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Project Quality Planning And Performance Of Road Construction Projects In Mombasa County, Kenya.

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Abstract

Purpose: *This study examined the effect of project quality planning on the performance of road construction projects in Mombasa County, Kenya. The study sought to establish whether project quality planning, involving the systematic definition of project objectives and scope, structured scheduling and resource planning, stakeholder involvement, flexibility and adaptability, and documentation of quality plans and performance benchmarks, significantly influences the performance of road construction projects.*

Methodology: *The study was anchored on Systems Theory and employed an explanatory research design. The target population comprised 354 technical and administrative personnel involved in the management of road construction projects in Mombasa County. Proportionate stratified random sampling and simple random sampling techniques were used to select 268 respondents. Primary data were collected using structured questionnaires based on a five-point Likert scale. A total of 244 questionnaires were returned, representing a response rate of 91.04%, while 235 valid questionnaires were retained for analysis. Data were analyzed using descriptive statistics, Pearson correlation analysis, and hierarchical multiple regression analysis, with project duration and project size treated as control variables.*

Findings: *The findings revealed a strong positive and statistically significant relationship between project quality planning and project performance ($r = .789$, $p < .001$). Hierarchical regression analysis further established that project quality planning significantly and positively influenced project performance ($\beta = .310$, $p < .001$). The explanatory power of the regression model increased from 15.8% in Model 1, comprising project duration and project size, to 67.2% after the inclusion of project quality planning, representing an increase of 51.4 percentage points in explained variance. Project size ($\beta = .147$, $p < .001$) and project duration ($\beta = .125$, $p = .001$) also had significant positive effects on project performance.*

Conclusion: *The study concluded that project quality planning is an important determinant of the performance of road construction projects in Mombasa County. Systematic definition of quality objectives, comprehensive scheduling and resource planning, stakeholder involvement, adaptive planning, and effective documentation of quality requirements can contribute to improved project performance. Strengthening quality planning practices can therefore support better cost efficiency, timely completion, and stakeholder satisfaction in road construction projects.*

Value: *The study contributes to Systems Theory by demonstrating how project quality planning functions as an integrated process through which project objectives, resources, standards, stakeholder requirements, and implementation activities are coordinated to influence project outputs. The findings provide practical insights for*

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government departments, project managers, engineers, contractors, quantity surveyors, and other road construction stakeholders on strengthening quality planning practices to improve project performance in Kenya.

Keywords: *Project Quality Planning; Project Performance; Road Construction Projects; Systems Theory; Cost Efficiency; Timely Completion; Stakeholder Satisfaction; Mombasa County; Kenya.*

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1.INTRODUCTION

An important dimension of economic development, mobility, trade facilitation and regional integration is the construction of infrastructure in the road sector. Road construction project performance has been enhanced by the implementation of advanced project quality management systems, digital monitoring technologies and strict regulatory oversight frameworks in developed economies across the globe (World Bank, 2021; OECD, 2023). Total Quality Management (TQM), quality assurance systems and performance-based contracting are becoming more common in the United States for improving the results of roads projects (AASHTO, 2021; FHWA, 2022). They have helped to boost project delivery rates and reduce maintenance expenses and increase road lifespan (World Bank, 2022; OECD, 2023). The United Kingdom is also known for its strict quality management regulations and requirements for infrastructure projects, which include accountability, risk management, and stakeholder engagement with the project and ongoing quality improvement (HM Treasury, 2022 and UK Highways Authority, 2021). However, budget overruns, environmental issues related to compliance, and the performance of contractors on road construction projects persist (OECD, 2023; World Bank, 2022).

In Europe, European countries have invested significantly in modern project management systems to boost the performance of road construction. In Europe, Germany and France have invested in modern project management systems to enhance road construction performance to a great extent. Quality assurance, standardized project procedures and rigorous technical inspections are strongly promoted in Germany during project implementation, resulting in efficiency, safety and durability (European Commission, 2021; OECD, 2023). France has also integrated quality management strategies which integrate planning, monitoring, auditing and stakeholders' involvement to improve project results. Yet, unforeseen issues can still be found due to regulatory modification, ecological considerations, and procurement considerations (European Commission, 2021; OECD, 2023). The governments are driving large-scale road construction programmes in Asia due to the growing demand for road infrastructure resulting from the rapid urbanization and industrialization of the region (Asian Development Bank, 2023; World Bank, 2022). China has put considerable effort into express highways and transportation corridors, but issues of poor quality of infrastructure, safety, and project management problems have been raised due to its rapid infrastructure development (Asian Development Bank, 2023; World Bank, 2022). India also faces the same issues, such as quality control, procurement inefficiencies, and regulatory compliance, leading to cost overruns and delays in implementation (Asian Development Bank, 2023).

In Latin America, however, countries like Brazil or Mexico keep facing problems in

performance despite the high amount of investment in the road infrastructure sector. In Brazil, infrastructure projects have been hindered by unmet quality monitoring and procurement irregularities, as well as weak governance (World Bank, 2022). Other infrastructure quality issues have also been observed in Mexico due to inadequate project management and enforcement of regulations (Inter-American Development Bank, 2021). These hurdles have helped drive reforms towards systems of quality assurance and evaluation and monitoring of contractors' compliance with regulations (World Bank, 2022). These experiences highlight the fact that it is not only the finance of infrastructure projects that determines successful project delivery; good project management of the quality of infrastructure projects and robust regulatory systems also matter (OECD, 2023).

Road infrastructure continues to be a significant contributor of trade, industrialization and regional integration in Sub-Saharan Africa (African Development Bank, 2022). Despite these efforts, most countries still have a poor track record in the performance of their road construction projects, with some projects delaying their completion, poor workmanship, cost overruns, and early degradation of finished projects (World Bank, 2021; African Development Bank, 2022). Despite the relative advancement of its construction industry, South Africa has construction industry specific project challenges related to procurement inefficiencies, contractor dispute and regulatory complexities (World Bank, 2021). Similarly, Nigeria suffers delays and quality shortcomings associated with poor oversight, corruption and poor quality management (African Development Bank, 2022). The challenges show how vital effective quality planning, supervision, assurance and control are in enhancing the performance and sustainability of road construction projects in the region.

In East Africa, road infrastructure development plays a key role in economic integration and the competitiveness of the region (East African Community, 2022). Some countries, including Tanzania and Uganda, have been making significant investments in road development to enhance connectivity and promote trade (World Bank, 2022). Tanzania on the other hand has had issues with slow procurement process, contractor performance and poor quality, while Uganda has been plagued by frequent escalation of costs and delays in projects, coupled with weak quality assurance systems (World Bank, 2022; East African Community, 2022). The regional experiences reflect the ongoing challenges to creating infrastructure investment results in a timely, cost-effective and quality way. Therefore, the implementation of quality road construction processes is crucial to ensure that projects are built in compliance with the required standards and do not have defects or fail to deliver the desired performance.

Road infrastructure development is a major component of Vision 2030, with significant investments in road infrastructure, including both urban road and rural access roads, aimed at facilitating economic development and mobility in Kenya (Kenya National Highways Authority, 2023; World Bank, 2023). Large scale road projects are ongoing in the country by various agencies such as the Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KeRRA) and Kenya Urban Roads Authority (KURA) (Kenya Rural Roads Authority, 2022; Kenya Urban Roads Authority, 2022). Road construction project performance is still a worry, with frequent instances of cost overruns, delays in project schedules, poor quality work and disputes between contractors and government agencies (KNBS, 2023; Kenya National Highways Authority, 2023). There is evidence that many projects go over budget and suffer from longer than scheduled completion dates, in part due to project monitoring and quality management system weaknesses (Ministry of Transport Kenya, 2022; World Bank, 2023).

These performance problems are especially pertinent at the county level, with Mombasa County representing Kenya's main port of entry by sea. Despite the importance of road infrastructure for trade facilitation and connectivity, delays, cost overruns, quality issues and dissatisfaction of stakeholders are prevailing in road construction projects in Mombasa (Kenya Ports Authority, 2023; World Bank, 2023). Project management quality processes are becoming more and more recognised as crucial factors that influence the performance of infrastructure projects. These include quality planning, quality assurance, quality control, continuous improvement, auditing and compliance monitoring processes throughout the project lifecycle (ISO, 2020; PMI, 2021). These processes can aid in compliance with the standards, reduce defects, reduce rework, and control cost escalation if done properly (World Bank, 2022).

The quality planning of the project is therefore one of the important factors of the performance of road construction project as it can be the basis in setting road construction project quality requirement and procedures during implementation of the project. The processes of quality management are used to ensure that construction activities meet the required standards and any potential quality issues are identified and addressed throughout the life of the project (ISO, 2020; PMI, 2021). Secondly, regulatory compliance is crucial since road development projects need to meet legal, environmental, safety, procurement and construction regulations established by related regulatory bodies, such as the OECD and the World Bank (OECD, 2023; World Bank, 2021). Giving good regulatory compliance leads to better accountability, transparency and project quality, with fewer disputes and fewer project risks (OECD, 2023).

While project quality processes are important in delivering infrastructure projects, there has been little empirical research that focuses on the link between project quality planning and road construction project performance in Mombasa County. Early studies have investigated the practices of project management and the compliance of regulatory framework; however, there is a dearth of empirical evidence on the relationship between PM quality processes and the performance of road construction projects in the context of Mombasa County (World Bank, 2023; KNBS, 2023). This is especially crucial in the context of the strategic importance of the road infrastructure in Mombasa in terms of trade facilitation, transportation and service delivery. Thus, it was essential to study the quality planning and performance of road construction projects in Mombasa County to get empirical evidence of the relationship between the quality oriented project management practices and the performance of road construction projects in Mombasa County.

2. Theoretical review

This study is influenced by the writings of System Theory, which considers the road construction project as a system comprising inputs, processes, outputs, and feedback (von Bertalanffy, 1968; Skyttner, 2005). Project quality planning is considered one of the important processes in this context because it involves coordinating resources, quality requirements, procedures, and stakeholder requirements to achieve expected project results (PMI, 2021). According to System Theory, the successful integration and coordination of project components influence the overall performance of the system (Skyttner, 2005). Therefore, the study uses System Theory to explain how quality planning activities interact with other project elements to affect the performance of road construction projects in Mombasa County. The theory also emphasizes feedback mechanisms that facilitate monitoring, corrective action, adaptation, and continuous improvement throughout the project life cycle (von Bertalanffy, 1968; Skyttner, 2005).

3.Emperical review

The study by Muthoni, Waiganjo and Njeru (2021) "Influence of Project Planning Practices on the Performance of Constituency Development Fund Projects in Kenya" explored the impact of planning activities in the execution of successful projects in Kenya. The study was driven by the growing number of public projects that are delayed, over budget, and of poor quality although they have a high cost. The researchers used descriptive survey research method and the respondents were project managers, project committee members and government officials of the implementation of the projects under the Constituency Development Fund (CDF). The research method used to collect data was structured questionnaires and the analysis method used was descriptive analysis and inferential analysis which included correlation analysis and regression analysis. The study defined project planning as scope planning, resource planning, budget planning, scheduling and risk planning and project performance as time to completion, adherence to budget, achievement of quality and stakeholder satisfaction. The results indicated that the project planning positively influenced the project performance statistically significant. Specifically, projects with clearly defined objectives, a realistic project timetable, a detailed budget, and a comprehensive plan for dealing with risk were more successful in achieving the desired results. The study also concluded that one of the key factors of the delays and cost escalations in public sector projects was lack of planning. Planning was also an effective way to distribute the resources, coordinate activities of all stakeholders, and monitor and control them during the implementation of the project. The authors found that project planning is an important prerequisite for a successful project as it creates a blueprint to follow which ensures the project is executed and evaluated. The study suggested that sufficient time and effort be devoted to project activity planning before project initiation and that the project plans should be continually reviewed during the project life cycle. The results confirm that comprehensive planning has a positive influence on project performance, hence the chance of achieving project objectives is higher because there are lesser uncertainties and better decision-making processes (Muthoni et al., 2021).

Namugongo and Musoke (2022) conducted a study in Uganda titled "Project Planning Practices and Performance of Donor-Funded Community Development Projects in Uganda" to explore the link between project planning activities and project performance in community development projects funded by international donors in Uganda. The study used a cross-sectional survey design using project coordinators, field officers and beneficiary representatives from various donor funded projects in Uganda. The data were gathered through questioning, interview and analyzed through the use of statistical methods such as regression analysis and correlation analysis. The study addressed aspects of project planning including activity scheduling, stakeholder planning, financial planning, communication planning and risk assessment. Project efficiency, effectiveness, beneficiary satisfaction, sustainability and project objectives were used to measure project performance. The results showed that the project planning had a great impact on project performance. The researchers found that projects with detailed work plans, strategies to involve stakeholders and realistic budgets were more successful and sustainable than poorly planned projects. Another finding of the study was that engaging stakeholders in planning increased the sense of ownership of the project and affected the implementation outcomes. In addition, projects that included risk assessment mechanisms in planning had fewer disruptions and better results in performance. The researchers reported that planning assists project teams in identifying possible issues and planning for mitigation in advance of implementation. Communication planning also helped to improve coordination between project

stakeholders, which minimized conflicts and increased accountability. The study found that project planning is a strategic management process that directly contributes to the success of the projects by improving utilization of resources, better involvement of stakeholders and effective project monitoring. The authors suggested that donor agencies or implementing organizations should increase the project managers' capacity to plan more effectively and adopt participatory planning to enhance project results. The study has empirical evidence that shows that project planning plays a significant role in the successful performance of community development projects in developing countries since it ensures that project activities are aligned to the project objectives, project resources and stakeholder expectations (Namusonge & Musoke, 2022).

A study done in Nigeria by Afolabi and Adeyemi (2023) on the topic "Project Planning and Performance of Construction Projects in Nigeria" investigated how planning practices affect the success of construction projects. This study was done in the context of the rising number of construction projects failing due to delays, budget overruns, and quality issues. The study employed an explanatory research approach and data were obtained from project managers, engineers, architects, and contractors in the construction industry across Nigeria in the context of large-scale construction projects. Data were collected by using a structured questionnaire and then tested for the relationship between project planning and project performance by using multiple regression analysis. The study explored project planning by examining the scope definition, scheduling, budgeting, resource planning and risk planning. Project performance was evaluated through project completion time, cost performance, quality standards, clients' satisfaction, and overall project success. The results showed that project planning has a very positive correlation with project performance. The study showed that projects with strict scopes and schedules had less expense and delay. Resource planning was carried out effectively, allowing project managers to manage their resources and equipment, and staff best, thus enhancing productivity and minimizing wastage. Also, risk management planning enabled organizations in identifying and mitigating risks before they impact the project execution. The study also identified planning as effective tool for enhancing communication between project stakeholders which resulted in better coordination and minimized conflicts during implementation. Based on the analysis, the researchers arrived at the conclusion that project planning is a key factor of determining the project performance due to the fact that it gives direction to the project, establishes performance benchmarks and helps to make informed decisions during the project life cycle. The study concluded that the construction companies need to improve their planning processes by using new project management techniques and tools to improve the quality of the projects that are being undertaken. The results show that comprehensive planning plays a significant role in the success of a project by ensuring efficiency, effectiveness and accountability in project implementation (Afolabi & Adeyemi, 2023).

Uwimana and Mugisha (2024) conducted a study titled 'Effect of Project Planning on the Performance of Infrastructure Development Projects in Rwanda' in Rwanda which focused on the impact of planning processes on the performance of infrastructure development projects. The study used a mixed methods research approach, involving both quantitative surveys and qualitative in-depth interviews with project managers, engineers, government and contracting officials from road, water and energy infrastructure projects. The descriptive statistics, regression analysis and thematic content analysis were used for data analysis. The researchers approached project planning from the following dimensions: Scope planning, Schedule planning, Budget planning, Stakeholder planning, Risk planning. Timeliness, cost efficiency, quality

compliance, stakeholder satisfaction and project sustainability were selected as the indicators for project performance. The results showed that project planning influenced the project performance positively, significantly. Infrastructure projects with a comprehensive planning framework prior to implementation were more likely to be finished within budget, on time, and of the necessary quality. The study revealed that budget planning led to increased financial accountability and reduced resource wastage, while schedule planning resulted in better coordination and timely completion of work on the project. Stakeholder planning was also revealed as a positive factor for the acceptance and sustainability of the project, as it involved community needs and expectations in the design and implementation of the project. In addition, risk planning allowed project teams to predict risks and make plans to mitigate risks and minimize disruption to projects. The researchers concluded that the project planning is an essential part of project management as it forms the basis of the successful implementation of the project and its performance. The study suggested that government departments and project sponsors need to establish institutional arrangements for comprehensive planning and ongoing training for project managers about planning methods. The results highlight the significance of project planning as a strategic tool to enhance the performance of infrastructure development projects and subsequently, the long-term socioeconomic benefits are realized (Uwimana & Mugisha, 2024).

H1: project quality planning and performance of road construction projects in Mombasa county, Kenya.

4. Research methodology

The study was of explanatory research design, where the researcher was able to collect quantitative data that could be analyzed to establish the relationship between project quality planning and performance of road construction projects in Mombasa County, Kenya. The unit of observation was technical and administrative staff members who participated in the process of managing road construction projects in the County Government of Mombasa Roads, Transport and Public Works Department and individual staff member as the unit of analysis. Respondents were stratified based on their departmental responsibilities and proportional stratified random sampling method was used to ensure adequate sampling of staff in various job categories of road construction projects.

Sample size and data collection

A total target population of 354 technical and administrative personnel who are working in the management of road construction projects was identified. The population consisted of County Executive Leadership, Senior Management, Engineering Directorate, Works and Supervision Staff, Procurement and Supply Chain Officers, Project Management Staff, Compliance and Regulatory Officers and Technical Support Staff. Stratified random sampling was used in which the respondents were selected from the workers in different departments of the company so that the selected respondents would represent each category. Within each stratum, a proportionate sampling was then conducted and simple random sampling to pick individual respondents. A structured questionnaire with a 5-point Likert scale was used to gather quantitative data from the field focused on measuring the project quality planning and performance of road construction projects. The number of responses was calculated based on Yamane (1967) formula resulting in 268 respondents out of 354 in the target population at 3% margin error. The questionnaire was first tested with 27 respondents in Kwale County which is about 10% of the target population. The pilot study was done to determine the

validity and reliability of the research instrument before the actual data collection. The internal consistency of the tools was evaluated by the Cronbach alpha coefficient which value was accepted as more than 0.70 for reliability.

Measurement of variables

This part discussed the measurement of the study variables, which is project quality planning (independent variable) and performance of road construction projects (dependent variable). Regulatory adherence was included as a moderating variable. The cost efficiency, timely completion, and satisfaction of stakeholders were measured for the project performance, and project quality planning was measured for the independent variable. Definitions and measurements for all the study variables are outlined in Table 1.

Table 1: Measurement of variables,

TYPE OF THE VARIABLE	VARIABLE	INDICATORS OF THE VARIABLE
Project performance	dependent	cost efficiency timely completion satisfaction of stakeholders
project quality planning	Independent	project quality planning
Pjoect size and project duration	Control variables	Duration and size

Data analysis and model specification

Data was analyzed using SPSS Version 25; the study was of a quantitative nature. The collected data were analyzed using descriptive and inferential statistical techniques. Demographic characteristics of the respondents and study variables were summarized using descriptive statistics including frequencies, percentages, means, standard deviations, minimum and maximum values. Then the inferential statistics were used to investigate the relationships among the study variables by using correlation and regression analysis. The regression analysis was also used to test the proposed hypotheses with the given regression equation.

Model 1: Testing the effect of the control variables on performance of road construction projects in Mombasa County, Kenya.

$Y = \beta_0 + C + \varepsilon$

Model 2: Testing the effect of project quality planning on performance of road construction projects in Mombasa County, Kenya.

$Y = \beta_0 + C + \beta_1 X_1 + \varepsilon$ ……1

Where:

Y = Project performance

β_0 = Constant

C = Control variables

β_1 = Regression coefficient of career concern

X_1 = Project quality planning

ε = Error term

5. Findings

A total of 268 questionnaires were given to the selected participants in the road construction projects in Mombasa County, Kenya. Of these questionnaires, 244 were successfully returned (91.04%). After the cleaning of the data and screening for complete, consistent and accurate data, 235 questionnaires were identified for analysis. Therefore, the usable questionnaires were 96.31% of questionnaires returned and 87.69% of questionnaires distributed. Response rate was 91.04%, which was a very

high rate for survey research and indicated a high response rate among the selected respondents. A response rate of more than 70% is considered satisfactory for data analysis and to ensure reliability and validity of the research results (Mugenda & Mugenda, 2019). Thus, the achieved rate of response was found adequate for statistical analysis and for this study, the response was sufficient to examine the moderating effect of regulatory adherence between project quality management and performance of road construction projects in Mombasa County, Kenya.

Table 2: Response Rate

Distributed Questionnaires	Received Questionnaire	Usable Questionnaires	Response Rate
268	244	235	87.69%

Source: Primary Data (2026)

Project characteristics

Descriptive statistics for the 235 valid observations showed that project size (PSS) had a mean of 2.9864 (SD = 0.74821), while project duration (PDD) had a mean of 3.0017 (SD = 0.74742). Item means for both variables clustered around 3.00, indicating moderate project size and duration. Standard deviations ranged from 0.783 to 0.840, suggesting moderate variability. Overall, respondents' assessments were concentrated around the middle categories of the measurement scales.

N/B: project duration (PDD), project size (PSS).

Descriptive statistics for project performance.

Three dimensions – cost efficiency, stakeholder satisfaction and timely completion – have been analyzed with respect to the descriptive statistics of the project performance. Valid sample size (N = 235) was used for the analysis. The project performance statements were rated by the respondents on a five-point Likert scale with the lowest possible rating being 1 and highest possible being 5. Mean scores were used to determine the overall level of agreement among respondents with each of the statements, and the standard deviations were used to show how far the views of the respondents varied from each other. In general, the mean score for each of the project performance indicators ranged between 2.92 and 3.05 with a mean aggregate project performance score of 2.9898 and a standard deviation of 0.72235. This means that the respondents' perception of the project performance was at a moderate level. With regards to CE1, it said: "The project implementation processes were managed to make optimal use of financial resources to avoid unnecessary expenditure and to ensure that the required outputs were realised and that the approved budgetary allocations were adhered to throughout the project lifecycle." The average score on the statement was 2.92 with a standard deviation of 0.813. The mean was moderate, indicating that the respondents were moderately in agreement that the implementation processes of the projects made it possible to use the financial resources effectively. In general, the financial resources were used with some care in order to avoid unnecessary expenses, but the respondents did not consider the costs to be particularly high. The moderate standard deviation of 0.813 indicates that there is some level of variation in responses, which may mean that there was a difference in how respondents were assessing financial resource utilization. For CE2, it said "The project team has always been prudent in maintaining a financial balance, avoiding budget overruns and ensuring that costs are spent in the proper way, with all costs clearly linked to project objectives, without the need to sacrifice the quality of the project." The average was 2.98 with a standard deviation of 0.798. Overall, the mean score (2.99) indicates a moderate

perception of prudent project team financial management. In actual practice, respondents did not seem to be very confident or very displeased that the project could contain costs and budget overruns. The standard deviation suggests that there is moderate dispersion with a fairly similar perception between the respondents, but differences occurred when considering the effectiveness of the financial controls. For CE3, it said that "The project's financial resources were allocated and used efficiently, with resources allocated to priority activities and thereby minimizing wastage, maximizing value for money during the implementation process." This meant had a mean of 2.95 and a standard deviation of 0.818. The finding suggests that the financial allocation and utilization of the project are moderately efficient. Respondents agreed that there is some strategic allocation of financial resources to priority activities; however, the mean score would not suggest it is done very well. The low standard deviation of 0.818 indicates that there was no high variation of perceptions among the respondents. Hence financial resources were perceived as being put to reasonable use but there was scope for value for money and minimisation of wastage. It said for CE4, "The local availability of employment opportunities has increased the economic resilience of this community." The mean was 2.98 with a standard deviation of 0.770. The mean represents a moderate degree of consensus that project-related employment opportunities helped to increase economic resilience. This means that people were aware that employment creation is one of the benefits of project implementation. The relative low standard deviation suggests that answers were relatively clustered around the mean, suggesting that there was relatively consistent perception among the participants. For CE5, it said that, "Availability of affordable credit and financial services has improved entrepreneurship in the community." It had the highest mean score (3.05) of all cost-efficiency indicators and a standard deviation score of 0.810. This means that in this instance, there was a slightly higher level of consensus on the link between the access to financial services and entrepreneurial activities. The findings indicate that respondents were aware of financial accessibility as an important factor influencing the economic and project outcomes. However, the overall mean was only slightly above 3.00, so the overall impression was still moderate and not strongly positive. There is moderate variation in respondents' views as indicated by the Standard Deviation. Stakeholder satisfaction was the second aspect of project performance. It said that for SS1 "The project implementation processes were satisfactory in terms of meeting the needs and expectations of the key stakeholders, which led to a high level of satisfaction with the overall project outcomes and project implementation process." The mean and standard deviation of the item were 2.98 and 0.765, respectively. This suggests a medium level of stakeholder needs and expectations met by the projects. The presence of the finding indicates that the needs of the stakeholders were taken into account during the implementation but not to a great extent to get a high level of agreement. The standard deviation shows a fairly low level of variation among the perceptions of the respondents. In summary, it said that it "effectively communicated with stakeholders, and their concerns, expectations and feedback were timely identified and addressed throughout the project lifecycle, thus maximizing stakeholder satisfaction" in SS2. This statement had a mean of 2.98 and a standard deviation of 0.779. The result reveals that the respondents' perception toward communication between project teams and stakeholders was at a moderate level. It indicates that communication channels were in place and that these channels were being utilized for the purpose of communicating to address stakeholder concerns, but there was scope for further developing communication mechanisms to ensure it is timelier and more comprehensive. It said that for SS3, "Stakeholders were satisfied with the quality and

relevance of project deliverables, while the project outputs generally met the agreed project requirements, standards and expectations." The mean and standard deviation for the item was 3.00 and 0.793 respectively. The mean indicates a moderate satisfaction level toward project deliveries. The stakeholders' needs were generally met with project outputs to a certain extent. But the mean value of 3.00 does not imply a strong endorsement, rather it points to a neutral to moderate stance. Medium differences in perceptions of quality and relevance of project output as indicated by the standard deviation. For SS4 it said, "An effective process of involving stakeholders in key project decisions was observed that strengthened transparency, trust, and stakeholder ownership, and consequently increased stakeholder satisfaction." Its mean was 3.03 with a standard deviation of 0.792. The result shows a moderate level of awareness of stakeholder participation in decision-making for the project. The slightly higher mean indicated that stakeholder engagement was perceived as relatively good compared to some other satisfaction measures. This suggests that stakeholder participation in decision making has helped to promote transparency, trust and ownership of the project activities. It says that in SS5, "The project team addressed stakeholder concerns, complaints and expressed needs effectively, and resolved issues promptly and stakeholders were satisfied with the implementation and outcomes of the project." The average of the item was 2.99 with a standard deviation of 0.779. This result shows that the perceptions of project team responsiveness to stakeholder concerns were at a moderate level. Respondents found the teams were generally considered to be fairly responsive, although there was ample scope for improving processes for responding to complaints and growing stakeholder needs as illustrated by the mean.

Timely Completion. The third dimension was when the thing was "done." For TC1, it said that "Project implementation processes were in tight linkage with the pre-planned schedule, and there were no noticeable delays throughout the project life cycle at key stages." The mean of the statement was 3.01 and the standard deviation was 0.776. The outcome suggests that on the whole, projects were perceived as being performed on schedule. The mean was slightly over 3.00, which indicates a somewhat positive attitude toward adherence to the schedule, but delays could have been experienced in the implementation process. It said the project team had been very efficient in managing time related constraints, such as making prompt decision, addressing issues timely etc., which helped in timely completion of the project activities for TC2. The mean was 3.03 with a standard deviation of 0.795. This suggests a somewhat positive attitude to project team competency in dealing with time constraints. The general view of the respondents was that decision making and issue handling had helped to implement the project in a timely fashion. But these practices could be strengthened, as the mean is in the moderate range. It said for TC3 it was able to report "There was effective coordination between stakeholders and project actors, allowing the necessary information and resources to be shared on time and with the necessary efficiency, thereby reducing project implementation overruns and thus improving the overall speed of the project." The average of the statement was 2.98 with a standard deviation of 0.845. The finding suggests a moderate level of actor co-ordination. The higher standard deviation indicates a wider range of respondents' experiences with regard to coordination and information flow. This may suggest that some projects or project phases were well-coordinated and others were not. Regarding TC4, it said in its report that the project was monitored and evaluated regularly to ensure the project was on track and provided adequate corrective measures when delays occurred to help maintain the project schedule. The item had a mean of 2.96 and a standard deviation of 0.815. This reflects a moderate level of perception of monitoring and evaluation processes being used to

assist in the timely completion. Participants seemed to be aware of the importance of monitoring to detect delays, but the mean did not indicate that the monitoring was implemented in all activities of the project. Finally, it said, “External and internal factors that may impact project timelines were managed proactively, including regulatory approvals, availability of resources and environmental uncertainties, to keep implementation activities on track with the project schedule for TC5. The mean found in the statement was 2.99 with a standard deviation of 0.832. The outcome shows a moderate level of perceived internal and external risks related to project timelines were proactively managed. A relatively high standard deviation indicates that the respondents had slightly different experiences with the management of various factors, including regulatory approval, resource availability and environmental uncertainties. With 235 respondents, the mean value of the aggregate project performance (PP) variable was 2.9898, the minimum value was 1.13, the maximum value was 5.00 and the standard deviation of the variable was 0.72235. The mean of 2.99 suggests a moderate level of overall performance of the projects. The findings indicated that the projects performed well on cost effectiveness, stakeholder satisfaction, and project completion but not enough to show a high level of agreement with the respondents. A relatively moderate dispersion from the mean is seen, with a standard deviation of 0.72235. This indicates a fairly narrow range of respondents' judgments of project performance, but there were some variations in perceptions. The lowest score of 1.13 and the highest score of 5.00 indicates that the respondents had a fairly wide distribution of perceptions on the project performance, ranging from low to very high. Importantly, the Valid N (listwise) of 235 identifies that all 235 respondents had observations that were suitable across the variables that were analyzed. Overall, the descriptive results showed a moderate performance level in the three dimensions of projects. Cost efficiency had a mean score between 2.92 and 3.05, the stakeholder satisfaction was between 2.98 and 3.03, and the timely completion was between 2.96 and 3.03. Inconsistency in respondents' evaluations of the various aspects of project performance is reflected in the relatively narrow range of means. The results also indicate that the projects, on overall, had a reasonable financial and stakeholder management but had opportunities for schedule management improvements. In specific, more effective cost control, increased stakeholder engagement, faster communication with stakeholders, better monitoring and evaluation and proactively managing influences on project schedules may lead to better project performance. Thus, the overall mean of 2.9898 indicates the project was moderate but there was a good scope for improvement in the effectiveness and efficiency in the implementation of the project.

Descriptive statistics for project quality planning

The descriptive statistics for project quality planning was presented in terms of the mean and standard deviation of the individual measurement items. The analysis was based on 235 valid responses, with all the items measured on a five-point Likert scale ranging from 1 to 5. The mean scores provided an indication of the general level of agreement among respondents regarding the application of project quality management practices, while the standard deviations indicated the extent to which respondents' views differed from one another. PQP1 stated that the project planning process in the organization involves the systematic identification and clear definition of project objectives, deliverables, and scope boundaries, ensuring that all stakeholders have a shared understanding of the project direction and expected outcomes from the outset. This statement recorded a mean of 2.99 and a standard deviation of 0.816. The mean of 2.99 was approximately at the midpoint of the five-point scale, indicating a moderate level of agreement among respondents. This finding means that respondents moderately

perceived that project objectives, deliverables, and scope boundaries were systematically identified and clearly defined during project planning. However, the score being slightly below 3.00 also suggests that this practice was not consistently strong across all projects. The standard deviation of 0.816 indicates a moderate dispersion of responses, meaning that although many respondents had relatively similar views, there were noticeable differences in their perceptions of how effectively project objectives and scope were defined. PQP2 stated that project planning is carried out in a structured and comprehensive manner, including the development of detailed schedules, resource allocation plans, and risk management strategies that guide the successful execution of project activities from initiation through completion. The item obtained a mean of 2.97 and a standard deviation of 0.819. The mean indicates a moderate perception of structured and comprehensive project planning. In practical terms, respondents moderately agreed that project schedules, resource allocation plans, and risk management strategies were developed to guide project implementation. Nevertheless, the mean below 3.00 suggests that these planning activities were not perceived as being sufficiently comprehensive or consistently implemented in all cases. The standard deviation of 0.819 demonstrates moderate variability in responses, implying that some respondents considered the planning processes relatively effective, while others perceived weaknesses in the preparation and application of schedules, resources, and risk management strategies. PQP3 stated that the project planning phase effectively incorporates stakeholder input and engagement, ensuring that the needs, expectations, and constraints of all relevant parties are adequately considered and integrated into the overall project plan. The item recorded a mean of 3.04 and a standard deviation of 0.781. The mean slightly exceeded the midpoint of the scale, indicating a moderate but relatively positive perception of stakeholder involvement in project planning. This means that respondents generally perceived that stakeholders were involved in the planning process and that their needs and expectations were considered when developing project plans. The standard deviation of 0.781 indicates relatively moderate variation in responses. Therefore, although stakeholder participation in planning was generally viewed positively, the practice may not have been equally effective or consistent across all road construction projects. PQP4 stated that project planning within the organization is sufficiently flexible and adaptive, allowing for adjustments in response to emerging risks, uncertainties, and changes in the project environment without significantly disrupting the project's initial objectives. This item recorded the highest mean among the project quality planning items at 3.05, with a standard deviation of 0.794. The mean indicates a moderate level of agreement that project planning was flexible and adaptive. This means that respondents generally perceived that project teams were capable of modifying project plans when unexpected risks, uncertainties, or environmental changes occurred. The relatively higher mean suggests that adaptability represented one of the comparatively stronger aspects of project quality planning. The standard deviation of 0.794 indicates moderate differences in respondents' perceptions, suggesting that flexibility in planning may have varied depending on the specific project or implementation circumstances. PQP5 stated that the quality of project planning is evident in the extent to which detailed plans, including timelines, cost estimates, and performance benchmarks, are clearly documented and used as a guiding framework to enhance project control and implementation effectiveness. The item recorded a mean of 2.97 and a standard deviation of 0.832. The mean indicates moderate agreement that detailed plans were documented and used to guide project implementation. However, the score below 3.00 suggests that respondents did not perceive documentation of timelines, cost estimates,

and performance benchmarks as particularly strong. The standard deviation of 0.832 was the highest among the project quality planning items, indicating comparatively greater variation in responses. This implies that the extent to which detailed project plans were documented and used as control mechanisms differed considerably across the projects. Overall, project quality planning recorded relatively consistent mean scores ranging from 2.97 to 3.05. The findings therefore indicate a moderate level of project quality planning. Among the five indicators, PQP4, relating to flexibility and adaptability, had the highest mean of 3.05, while PQP2 and PQP5 recorded the lowest mean of 2.97. This suggests that although planning practices existed, there was room for improvement, particularly in comprehensive planning, documentation, scheduling, resource allocation, risk management, and the use of performance benchmarks.

Correlation analysis.

Based on 235 observations, the correlation analysis looked into the relationships between project duration (PDD), project size (PSS), project quality planning (PQP) and project performance (PP). There was a weak positive correlation between project duration and project performance ($r = .258$, $p < .001$) and a moderate positive correlation between project size and project performance ($r = .365$, $p < .001$). Project quality planning was correlated with project performance with a moderate positive correlation ($r = .789$, $p < .001$), meaning that the higher the project quality plan, the higher the project performance. PQP was not significantly related to PDD ($r = .124$, $p = .059$), but was significantly related to PSS ($r = .234$, $p < .001$). Overall, the results showed positive correlations between the variables in this study.

Table 3: Correlation analysis

		PDD	PSS	PP
PDD	Pearson Correlation	1	.299**	.258**
	Sig. (2-tailed)		.000	.000
	N	235	235	235
PSS	Pearson Correlation	.299**	1	.365**
	Sig. (2-tailed)	.000		.000
	N	235	235	235
PQP	Pearson Correlation	.124	.234**	.789**
	Sig. (2-tailed)	.059	.000	.000
	N	235	235	235
PP	Pearson Correlation	.258**	.365**	1
	Sig. (2-tailed)	.000	.000	
	N	235	235	235

N/B: PP: Project performance, PQP: Project quality planning, PDD: project duration, PSS: Project size

Regression analysis (Hypothesis testing).

Hierarchical regression analysis was conducted to determine the incremental contribution of project quality management to project performance after controlling for project duration (PDD) and project size (PSS). In Model 1, PDD and PSS jointly explained 15.8% of the variance in project performance ($R^2 = .158$; adjusted $R^2 = .150$). The model was statistically significant, $F(2, 232) = 21.726$, $p < .001$, indicating that the control variables significantly predicted project performance. The Durbin-Watson statistic of 2.097 indicated that the independence-of-errors assumption was satisfied. In Model 2, project quality planning (PQPP). was added to the control variables. The model's explanatory power increased substantially, with R^2 rising from .158 to .672 and adjusted R^2 increasing to .665. Thus, the project quality management dimensions explained an additional 51.4% of the variance in project performance ($\Delta R^2 = .514$).

Model 2 was statistically significant, $F(5, 229) = 93.719$, $p < .001$. All predictors had significant positive effects: PSS ($\beta = .155$, $p < .001$), PDD ($\beta = .120$, $p = .003$), PQPP ($\beta = .337$, $p < .001$). Project quality planning had the strongest contribution.

Table 4. Hierarchical regression analysis

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-.727	.181		-4.010	.000
	PSS	.142	.038	.147	3.716	.000
	PDD	.120	.037	.125	3.230	.001
	PQPP	.305	.044	.310	7.008	.000

a. Dependent Variable: PP

PSS: Project Size
PDD: Project duration
PQPP: Project quality planning.

6. Discussion

The results of this analysis indicated a significant positive relationship between project quality planning and project performance ($r = .789$, $p < .001$) which means that quality planning for road construction projects is linked to project performance. This was corroborated by hierarchical regression, which revealed that project quality planning was a significant predictor of project performance after controlling for project duration and project size, respectively ($\beta = .310$, $p < .001$). The high values of explained variance indicate the significance of introducing quality planning in project management, which went from 15.8% to 67.2% explained variance. The results also show that the duration of the project and the size of the project have significant influence on the project performance even though the effect of these factors is relatively small.

7. Conclusions

The study finds quality planning of projects as an important factor of the success of projects in the construction of the road. Correlation results showed that project quality planning and project performance are strongly positively correlated; and hierarchical regression results showed that project duration and size are not significant factors that explain the variance in project performance, but project quality planning is. The addition of the project quality planning significantly enhanced the explanatory power of the regression model, suggesting that the plan for project quality adds a lot of explanation to project performance variations. The study also finds that the duration and size of a project have significant impact on project performance. In total, systematic quality planning works to enhance project results.

8. Recommendations.

Policy recommendations

Government departments that are involved in the construction of roads should reinforce the policy that comprehensive quality planning of projects must be carried out prior to implementation. These policies should include procedures and requirements for quality objectives, quality standards, inspection, material specifications, testing, responsibilities, and monitoring for road projects that are clearly documented. There should be quantifiable quality planning requirements and compliance indicators in procurement and contract management processes too. Contractors and implementing agencies should be regularly checked by regulatory agencies to ensure compliance to approved quality plans during project implementation. These policy requirements will

be further strengthened if that leads to uniformity in quality management, to greater accountability among project stakeholders, and to better project performance through systematic planning and monitoring of quality-related project activities.

Recommendation to practitioners

Project managers, engineers, contractors, quantity surveyors and site supervisors should pay more focus to project quality planning on project life cycle. Quality planning should be conducted prior to construction, and all project stakeholders should be informed of the requirements for quality. Project implementation processes should include regular inspections, material test, documentation, corrective actions and quality reviews. Project duration and size should also be tracked by project teams as they have been shown to have important effects on the performance of the project. Quality issues can be identified early and corrective action taken in a timely manner, if there is good coordination and integration among technical teams, resulting in less rework, delays, cost implications and performance deficiencies.

Theoretical recommendations

Based on the study, systems theory is recommended to be applied in the future to explain the relationship between project quality planning and project performance. The results show that quality planning can be considered as a significant process in which project's inputs, activities, resources, standards and controls are coordinated to create project's outputs. Researchers in the future should therefore build on systems-based explanations by adding to the processes of project management that were not included, such as quality assurance, quality control, risk management, stakeholder management, and communication. Future studies can also investigate the interaction of these processes with project complexity, contractor capability and institutional factors. These extensions can offer a wider comprehensive understanding of the performance of a project in a road construction setting.

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