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

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ABSTRACT

The persistent underperformance of public road infrastructure projects, characterised by significant cost overruns and failure to meet quality standards, represents a critical development challenge in Nairobi City County, Kenya, despite substantial government investment. This study empirically investigated the impact of specific project planning practices—namely, budget, schedule, risk, and communication management—on the performance of road construction projects. Grounded in a theoretical framework integrating the Theory of Constraints, Cybernetics, Enterprise Risk Management, and Resource Allocation Theory, the research employed an explanatory design. A census of 63 project professionals (managers, engineers, and quantity surveyors) involved in 21 road projects was conducted using validated, semi-structured questionnaires. Data analysis via SPSS v.22 incorporated both descriptive and inferential statistics, including multiple linear regression. The findings revealed strong positive outcomes, with 82.76% of respondents reporting projects completed within budget, 87.94% confirming schedule adherence, and 89.66% affirming achieved quality standards. The regression model was statistically significant ($p < .001$), explaining 68.7% of the variance in project performance, and identified all four planning practices as significant positive predictors. Schedule management emerged as the strongest predictor ($\beta = 0.350$, $p = 0.028$), followed by risk management ($\beta = 0.211$, $p = 0.021$), budget management ($\beta = 0.142$, $p = 0.035$), and communication management ($\beta = 0.126$, $p = 0.036$). The study concludes that the rigorous application of these core planning practices is fundamental to successful project outcomes. It provides actionable recommendations for project teams to adopt advanced planning tools and enforce rigorous controls, and urges county policymakers to develop standardised regulatory frameworks to institutionalise these practices, thereby ensuring the efficient and effective utilisation of public resources in the infrastructure sector.

Keywords: Project Planning, Budget Management, Risk Management, Schedule Management, Communication Management, Road Construction, Project Performance, Nairobi County.

INTRODUCTION

Background of the Study

Nairobi City County has experienced rapid urbanisation, resulting in increased pressure on its road infrastructure network. Despite consistent government allocation of funds through the Kenya Roads Board and county budgets, numerous road projects face challenges in meeting their objectives. The County Integrated Development Plan (CIDP) 2018-2022 highlighted the need for improved project management practices to ensure efficient utilisation of public funds.

This study emerges against this backdrop, seeking to provide empirical evidence on how specific planning practices can address the persistent performance gaps in road construction projects within the county.

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 (Karanja & Ruguru, 2023; Odeck, 2018). This persistent underperformance undermines public investment, disrupts economic activities, and diminishes the quality of life for residents. The execution of public infrastructure projects, particularly roads, is a complex undertaking fraught with uncertainties, and their success is critically dependent on the efficacy of preliminary planning stages (Dvir et al., 2003; Phullsunder, 2019).

This study examined the relationship between project planning practices and the performance of road construction projects in Nairobi City County. The analysis was structured around the theory of constraints (Goldratt & Cox, 1986), the cybernetics theory (Krivý, 2018), the enterprise risk management theory (Jankensgård, 2019), and the resource allocation theory (Bower, 2017). By focusing on the core planning domains of budget, risk, communication, and schedule management, this research provides a granular understanding of their specific contributions to project performance, offering actionable insights for practitioners and policymakers.

LITERATURE REVIEW

Theoretical Framework

The theoretical foundation of this study integrates four key theories. The Theory of Constraints (Goldratt & Cox, 1986) posits that any manageable system is limited by a small number of constraints, and project performance is dictated by how well these constraints are identified and managed during planning. Cybernetics Theory (Krivý, 2018), with its focus on communication and control in systems, underpins the importance of feedback loops and information management in project execution. The Enterprise Risk Management Theory (Jankensgård, 2019) provides a structured framework for identifying, assessing, and mitigating risks that could derail project objectives. Finally, the Resource Allocation Theory (Bower, 2017) explains how the effective planning and deployment of financial resources directly influence a project's ability to stay within budget and achieve its goals.

Project Planning and Performance

Existing literature consistently affirms a strong correlation between robust project planning practices and successful outcomes. Seminal work by Dvir et al. (2003) established an empirical link between project planning and success, a relationship further corroborated by recent reviews (Phullsunder, 2019). Studies in construction management have identified inadequate risk assessment, poor communication channels, unrealistic scheduling, and weak budgetary controls as primary contributors to project failures (Flyvbjerg et al., 2017; Olawale & Sun, 2017). Specifically, in the context of road projects, cost overruns are a well-documented global

phenomenon (Odeck, 2018). Research within Kenya highlights similar challenges, with project performance often hindered by inadequate planning practices (Karanja & Ruguru, 2023; Matu et al., 2020). However, there is a scarcity of empirical research that quantitatively examines the collective and individual impact of these four specific planning practices within the context of county-level road projects in Kenya.

RESEARCH METHODOLOGY

Research Design

An explanatory research framework was implemented to explore directional relationships between planning practices and performance outcomes. This design is appropriate for identifying the extent and nature of cause-and-effect relationships between the independent variables (planning practices) and the dependent variable (project performance).

Population and Sampling

The sampling technique used was a Non-Probability, Purposive Sampling technique, specifically a combination of Judgmental and Criterion-Based sampling. This investigation identified 21 ongoing and recently completed road construction projects within Nairobi City County's jurisdiction as the finite population for this investigation. From these projects, the research utilised complete enumeration, securing participation from the entire population of 63 qualified respondents, comprising project managers, engineers, and quantity surveyors directly involved in the projects.

Data Collection

Semi-structured questionnaires served as the principal research tool, enabling comprehensive data acquisition from the entire sample population. The questionnaire was divided into sections capturing demographic data, the extent of implementation of the four planning practices (on a Likert scale), and the perceived performance of the projects. 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.

Data Analysis

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.

Validity and Reliability

To ensure the robustness of the research instruments, both validity and reliability tests were conducted following the pilot study. Content validity was established by having the questionnaire reviewed by a panel of three experts in project management and construction engineering. Their feedback was used to refine the questions for clarity and relevance. Reliability was assessed using Cronbach's Alpha, a measure of internal consistency. The results, as shown in Table 1, indicate that all constructs had alpha values well above the

accepted threshold of 0.7, confirming the questionnaire's high reliability (Mohajan, 2017; Cohen et al., 2017). The scale demonstrated "Good" to "Excellent" reliability across all variables.

Table 1: Reliability Statistics (Cronbach's Alpha)

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)

Ethical Considerations

The study adhered to strict ethical standards throughout the research process. Informed consent was obtained from all participants after explaining the research purpose and their rights. Confidentiality was maintained by anonymising participant identities and using codes for data analysis. The research protocol received approval from the Kenyatta University and the National Commission for Science, Technology and Innovation, NACOSTI (Licence No. NACOSTI/P/24/38749) before data collection commenced.

Analysis Result

Descriptive Statistics

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 (on a 5-point scale), demonstrating successful implementation across all domains, though standard deviations of 1.08 to 1.25 indicated some variation in participant perspectives.

Correlation Analysis Results

A Pearson correlation analysis was conducted to examine the relationships between the project planning practices and project performance. The results, presented in Table 2, reveal significant positive relationships between all variables at the 0.01 level (2-tailed). All four planning practices show strong and significant correlations with project performance, with coefficients

ranging from 0.540 to 0.671. Furthermore, the intercorrelations among the independent variables, while significant, were not high enough to indicate multicollinearity concerns, which was later confirmed by the VIF scores in the regression diagnostics. These strong and significant correlations provided a solid foundation for proceeding with the multiple regression analysis.

Table 2: Correlation Matrix for Planning Practices and Project Performance

Variables	Project Budget Management	Project Schedule Management	Project Risk Management	Project Communication Management	Project Performance
Project Budget Management	1	.737**	.677**	.483**	.603**
Project Schedule Management	.737**	1	.694**	.560**	.671**
Project Risk Management	.677**	.694**	1	.709**	.639**
Project Communication Management	.483**	.560**	.709**	1	.540**
Project Performance	.603**	.671**	.639**	.540**	1

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

Source: survey data (2024)

Regression Analysis

A multiple linear regression was performed to predict project performance based on the four planning practices. The regression model was statistically significant, $F(4, 58) = 22.45$, $p < .001$, and explained 68.7% of the variance in project performance (Adjusted $R^2 = .687$). The coefficients, detailing the unique contribution of each predictor, are presented in Table 3.

Table 3: Regression Coefficients for Planning Practices on Project Performance

	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)

Diagnostic Tests

Prior to the regression analysis, diagnostic tests were conducted to ensure that the assumptions of multiple linear regression were not violated. The Durbin-Watson statistic value of 1.892 indicated that the residuals were independent, showing no significant autocorrelation. A test for multicollinearity using the Variance Inflation Factor (VIF) showed that all VIF values were below 3, which is well within the acceptable limit of 10 (Oke et al., 2019; Shrestha, 2020), confirming that multicollinearity was not a concern among the independent variables. Furthermore, a visual inspection of the P-P plot suggested that the residuals were approximately normally distributed.

Discussion

Derived from the empirical analysis of road construction projects in Nairobi City County, this study confirms that all four core planning practices—schedule, risk, budget, and communication management—have a statistically significant positive effect on project performance ($p < 0.05$). This finding aligns with global literature on the importance of project planning (Dvir et al., 2003; Phullsunder, 2019) and addresses the specific problem of cost overruns and poor performance in Kenyan road projects (Karanja & Ruguru, 2023; Odeck, 2018). The regression model explains a substantial portion of the variance in performance, highlighting the collective power of these planning practices.

As shown in Table 3, project schedule management emerged as the most influential predictor (Beta = 0.350, p = 0.028), underscoring the paramount importance of realistic timeline estimation and rigorous time control in road construction, a finding consistent with Olawale and Sun (2017). This was closely followed by project risk management (Beta = 0.211, p = 0.021), indicating that proactive identification and mitigation of risks are crucial for success, which supports the principles of Enterprise Risk Management (Jankensgård, 2019) and empirical findings by Carvalho and Junior (2019). Both project budget management (Beta = 0.142, p = 0.035) and project communication management (Beta = 0.126, p = 0.036) also demonstrated significant, though slightly lesser, individual impacts. This confirms that financial discipline, guided by Resource Allocation Theory (Bower, 2017), and clear,

consistent stakeholder communication (Lubis, 2021; Matu et al., 2020) are indispensable components of effective project planning.

Conclusion

This research provides empirical evidence that the rigorous application of project budget, risk, communication, and schedule management practices significantly enhances the performance of road infrastructure projects in Nairobi City County. The findings demonstrate that when these planning practices are systematically implemented, projects are more likely to be completed on time, within budget, and to the required quality standards.

To optimise outcomes, the study recommends that project teams adopt advanced scheduling tools (for example, Critical Path Method software), enforce rigorous financial controls and real-time tracking, implement continuous risk monitoring and updating of risk registers, and use dedicated digital platforms for stakeholder communication. It further advises policymakers to develop enforceable regulatory frameworks that standardise these planning practices across all county-funded infrastructure projects. This research provides actionable guidance for project teams, practical insights for clients, and a foundation for future academic work.

Recommendations for Further Research

Based on the findings and limitations of this study, several avenues for future research are proposed. Firstly, a longitudinal study tracking the same projects from inception to completion could provide deeper insights into the causal relationships between planning practices and performance over time. Secondly, this research was quantitative; a complementary qualitative or mixed-methods study could explore the underlying reasons for the variations in participant perspectives and the contextual factors influencing the implementation of these practices. Finally, future studies could investigate the role of moderating variables, such as project size, complexity, or the regulatory environment, on the relationship between project planning and performance.

Practical Implications

The findings of this study offer significant practical implications for various stakeholders:

- **Project Managers:** Should prioritise integrated planning approaches, particularly focusing on schedule and risk management as primary drivers of performance.
- **County Government:** Can use these findings to develop standardised planning templates and checklists for all road projects.
- **Training Institutions:** Should incorporate these evidence-based planning practices into their curriculum for construction professionals.
- **Development Partners:** Can utilise these findings to structure their funding conditions to emphasise proper planning practices.

Policy Recommendations

Based on the research findings, the study proposes the following policy interventions:

- Mandatory risk management plans for all road projects exceeding KES 50 million
- Development of county-specific project planning standards and templates

- Establishment of a project planning compliance unit within the county infrastructure department
- Regular capacity-building programs for county project management staff

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