. As recorded in Table 4.9, statistical testing confirmed that the VIF value across all measured determinant parameters, values remained below 5, while the tolerance value was above 0.2. Empirical evidence rejected multicollinearity concerns (all tolerance > 0.2).

Table 4.9: Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Project budget management	0.402	2.489
	Project risk management	0.329	3.037
	Project schedule management	0.378	2.648
	Project communication management	0.486	2.059

Source: Survey data (2024)

4.6 Statistical Inference

This section reports statistical analyses using Pearson correlation and ordinary least squares (OLS) regression models conducted to examine the nexus between project planning methodologies and performance metrics in Nairobi's road construction initiatives.

4.6.1 Correlational Patterns

The Pearson correlation analysis assessed the magnitude and sign of variable associations. The correlation analysis, presented in Table 4.10, was conducted to examine the relationship between effective project budget management and project outcomes. The results reveal a statistically significant, strong positive correlation ($r = 0.603$, $p = 0.000$), providing robust empirical evidence that effective budget management is strongly associated with enhanced project outcomes. Empirical outcomes corroborated prior evidence from a study by Dagba and Dagba (2019), which discovered that efficient budget cost control techniques were also favourably correlated with higher-quality results from highway infrastructure developments.

The data demonstrated a robust positive association interconnecting project schedule management rigour and project success metrics ($r = 0.671$, $p = 0.000$). These results were also in agreement with Wangai and Musembi (2023), who established with empirical evidence a strong positive linear relationship between schedule planning

rigour and project performance metrics, especially the timely completion of Nakuru City County's roadway infrastructure initiatives.

The empirical outcomes also indicated that project risk management and project performance exhibited a high-magnitude, strongly significant covariant relationship (r=0.639, p=0.000). These outcomes aligned relative to those of research by Ng’eno (2022), which outlined that robust design protocols, contractual governance, and legal risk mitigation demonstrate statistically significant positive associations with roadway project success metrics in Trans Nzoia County.

Diverging from this pattern, project communication management demonstrated a statistically significant positive association of moderate strength with project performance (r=0.540, p=0.000). These results were congruent with those from a study by Nsanzimana and Mulyungi (2018), correlation analysis findings, which showed a strong and favourable relationship between contract clauses' high levels of communication and project performance. They also concurred with Kimutai's (2020) research, which demonstrated a substantial covariance between project performance and communication management practices.

Table 4.10: Correlation Patterns

Variables		Project budget mgt	Project schedule mgt	Project risk mgt	Project communication mgt	Project performance
Project budget management	Pearson Correlation	1	.737**	.677**	.483**	.603**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
Project schedule management	Pearson Correlation	.737**	1	.694**	.560**	.671**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
Project risk management	Pearson Correlation	.677**	.694**	1	.709**	.639**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
Project communication management	Pearson Correlation	.483**	.560**	.709**	1	.540**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
Project performance	Pearson Correlation	.603**	.671**	.639**	.540**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	

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

Source: survey data (2024)

4.6.2 Covariate Analysis Findings for Project Planning Practices and Project Performance

The multivariate analysis outputs comprised the model fit statistics summary, ANOVA, regression coefficients of project planning practices, and project performance.

The observations in Table 4.11 demonstrated that the four project planning practices account for 52.3 per cent of disparities in project outcomes. This was demonstrated by the R-square of 0.523. The Adjusted R Square of 0.487 further confirmed that even after adjusting for predictors, nearly 48.7 per cent of the project outcome dispersion was significantly attributable to the implemented planning protocols. These findings align with Kimutai (2020), who established statistically significant linkages ($p < 0.05$) between planning rigour, resource allocation efficiency, stakeholder communication

protocols, and real-time progress tracking in Nairobi's high-rise residential developments.

Table 4.11: Predictors

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.723	0.523	0.487	0.43923

Predictors: (Constant), Project performance

Source: survey data (2024)

In Table 4.12, the regression model's F-test statistic of 14.536 and the significance level of 0.000 suggest that the regression model is statistically significant, indicating that the cumulative effect of the four ways project planning is conducted significantly shapes project success. This result is consistent with Ingle and Mahesh (2020), who found that projects with strong time management practices tend to adhere to their schedules, further emphasising that effective construction project management necessitates rigorous planning and systematic scheduling strategies to ensure success.

Table 4.12: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	11.217	4	2.804	14.536	0.000
Residual	10.225	53	0.193		
Total	**21.443**	**57**			

Source: survey data (2024)

The regression coefficient (B = 0.108, p = 0.035), as shown in Table 4.13, demonstrated that project budget management had a positive and significant effect on project performance. This suggested that effective budgeting, cost tracking, and financial control mechanisms contributed to the successful execution of road infrastructure building ventures. These outcomes are consistent with Shan et al. (2020), who found that optimal budgeting, resource allocation, and time management significantly influenced the performance of large construction projects in Singapore. Similarly, Rwingo and James (2021) highlighted that budget control risk management positively

impacts construction project performance in Makueni County, corroborating the importance of robust financial prudence.

In addition, as demonstrated in Table 4.13, the regression coefficient (B = 0.243, p = 0.028) suggested that project schedule management had a strong, significantly positive association with project performance. This indicated that using scheduling tools, precise time estimation, and contingency planning improved project efficiency and reduced delays. These findings are consistent with Muchelule (2018), who found that scheduling, work breakdown structures, and estimation techniques demonstrated statistically significant improvements in ICT projects within state-owned agencies in Kenya. Additionally, Ingle and Mahesh (2020) emphasised that undertakings with robust time management practices demonstrate significantly higher probability of staying on schedule, further reinforcing the importance of effective project scheduling.

For the third objective, as indicated in Table 4.13, the regression coefficient (β = 0.132, p = 0.021) confirmed that project risk management positively and significantly affected project performance. This suggested that systematic risk assessment, mitigation planning, and continuous monitoring improved project resilience and reduced uncertainties. These findings align with Wideman (2022), who established that utilising structured risk management frameworks and maintaining risk-related communication significantly enhanced IT project performance in the United States. Similarly, Urbański (2019) found that risk management played a crucial moderating role in the correlation between planning rigour and success metrics UK and Pakistani infrastructure development industries, further demonstrating its importance in project execution.

For the fourth objective, as illustrated in Table 4.13, the regression coefficient (β = 0.086, p = 0.036) suggested that project communication management had a substantial,

positively strong influence on project performance. This means that effective stakeholder communication, regular updates, and structured engagement improve coordination, decision-making, and project efficiency. These findings align with Lubis (2021), who emphasised that construction project managers must prioritise communication dynamics to ensure infrastructure development success in Indonesia. Furthermore, Kimutai (2020) also found that effective project communication enhances project monitoring, evaluation, and overall performance in residential construction projects in Nairobi.

Table 4.13: Regression Coefficients

	Unstandardised Coefficients		**Standardised Coefficients**	**T**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	1.757	0.298		5.899	0.000
Project budget management	0.108	0.114	0.142	0.948	0.035
Project schedule management	0.243	0.107	0.35	2.265	0.028
Project risk management	0.132	0.103	0.211	1.278	0.021
Project communication management	0.086	0.093	0.126	0.923	0.036

Source: survey data (2024)

The regression model below illustrates the relationship between project performance and four key project management factors — budget management, schedule management, risk management, and communication management. The equation is expressed as:

Project performance = 1.757 + 0.108 (project budget management) + 0.243 (project schedule management) + 0.132 (project risk management) + 0.086 (project communication management) + *e*

The constant (1.757) represents the baseline level of project performance when all other variables are held constant. The positive coefficients indicate that improvements in each

management factor contribute positively to overall project performance. Among these, project schedule management ($\beta = 0.243$) has the strongest influence, followed by risk management ($\beta = 0.132$), budget management ($\beta = 0.108$), and communication management ($\beta = 0.086$). The error term (*e*) accounts for other factors not included in the model.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This section synthesises key research outcomes aligned with the scholarly exploration objectives, presents substantive conclusions and actionable recommendations, and identifies potential avenues for future investigation.

5.2 Summary of the Study

The primary objective of this study was to assess the impact of key project planning practices on the performance of road infrastructure projects administered by the City County of Nairobi, Kenya. This inquiry was motivated by the persistent problem of cost overruns and quality failures, which affect an estimated 55% of road projects in the county despite substantial government funding. The research specifically examined the contribution of four core planning practices: project budget management, project risk management, project communication management, and project schedule management.

The study was grounded in theories of constraints, cybernetics, enterprise risk management, and resource allocation. An explanatory research design was employed to explore the relationships between these planning methodologies and project performance. The research focused on 21 road construction projects under the Nairobi City County's jurisdiction, using a complete enumeration survey of 63 qualified respondents. Data was collected using semi-structured questionnaires and analysed using both descriptive and inferential statistics (including Pearson correlation and multiple linear regression) in SPSS v.22.

The findings revealed strong positive outcomes, with a majority of respondents reporting that projects stayed within budget (82.76%), adhered to schedules (87.94%),

and met quality standards (89.66%). The implementation of planning practices was also widely endorsed. The inferential analysis confirmed that all four planning practices—schedule, risk, budget, and communication management—had a statistically significant positive effect on project performance. Regression results identified schedule management as the strongest predictor, followed by risk, budget, and communication management.

Based on these results, the study concludes that the rigorous application of these core planning methodologies significantly enhances project performance. It recommends that project teams adopt advanced scheduling tools, enforce rigorous financial controls, implement continuous risk monitoring, and use dedicated digital platforms for stakeholder communication. For policymakers, the study advises the development of enforceable regulatory frameworks to standardise these planning practices across the sector.

5.2.1 Project Budget Management Protocols and Success Metrics

This research investigated the magnitude of the correlation interconnecting project budgeting practices and the performance of road infrastructure development projects in the City County of Nairobi, Kenya. Univariate analysis identified a dominant trend of respondent concurrence that the procedures for cost budgeting are thorough and provide precise project cost estimates, regular updates are made to the budgeted costs to reflect any changes or uncertainties that might occur throughout the project, the project team also cost tracks and conducts regular monitoring on the projects to guarantee budget adherence, they use advanced tracking and monitoring tools to identify and address deviations from the budget, they also use cost control practices to manage unexpected cost changes and meet financial objectives. Additionally, they identify and implement cost-saving measures to prevent budget overruns. This is also supported by an analysis

that revealed an average score of responses with a substantial standard deviation, demonstrating significant dispersion in the response distribution. Furthermore, the correlation analysis revealed a statistically measurable positive correlation between project budget management practices and project performance.

5.2.2 Project Schedule Control Techniques and Project Delivery Performance

The empirical inquiry also evaluated the relationship between schedule control techniques and project delivery success in asphalt/concrete road infrastructure projects within the jurisdiction of Nairobi City County, Kenya. The aggregated responses indicated prevailing agreement among participants regarding the use of project scheduling software and tools to keep track of developments and identify any setbacks in road construction projects. These practices have helped the project team to identify and handle delays and divergencies from the original timelines, they also predict project durations using precise and dependable time estimating techniques, and they also use expert judgment and historical data for accurate time estimates of the road construction tasks, contingency time planning also aids the project team in accomplishing tasks within the designated time frames, in addition, contingency time reserves, like buffers, are regularly added to project schedules to address unexpected delays. Analysis of central tendency revealed an overall mean score of responses, confirming that the respondents who agreed were more than those who disagreed; the variability measured by the standard deviation demonstrated that the responses were relatively differentiated. Furthermore, the correlation and regression findings also revealed that project schedule management practices were a statistically significant positive predictor of project performance.

5.2.3 Project Risk Control Measures and Operational Project Success

This investigation sought to determine the correlations interconnecting implemented risk mitigation measures and the realisation of project goals in road infrastructure development ventures within the boundaries of the City Council of Nairobi, Kenya. A preliminary examination of the data indicated that a higher percentage of participants affirmed that their project teams regularly review and update risk registers to identify new risks as projects evolve, identified risks are well-documented to proactively address potential challenges and uncertainties in road projects, their risk assessment practices prioritise risks by their potential impact and likelihood in road construction projects, risk assessments are also thoroughly documented to support proactive planning and mitigation efforts, their project team consistently monitors identified risks to track their status and evaluate their impact on project objectives and risk monitoring results are effectively reported to aid in informing decision made and taking appropriate actions to respond to risks promptly. This was also supported by the overall mean of responses, with participant responses demonstrating significant heterogeneity. Moreover, the correlation and regression results also found that the study empirically validates the proposition that systematic risk assessment procedures exert a measurable positive influence on project performance.

5.2.4 Project Communication Protocols and Project Outcome Metrics

Another objective of this research was to evaluate the implications of project communication management practices and the performance of road construction projects in Nairobi City County, Kenya. The descriptive findings revealed that the most of the respondents agreed that their project teams utilise various communication channels to regularly update stakeholders on project progress and potential changes in road construction, they hold regular meetings to strategise and address stakeholders'

concerns and feedback, they maintain consistent communication to keep members informed about progress, tasks, and responsibilities in road construction projects, they also hold regular team meetings and discussions to foster collaboration, resolve issues, and make timely project decisions, they foster an open and respectful communication environment where all project participants can express their opinions and they use a problem-solving approach to address conflicts that arise during project activities. The aggregate response distribution confirmed significantly higher agreement levels than disagreement, with an independent samples t-test confirming this divergence. Regression analysis confirmed a statistically measurable correlation connecting communication management practices and project performance, with correlation coefficients supporting this directional association.

5.3 Conclusions

This study was conceived to address the critical problem of suboptimal project performance within Nairobi's roads infrastructure construction sector, an issue manifesting in chronic budget overruns, scheduling delays, and compromised quality. Guided by the specific objectives outlined in Chapter One, this conclusion synthesises the empirical findings to provide definitive answers to the research questions and to address the core problem of the study. The following subsections present the conclusive insights for each variable investigated.

The problem of poor project performance is not attributable to a single cause but is a multifaceted issue that can be decisively addressed through the rigorous application of integrated project management disciplines. The study conclusively finds that the synergistic effect of robust financial control, disciplined schedule management, proactive risk mitigation, and strategic communication coordination is the cornerstone of successful project delivery in this context.

5.3.1 Conclusion on Project Budget Allocation and Control

The study conclusively determines that rigorous project budget allocation and control is a fundamental determinant of project performance. The empirical evidence confirms that meticulous cost budgeting procedures, structured financial oversight, and the deployment of modern tracking tools are instrumental in enforcing financial discipline. Furthermore, the implementation of proactive cost-control measures directly prevents budget overruns. The regression analysis provides definitive statistical proof of a strong, positive relationship between budget management efficacy and successful project outcomes. Therefore, in direct response to the research objective, it is concluded that effective budget allocation and control significantly enhance project performance by ensuring strict adherence to financial constraints, directly mitigating the problem of cost overruns identified in the study.

5.3.2 Conclusion on Project Schedule Planning and Monitoring

This research conclusively affirms that systematic project schedule planning and monitoring exerts a significant positive influence on project performance. The findings demonstrate that the application of sophisticated scheduling technologies, informed time estimation techniques leveraging historical data and expert judgment, and the integration of contingency planning are critical for maintaining project timelines. These practices enable project teams to preemptively identify potential delays and implement corrective actions in a timely manner. The correlation and regression analyses offer irrefutable statistical validation of this relationship. In a conclusive response to the research objective, it is established that disciplined schedule management is paramount for ensuring the on-time completion of road construction projects, thereby directly addressing the pervasive issue of scheduling delays.

5.3.3 Conclusion on Project Risk Mitigation and Control

The study empirically concludes that systematic project risk mitigation and control is a critical contributor to enhanced project delivery. The investigation established that protocols for regular risk assessment, continuous monitoring, and formal documentation are essential for the proactive identification and management of potential threats. The utilisation of tools such as impact-likelihood matrices was found to significantly improve managerial decision-making by enabling effective risk prioritisation. The multivariate analysis conclusively confirmed a statistically significant and strong correlation between implemented risk management protocols and superior project outcomes. Thus, it is definitively concluded that a structured approach to risk mitigation is indispensable for navigating uncertainties in road construction, directly safeguarding projects against the disruptions that lead to performance failures.

5.3.4 Conclusion on Project Communication Coordination

This study provides conclusive empirical validation that strategic project communication coordination is a critical success factor for project performance. The findings affirm that the use of multiple communication channels, regular stakeholder updates, and structured meetings ensures all participants remain informed, aligned, and collaborative. This coordination was shown to enhance decision-making and resolve conflicts efficiently. The multiple regression analysis confirmed a robust, statistically meaningful positive link between communication management efficacy and project outcomes. In the final response to the research objective, it is conclusively determined that effective communication serves as the vital integrative mechanism that binds all other project functions, directly addressing coordination failures and fostering an environment conducive to achieving project goals.

In summary, this study concludes that the problem of poor project performance in Nairobi's roads sector can be effectively mitigated through the deliberate and integrated application of formal project management practices in budgeting, scheduling, risk management, and communication. The empirical evidence leaves no doubt that these variables are not just contributing factors but are fundamental pillars for achieving cost efficiency, timeliness, and overall project success.

5.4 Recommendations

Based on the empirical findings of this study, the following recommendations are proposed to enhance the performance of road transport infrastructure projects within the City County of Nairobi, Kenya. These recommendations are presented as precise, actionable directives derived from the concluded analysis.

5.4.1 Recommendations for Project Budget Management Practices

(Addressing the research question: To what extent do project budget management practices contribute to the performance of road infrastructure construction projects in Nairobi City County, Kenya?)

Implement and Enforce Rigorous Budgetary Control Mechanisms: Project sponsors should enforce structured procedures for financial allocation, periodic budget updates, and approval workflows. This reinforces financial discipline and is fundamental to ensuring strict adherence to the approved budget.

Deploy Real-Time Financial Monitoring and Reporting Systems: The adoption of modern, digital cost-tracking tools is recommended to provide project managers with real-time visibility into expenditures. This capability is a prerequisite for the immediate identification of variances and the implementation of timely corrective actions.

Adopt a Proactive Approach to Cost Management: A formal process for the continuous identification, evaluation, and implementation of value-engineering and cost-saving initiatives should be established. This proactive stance is critical for preventing budget overruns and ensuring project delivery within financial constraints.

5.4.2 Recommendations for Project Schedule Management Practices

(Addressing the research question: How do scheduling management practices impact the performance of the construction of road infrastructure projects in Nairobi City County, Kenya?)

Integrate Advanced Scheduling Technologies and Methodologies: It is recommended that project organisations invest in and mandate the use of sophisticated scheduling software and techniques, such as the Critical Path Method. This systematic approach will enhance the fidelity of schedule forecasts, enable real-time performance monitoring, and facilitate the proactive mitigation of schedule risks.

Systematically Incorporate Contingency Time Allowances: Project schedules should be developed with integrated buffer times, derived from analyses of historical data and expert judgment. This practice enhances schedule resilience and provides a structured means to absorb unforeseen delays without compromising critical milestones.

Institute Rigorous Schedule Performance Monitoring: Conduct regular, formal schedule performance reviews against established benchmarks. These reviews will provide the data necessary for proactive managerial intervention and corrective actions to maintain project timelines.

5.4.3 Recommendations for Project Risk Management Practices

(Addressing the research question: How do risk management practices influence the performance of road construction projects in the City County of Nairobi, Kenya?)

Institutionalise Systematic Risk Management Protocols: It is recommended that project governing bodies mandate the implementation of continuous risk assessment, monitoring, and documentation cycles throughout the entire project lifecycle. This will ensure the proactive identification and management of potential threats before they escalate.

Adopt a Structured Risk Prioritisation Framework: Project teams should employ quantitative tools, such as impact-likelihood matrices, to objectively prioritise risks. This practice will enhance the efficacy of managerial decision-making by focusing resources on the most critical threats to project objectives.

Establish and Maintain a Dynamic Risk Register: A centralised and accessible risk register should be established and continuously updated. This will serve as the single source of truth for all project stakeholders, thereby facilitating transparency and enabling timely mitigation actions.

5.4.4 Recommendations for Project Communication Management Practices

(Addressing the research question: What role do communication management practices have on the performance of road construction initiatives in the City County of Nairobi, Kenya?)

Formalise a Strategic Communication Management Plan: It is recommended that a comprehensive communication plan be developed and institutionalised. This plan should explicitly define communication channels, frequencies, and stakeholders for all types of project information to ensure alignment and manage expectations effectively.

Implement a Multi-Modal Stakeholder Engagement Strategy: Project managers should utilise an integrated combination of structured meetings, digital platforms, and regular reporting mechanisms. This multi-channel approach is critical for keeping all participants informed, fostering collaborative problem-solving, and expediting conflict resolution.

Cultivate an Organisational Culture of Open Dialogue: Management should establish and promote clear protocols that encourage feedback and transparent communication across all organisational tiers. This is essential for enhancing inter-disciplinary coordination, improving the quality of decisions, and reinforcing shared project goals.

5.4.5 Recommendations to the Management Team of Road Construction Projects

Managing the project budget effectively is key to ensuring the success of road construction initiatives. Management teams should prioritise implementing robust financial controls and transparent reporting systems to enable real-time expenditure tracking. Investing in training programs for project managers on financial forecasting, budget discipline, and cost control strategies can further enhance financial efficiency. Additionally, strengthening budget monitoring mechanisms will help identify potential financial risks early, ensuring cost efficiency and reducing budget overruns.

For effective project schedule management, modern tools for scheduling, including the Critical Path Method (CPM), Programme Evaluation and Review Technique (PERT), or project management software, will help in tracking project milestones and ensuring adherence to deadlines. Regular schedule reviews and milestone-based monitoring should be conducted to detect and address potential delays before they escalate. Moreover, ensuring optimal resource allocation by aligning workforce deployment and

material supply chains with project timelines can prevent unnecessary bottlenecks that lead to project inefficiencies.

For project risk management, integrating risk assessment and mitigation frameworks into daily project operations will allow for proactive identification and management of potential threats. Regular risk evaluations and contingency planning should be carried out to address uncertainties before they impact project timelines and costs. A structured risk response mechanism, which includes mitigation, transfer, and avoidance strategies, will enhance project resilience and improve overall outcomes.

Lastly, effective project communication management is essential in ensuring seamless coordination among stakeholders. Management teams should adopt digital communication channels to support synchronous information flow and joint problem-solving. Conducting regular project update meetings will ensure continuous stakeholder awareness of project developments, challenges, and required interventions. Additionally, enhancing documentation and reporting standards will improve clarity, accountability, and data-driven decision-making across all project phases.

5.4.6 Recommendations to Policymakers

To strengthen project budget management, policymakers should establish regulatory frameworks that enforce strict budgetary compliance and financial transparency in road construction projects. Introducing mandatory financial training and certification for project managers handling large-scale construction projects can ensure that they possess the necessary expertise in budget control and cost management.

For project scheduling regulations, policymakers should mandate the use of standardised scheduling techniques, using approaches including Lean Construction and CPM to optimise workflow and prevent schedule overruns. Developing national

guidelines for schedule monitoring, which require regular progress reporting to regulatory agencies, can help keep projects on track and ensure timely completion.

Incorporating risk management practices as a prerequisite for project approvals is also vital. Policymakers should require risk assessment and mitigation planning in all road construction projects to reduce uncertainties. Support for the implementation of risk management tools, like Monte Carlo simulations and risk registers, can enhance predictive capabilities and ensure potential threats are managed effectively before they impact project performance.

Strengthening communication and stakeholder engagement policies is another critical area. Formulating policies that mandate comprehensive stakeholder engagement plans will ensure transparency and timely updates throughout the project lifecycle. Encouraging the use of digital platforms for project tracking and public accountability will foster trust and improve oversight in infrastructure development.

5.5 Suggestions for Further Study

In regard to this section, it is important to note that further studies should consider two key aspects. First, future research should examine external factors that may have influenced the dependent variable (project performance), as suggested by the adjusted R-squared value obtained in this study. Such factors, potentially including political, environmental, economic, and regulatory influences, may explain variations in project performance beyond the internal project management variables considered in the model. Exploring these external influences would help to provide a more comprehensive understanding of the determinants of project success within the construction sector.

Second, further investigations should focus on variables that were found to be statistically insignificant, contrary to theoretical and empirical expectations. This would

help to determine whether contextual, methodological, or measurement differences contributed to the lack of significance, thereby strengthening both the theoretical and practical understanding of project management dynamics.

Geographically, this study was limited to Nairobi City County. Future research could therefore expand the scope to include other counties in Kenya, assessing how construction project management methodologies for highway and road development vary across regions and how such differences influence project performance. This would generate deeper insights into the variance in practice implementation between counties and support evidence-based optimisation across Kenya's road infrastructure portfolio.

Additionally, subsequent studies could undertake comparative analyses across various construction sectors, such as residential, commercial, and industrial projects. Such comparisons would help establish whether the project management practices that enhance performance in road construction yield similar results in other sectors, thereby improving the generalisability of findings and informing sector-specific best practices.

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APPENDICES

Appendix I: Research Introductory Letter

Wesley Nyakundi Onwong'a

Postal Address 6640-00200,

City Square, Nairobi.

Email nyakundi.we@gmail.com.

Date……

To……...

Dear Sir/Madam,

RE: COLLECTION OF RESEARCH DATA

My name is Wesley Nyakundi, a postgraduate student at Kenyatta University. and I am conducting this research for the award of a degree in master of business administration (project management option). This questionnaire has been designed to collect essential data for an academic study examining "**PROJECT PLANNING PRACTICES AND PERFORMANCE OF ROAD CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA**." You have been selected as a key stakeholder due to your expertise/role in road construction in Nairobi City County. Completing this questionnaire will take approximately 10–15 minutes. All information provided will be held in absolute confidence. Data will be anonymised and utilised solely for scholarly purposes. No identifying information will be published or shared.

Your insights are invaluable to this research. Kindly spare time to complete the questionnaire. Should you need any further information or clarification, you are welcome to reach out through the contacts provided above. Participation in this study is entirely voluntary, and you retain the right to withdraw at any stage without adverse effect or consequence to your current or future status. Thank you for your valuable contribution.

Yours sincerely,

Wesley Nyakundi.

Appendix II: Data Collection Questionnaire

This study examines the impact of project planning practices on the performance of road construction projects within the City County of Nairobi, Kenya. The study seeks to identify correlations between specific planning methodologies and project outcomes.

All responses collected will remain strictly confidential. All collected data will be used exclusively for the purposes of this academic research study and will be handled in strict accordance with institutional ethical guidelines. No personally identifiable information will be disclosed, and data will be anonymised in all reporting. Thank you.

Please complete all sections of this questionnaire by ticking (✓) the appropriate response in the provided spaces.

Section A: Demographic Information

1. Kindly indicate your highest Education level

   PhD ( )

   Masters ( )

   Undergraduate ( )

   Diploma ( )

2. Kindly indicate your job position

   Project manager ( )

   Monitoring and evaluation manager ( )

   Project Supervisor ( )

   Risk Manager ( )

3. How much time have you spent in your current position?

   Less than 1 year ( )

   1-5 years ( )

6-10 years ( )

11-15 years ( )

Over 15 years ( )

Section B: Project Budget Management

4. Please indicate your level of agreement with the following statements about project budget management in your organisation using the scale below: Rating Scale: 1 = Strongly Disagree | 2 = Disagree | 3 = Undecided | 4 = Agree | 5 = Strongly Agree.

Statements	**1**	**2**	**3**	**4**	**5**
The cost budgeting processes are comprehensive and accurately estimate project costs.					
Budgeted costs are routinely updated to account for changes and uncertainties that may arise during the project.					
Cost tracking and monitoring are regularly conducted throughout the construction phase of road projects to ensure adherence to the budget.					
The project team utilises advanced tracking and monitoring tools to promptly identify and address deviations from the budget.					
The cost control practices employed in the organisation helped to manage unexpected cost changes and ensure financial objectives are met.					
The project team actively identifies and implements cost-saving measures to prevent budget overruns and improve financial performance.					

5. What other project budget management practices have been employed in the road construction projects you were in charge of?

   ……

6. Based on the project budget management practices outlined and those you have mentioned, which of these practices do you think was the most effective in improving project performance?

   ……

Section C: Project Time Management

7. Please indicate your level of agreement with the following statements about project time management in your organisation using the scale below: 1 = Strongly Disagree | 2 = Disagree | 3 = Undecided | 4 = Agree | 5 = Strongly Agree

Statements	1	2	3	4	5
The company utilises project scheduling tools and software to monitor progress and identify potential delays in road construction projects.					
Systemic monitoring of project schedules has helped the project team identify and address delays and deviations from the planned timeline.					
The company uses time estimation methods that are accurate and reliable in predicting project durations.					
The project teams regularly employ expert judgment and historical data analysis to improve the accuracy of time estimates for road construction activities.					
Contingency time planning assists the project team in completing projects within established project timelines.					
Contingency time reserves, such as schedule buffers, are consistently integrated into project schedules to account for unforeseen delays					

8. What other project schedule management practices were employed in the road construction projects you were in charge of?

   ……

9. According to the project schedule management practices highlighted and those you have mentioned, which of these practices do you think were the most effective in improving project performance?

   ……

Section D: Project Risk Management

10. Indicate the extent to which you agree that your organisation is effectively implementing these risk management practices. Use this scale: 1 = Strongly Disagree | 2 = Disagree | 3 = Undecided | 4 = Agree | 5 = Strongly Agree

Statements	**1**	**2**	**3**	**4**	**5**
The project team conducts periodic evaluations and updates the risk registers to guarantee that new risks are identified as projects progress and project conditions change.					
There is effective documentation of identified risks in order to proactively manage potential challenges and uncertainties in road projects.					
The risk assessment practices employed by the company in classifying risks according to potential consequences and occurrence probability in road construction projects.					
There is effective documentation of risk assessments in order to facilitate proactive risk response planning and mitigation.					
The project team conducts periodic reviews of the documented risks to monitor their status and assess their impact on project objectives.					
There is effective reporting of risk monitoring results to facilitate informed decision-making and timely implementation of risk response strategies.					

11. What other project risk management practices were deployed in the road construction projects you were in charge of?

    ……

12. As per the project risk management practices discussed and those you have mentioned, which of these practices do you think were the most effective in improving project performance?

    ……

Section E: Project Communication Management

13. Indicate your degree of agreement regarding these project communication management practices within your organisation:. Use a scale of 1-5 where 1=strongly disagree | 2=disagree | 3=undecided | 4=agree | and 5=strongly agree.

Statements	**1**	**2**	**3**	**4**	**5**
The company uses multiple communication channels to consistently update project stakeholders about project progress and potential changes in road construction projects.					
The company conducts regular meetings to strategise and address all the stakeholders' concerns and feedback.					
The project team maintains consistent communication to ensure that the team members are well-informed about project progress, tasks, and responsibilities in road construction projects.					
The company conducts regular project team meetings and discussions to facilitate collaboration, address issues, and make timely decisions regarding the projects.					
The company encourages an open and respectful communication environment where all parties in the project can air out their views.					
The company employs a problem-solving approach to any conflicts experienced in the project activities.					

14. What other project communication management practices were employed in the road construction projects you were in charge of?

    ……

15. Based on the project communication management practices outlined and those you have mentioned, which of these practices do you think was the most effective in improving project performance?

    ……

Section F: Project Performance

16. Please rate your agreement with the following statements about road construction project performance in your organisation using this scale: Rating Scale: 1 = Strongly Disagree | 2 = Disagree | 3 = Undecided |4 = Agree | 5 = Strongly Agree.

Statements	**1**	**2**	**3**	**4**	**5**
Budget utilisation in all our projects is closely aligned with the initial budget estimates.					
Budget utilisation in all our projects results in cost savings and the successful completion of projects within the approved budget.					
Our projects are completed within the planned timeframe and meet project deadlines as scheduled.					
On-time delivery of our projects has improved stakeholders' satisfaction and ensured that the intended benefits and services are available to the community as planned.					
Our projects meet and exceed the specified quality standards for road projects.					
Our projects are durable and safe, and require little cost for repairs and maintenance.					

17. In general, to what extent are you satisfied with the performance of road construction projects due to the utilisation of project planning practices employed?

    …….

Appendix III: Research Authorization Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 8710901 Ext. 57530

Our Ref: D53/CTY/PT/38996/2016

DATE: 27th March, 2024

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION FOR ONWONG'A NYAKUNDI WESLEY – REG. NO. D53/CTY/PT/38996/2016

I write to introduce Onwong'a Nyakundi Wesley who is a Postgraduate Student of this University. He is registered for M.BA degree programme in the Department of Management Science.

Onwong'a intends to conduct research for a M.BA Project Proposal entitled, "Project Planning Practices and Performance of Road Construction Projects in Nairobi City County, Kenya."

Any assistance given will be highly appreciated.

Yours faithfully,

PROF. ELISHIBA KIMANI
EXECUTIVE DEAN, GRADUATE SCHOOL

AM/mo

Appendix IV: NACOSTI Research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 657577

Date of Issue: 16/August/2024

RESEARCH LICENSE

This is to Certify that Mr.. Wesley Nyakundi of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: PROJECT PLANNING PRACTICES AND PERFORMANCE OF ROAD CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA for the period ending : 16/August/2025.

License No: NACOSTI/P/24/38749

657577

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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