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## Abstract

The purpose of this study was to investigate the influence of project planning practices on the performance of road construction projects in Kenya. Additionally, the study sought to determine the moderating effect of project monitoring on the relationship between project planning practices and project performance. Road construction projects in Kenya frequently encounter issues such as cost overruns (averaging 45%) and delays (up to 21 months), leading to poor performance. Despite the implementation of project planning practices, these challenges persist, affecting the overall quality and efficiency of road projects. The study adopted a positivist research philosophy and employed both cross-sectional survey and explanatory research designs. The target population included 62 contractors, 54 resident engineers, 60 quantity surveyors, 32 KURA officials, and 28 KENHA officials in Kenya. The sample size was determined using Slovin's formula and selected through stratified random sampling. Data collection methods encompassed both primary data, gathered via structured questionnaires, and secondary data from the websites of the Kenya Urban Roads Authority (KURA) and Kenya National Highways Authority (KENHA). Qualitative data were analyzed thematically, while quantitative data were processed using descriptive and inferential statistics through SPSS version 25. Results were presented using tables, pie charts, and bar charts. The study found that project planning practices have a positive and significant effect on the performance of road construction projects in Kenya. Additionally, it revealed that project monitoring moderates the relationship between project planning practices and the performance of road construction projects. From a practical standpoint, the study emphasizes the need for structured planning, including stakeholder identification and clear project objectives, to enhance outcomes. From a policy perspective, the findings support mandating rigorous planning and monitoring frameworks to better equip project managers and enhance infrastructure development.

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**Keywords**: *Project Planning, Project Performance, Road Projects, Project Management*

## 1.0 Introduction

Infrastructural development through construction of new roads and maintenance of existing ones is a fundamental aspect in development of every economy. The total percentage of the global cover of the paved roads was measured as 69% in 2019 (African Development Bank, 2019). In an effort to improve the road network around the world, different nations have invested heavily in road construction projects in the last two decades. Despite the high investment in roads construction, most of the road projects have been performing poorly as most of them exceed the estimated budget and cost, others are characterized by low quality. Famiyeh, Amoatey and Agbenohevi (2019) indicate that most of the road construction projects are characterized by cost overrun, time overrun, poor communication, low beneficiary satisfaction, and poor quality. In addition, Abbasbhai and Somabhai (2020) observed that road construction in Africa is often characterized by delays and quality issues which often ended up resulting in cost escalations. As observed by Caniëls and Bakens (2020), the performance of road construction projects can be improved through the adoption of information technology and automation of various processes and activities.

Project planning practices within a Project Management Information System (PMIS) are essential for structuring and executing projects efficiently (Majumder, Majumder & Biswas, 2022). These practices involve using the PMIS to develop detailed project plans that include schedules, resource allocation, and milestones. Nyandongo and Lubisi (2019) observed that by integrating planning tools and templates, the PMIS helps project managers establish clear timelines, assign tasks, and set realistic deadlines. This structured approach ensures that all aspects of the project are well-coordinated and aligned with overall objectives (Tuyishime & Nyambane, 2021). The PMIS also facilitates the visualization of project plans through Gantt charts and other scheduling tools, providing a comprehensive overview of project progress and dependencies. In addition, the PMIS supports dynamic planning and adjustments by allowing project managers to update plans in real time as new information or changes arise (Muute & James, 2019). This flexibility is crucial for responding to unexpected challenges and ensuring that the project remains on track.

Globally, project management processes have been continuously automated due to increasingly reliance on software applications. In Iran, Gholipour-Kanani and Fallah (2018) indicates that PMIS practices like project planning were adopted in construction projects, which led to project management success due to better planning, proper scheduling, regulating and controlling the project. In India, Zambare and Dhawale (2017) observed that project planning as a project management information systems (PMIS) practice had a significant effect on schedule and quality of projects. In Ghana, a study by Kwak, Kim and Song (2018) found that project planning by use of PMIS was associated with improved project communication, which in turn led to better project. Obodoh, Mbanusi and Obodoh (2019) indicate that PMIS practices like project planning have a significant impact in the reduction of project failure rates in the Nigerian Construction Industry. In Kenya, Ngari and Ndiritu (2017) observed that PMIS practices, such as project planning, provide project managers with essential information on the cost parameter, time parameter and performance parameter of a project. In addition, Ogero (2018) indicates that the utilization of project management information system practices like project planning in road projects in Nairobi County helped in the improving performance of project while respecting the projects constraints of time, budget and quality specification while meeting the project objectives.

### 1.1 Statement of the Problem

In an ideal situation, road construction projects would be completed efficiently, on time, and within budget, resulting in improved transportation infrastructure and economic benefits for the country (Kisavi, 2019). However, in many cases, road construction projects face challenges that can negatively impact their performance, such as cost overruns, delays, and poor quality. One study found that cost overruns and delays were common in road construction projects in Kenya, with an average cost overrun of 45% and an average delay of 21 months (Ochieng & Ochieng, 2021). Another study found that poor performance of road construction projects in Kenya was often due to inadequate project planning and management, as well as a lack of stakeholder coordination (Odongo & Mugenda, 2019). These challenges can have significant economic consequences, including reduced competitiveness, lower GDP, and decreased economic growth.

Ndurya and Bii (2019) indicates that 30% of all road projects in Kenya stagnate, 50% exceed their estimated cost and estimated completion time, and only 20% are completed within timeline and budget. For instance, the cost of Thika Super Highway project increased by 23.25% from 26.44 billion to 34.45 billion (Mwita, 2020). In addition, the initial deadline of the project was July 2011 and was revised to July 2013. In addition, the Kenya Roads Board submits that 76% of the 29 roads projects under implementation by KeNHA in 2018-19 Financial Year were behind schedule. According to the Kenya Urban Roads Authority (KURA) December 2018 projects progress report, 9 out of 24 projects which is equivalent to 37.5% of road construction projects that were expected to be completed by December 2018, had exceeded their set contractual completion dates. For instance, The Upgrading of Outering road exceeded its completion time by 24.8% from September 2017 to July 2018. The quality of the road works has also suffered leading to shortened life (sustainability) of public works. This has been ascribed to inadequacies in the system for supervising the construction projects (World Bank, 2017).

Utilization of project planning as a practice within a Project Management Information System (PMIS) enhances project performance by providing a structured framework for developing, tracking, and adjusting project plans. Through the PMIS, project managers can create detailed schedules, allocate resources, and set milestones, which improves coordination and ensures that all project activities align with overall objectives (Bor & Chepnoen, 2018). The ability to update plans in real time and visualize project timelines through tools like Gantt charts facilitates better management of dependencies and deadlines. This comprehensive planning approach helps mitigate risks, manage resources effectively, and adapt to changes swiftly, ultimately leading to more efficient execution and successful project outcomes. Thus, the use of project planning as a component of PMIS in construction will help improve performance of projects (Odongo & Mugenda, 2019).

Various studies have been conducted in Kenya on influence of project planning practices on the performance of roads construction projects. For instance, Muute and James (2019) conducted a study on project planning practices and performance of construction projects in Nairobi County; and Mwanza, Namusonge and Makokha (2020) conducted research to assess the influence of project planning practice on performance of construction projects. However, these studies focused on the construction of buildings, which are different from road construction projects in terms of resource requirements, objectives and scope. This study sought to address a knowledge gap by exploring the influence of project planning as a practice in PMIS on the performance of road construction projects in Kenya.

### 1.2 Research Hypotheses

The null hypotheses in this study were;

**$H_0$1:** Project planning practices have no statistically significant influence on the performance of roads construction projects in Kenya.

**$H_0$2:** Project monitoring has no statistically significant moderating effect on the relationship between project planning practices and performance of roads construction projects in Kenya.

## 2.0 Literature Review

### 2.1 Theoretical Review

This study was anchored on General System Theory (GST), which was originally founded by Hungarian biologist Ludwig von Bertalanffy in 1972 (Von Bertalanffy, 1972). From a sociological perspective, systems theory is the trans-disciplinary approach of an organization. A sociological system comprises of four things, namely; objects, attributes, internal relationships among objects and environment. According to Zenko et al. (2013), objects are considered to be parts, elements, or variables within the system. Attributes are the properties, characteristics of qualities of a system and its objects (Valentinov, Hielscher & Pies, 2016).

Every system has internal relationships that exist among its objects. In addition, a system exists in an environment (Zenko et al., 2013). GST is criticized for being too vague and lacking accepted definitions; however, it allows the researcher to gain a broader perspective of the complex elements within a system to include all relevant factors (Shaw, 2020). The theory is seen to be too ambitious, with some assuming that a single profession can be all things to all people. Also, another flaw of social systems theory is that this approach to an individual's issues is not always adequate to explain their present circumstances.

The study used the general system theory to explain the influence of project planning practices on performance of road construction projects in Kenya. Construction projects are open systems that are characterized by interrelationships between various stakeholders. The poor performance of road construction projects shows inadequate communication and feedback in the project. Project planning involves the identification of stakeholders, development of project objectives and identification of a project scope.

### 2.2 Empirical Literature

In India, Majumder, Majumder and Biswas (2022) conducted a study on assess the impact of effective construction planning in project performance improvement. The study made use of a descriptive research design. The results indicated that the organizational characteristics of the construction firms and the project environment have a great influence on planning and scheduling efforts. The firm should be organized appropriately to maintain a relevant environmental context in the project planning. The magnification of the construction sector is based on the growth of the corporate sector and infrastructure development either directly or indirectly.

In Rwanda, Tuyishime and Nyambane (2021) examined the relationship between planning and project performance in public institutions. The study used causal research design. Target population comprised of 145 respondents from Rwanda Utilities Regulatory Authority. The researcher also used structured questionnaire to collect the data. The results indicated that project planning practices in terms of setting objectives, targets and key performance indicators,

coordination of activities and mobilization of resources, had a significant effect of projects performance.

Muute and James (2019) conducted a study on project planning practices and performance of construction projects in Nairobi County, Kenya. The target population was one hundred and twenty-five construction projects within Nairobi County, Kenya. Semi-structured questionnaires were used to collect data from one hundred and twenty-five project managers who formed the respondents of the study. The study findings indicated that majority of the firm accord human resource management function as an important role and that majority of the firms conduct training to its project team members. The results also indicated that project completion was being done without much struggle and that the budgeted funds were enough to complete the project.

Mwanza, Namusonge and Makokha (2020) conducted research to assess the influence of project planning practice on performance of construction projects in Kenya. The study adopted a mixed research design which included descriptive survey, census and correlation. The target population was 1761 respondents with a sample size of 313 respondents comprised of 160 managers of Early Childhood Development Education, 11 managers of county polytechnics, 133 stall managers and 9 managers of county modern markets. The study found out that project planning practice had a negative significant influence on performance of construction projects. The study also found out that planning gives direction to the activities to be performed in time and reduces mistakes.

### 2.3 Conceptual Framework

Figure 1 is a diagrammatic representation of the relationship between the independent variable and the dependent variable. The independent variable in this study was project planning practices and the dependent variable was performance of roads construction projects in Kenya and the moderating variable was project monitoring.

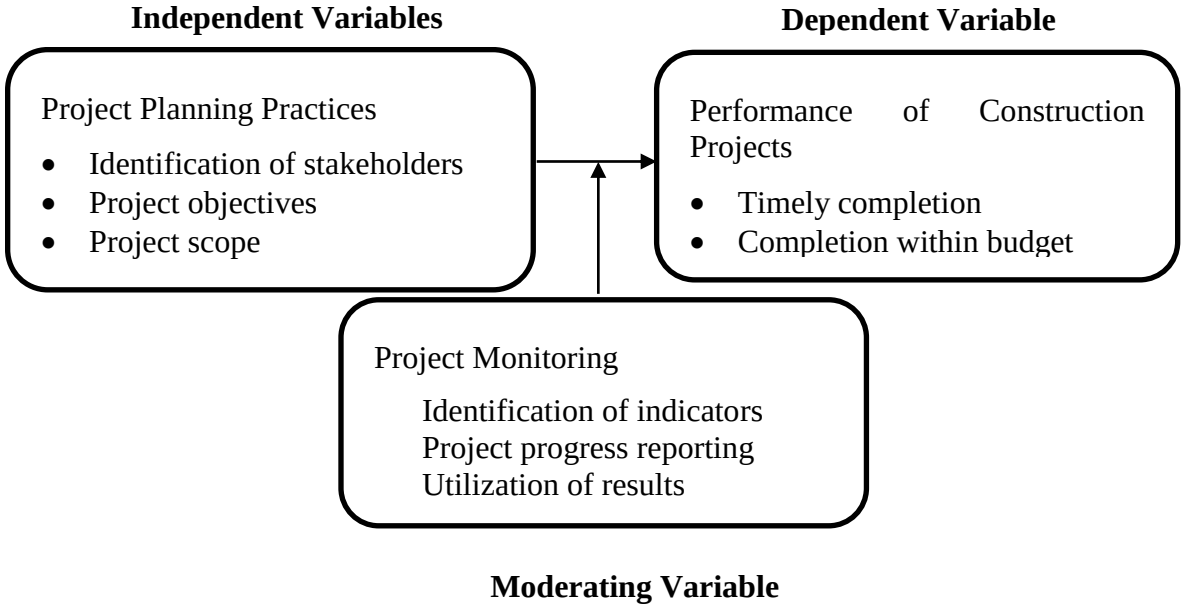


**Figure 1: Conceptual Framework**

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## 3.0 Research Methodology

The study adopted a positivist research philosophy utilized both both cross-sectional survey design and explanatory research design. The unit of analysis in this study was 62 road construction projects by KURA and KENHA in Kenya for the financial year 2019/2020, 2020/2021 and 2021/2022. The unit of observation was contractors, resident engineers, quantity surveyors, KURA officials and KENHA officials in Kenya. The target population of the study was 62 contractors, 54 resident engineers, 60 quantity surveyors, 32 KURA officials and 28 KENHA in Kenya.

Slovin's formula was used in the determination of the sample size in this study. This formula was preferred because it puts into consideration the target population.

$$n = \frac{N}{1 + NE^2}$$

Where; n = Number of samples; N = Total population and e = Error tolerance (0.05)

$$n = \frac{236}{1 + (236 * 0.05^2)} = 148$$

**Table 1: Sample Size**

| Category | Target Population | Sample Size |
|---|---|---|
| Contractors | 62 | 39 |
| Resident Engineers | 54 | 33 |
| Quantity Surveyors | 60 | 38 |
| KURA Officials | 32 | 20 |
| KENHA Officials | 28 | 18 |
| **Total** | **236** | **148** |

The study made use of stratified random sampling in the selection of sample size from the target population. The strata in this study included contractors, civil engineers and quantity surveyors. This sampling technique was used because it minimizes selection bias and the stratification of a sample size helps in ensuring that the sample size reflects the study population. The study used proportionate stratification, where the sample size of each of the stratum is expected to be proportional to the population size of that specific stratum.

The study used both primary and secondary data. Secondary data was obtained from the websites of Kenya Urban Roads Authority and Kenya National Highways Authority. Primary data was collected by use of a semi-structured questionnaire. A pilot study was conducted among road construction projects in Kiambu County so as to assess the validity and reliability of the research instrument. According to Sileyew (2019), the sample size for a pilot study should be 10 percent of the sample size. The pilot group comprised of 10 percent of the sample size (23).

The questionnaire generated both quantitative and qualitative data. Thematic analysis was used to analyze qualitative data from the open-ended questions and the results were presented in a narrative form. Descriptive and inferential statistics were used in analyzing quantitative data with the help

of the Statistical Package for Social Sciences (SPSS version 25) statistical software. Descriptive statistics included frequency distribution, percentages, mean, and standard deviation. Inferential statistics included Pearson correlation coefficient and linear regression analysis. The results were presented in tables and figures such as pie charts and bar charts. The regression model was as follows;

$$Y = \beta_0 + \beta_1 X_1 + \varepsilon$$

Whereby; Y = Performance of roads construction projects; $B_0$ = Constant; $\beta_1$ =Coefficients of determination; $X_1$ = Project planning practices; and ε = Error term

## 4.0 Findings and Discussion

The sample size of this study consisted of all the 135 individuals that comprised of 39 contractors, 33 resident engineers, 38 quantity surveyors, 20 KURA officials and 18 KENHA. The response rate was as shown in Table 2.

**Table 1: Questionnaires' Response Rate**

| Category | Sample Size | Responses | Responses Rate |
|---|---|---|---|
| Contractors | 39 | 36 | 92.31 |
| Resident Engineers | 33 | 29 | 87.88 |
| Quantity Surveyors | 38 | 36 | 94.74 |
| KURA Officials | 20 | 18 | 90.00 |
| KENHA Officials | 18 | 16 | 88.89 |
| **Total** | **148** | 135 | 91.22 |

Out of 148 questionnaires that were distributed, 135 responses were obtained, which gives a 91.22% response rate. According to Babbie (2017), a response rate of 50% is sufficient for effective analysis and reporting, a response rate of 60% is good while a response rate of 70% is regarded as excellent. This implies that the response rate (91.22%) in this study was within acceptable limit for drawing conclusion and making recommendations.

### 4.1 Descriptive Analysis

### Project Planning Practices

The respondents were asked to indicate their level of agreement with various statements on project planning practices in road construction projects. The results were as presented in Table 3. The respondents agreed with a mean of 3.822 (Std. Deviation = 0.937) that changes to the project scope were well-documented and managed effectively. The respondents also agreed with a mean of 3.763 (Std. Deviation = 0.994) that the project scope is flexible enough to accommodate changes as the project progressed. These findings agree with Mwanza, Namusonge and Makokha (2020) findings that the project scope should be reviewed regularly throughout the project to ensure that the project team is staying on track and that any necessary adjustments are made in a timely manner. They further agreed with a mean of 3.755 (Std. Deviation = 1.025) that the work breakdown structure enabled the project team to identify dependencies and ensure timely completion of tasks. These findings are in line with Nyandongo and Lubisi (2019) argument that work breakdown structure enabled the project team to identify dependencies. The respondents agreed with a mean of 3.555 (Std. Deviation = 1.136) that the project schedule is effectively used to monitor progress and identify potential issues.

With a mean of 3.459 (Std. Deviation = 1.189), the respondents were neutral with the statement indicating that the work breakdown structure provided an effective framework for tracking progress. With a mean of 3.392 (Std. Deviation = 1.140), the respondents were neutral with the statement indicating that the project schedule is communicated clearly to all team members. Moreover, the respondents were neutral with the statement indicating that the project teams have a clear understanding of the project scope and objectives as shown by a mean of 3.377 (Std. Deviation = 1.118). In addition, the respondents were neutral with the statement indicating that the use of a work breakdown structure helped to define the project's scope clearly as shown by a mean of 3.377 (Std. Deviation = 1.118). With a mean of 3.1704 (Std. Deviation = 1.174) the respondents were neutral with the statement indicating that the project schedule is aligned with the project objectives and milestones. The standard deviations for all the statements ranged from 0.994 to 1.189, which indicates concurrence around the means.

The respondents were asked to indicate other issues regarding project planning practices in road construction projects. From the findings, they indicated that conducting a thorough environmental impact assessment (EIA) is a crucial part of project planning. Road constructions have significant environmental consequences, such as habitat disruption and water pollution. Identifying and mitigating these impacts, as well as ensuring compliance with environmental regulations, should be integrated into the planning process. The respondents also indicated that involving local communities and relevant stakeholders from the planning stage is important. Identifying and addressing their concerns and needs, as well as seeking their input on project design and implementation, can help build support and minimize conflicts throughout the project's life cycle. The respondents further indicated that compliance with permits and regulatory requirements is a critical aspect of project planning. This includes securing necessary permits for construction, land use, and environmental protection, and ensuring that the project adheres to all relevant laws and regulations.

**Table 2: Project Planning Practices**

| | Mean | Std. Deviation |
|---|---|---|
| The project scope is flexible enough to accommodate changes as the project progressed. | 3.763 | .994 |
| The project team has a clear understanding of the project scope and objectives. | 3.377 | 1.118 |
| Changes to the project scope were well-documented and managed effectively | 3.822 | .937 |
| The use of a work breakdown structure helped to define the project's scope clearly. | 3.377 | 1.118 |
| The work breakdown structure provided an effective framework for tracking progress. | 3.459 | 1.189 |
| The work breakdown structure enabled the project team to identify dependencies and ensure timely completion of tasks. | 3.755 | 1.025 |
| The project schedule is communicated clearly to all team members. | 3.392 | 1.140 |
| The project schedule is aligned with the project objectives and milestones | 3.1704 | 1.174 |
| The project schedule is effectively used to monitor progress and identify potential issues. | 3.555 | 1.136 |
| **Average** | **3.519** | **1.092** |

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**Project Monitoring**

The respondents were asked to indicate their level of agreement with various statements on project monitoring in road construction projects. The respondents agreed with a mean of 4.022 (Std. Deviation = 0.651) that stakeholders are given opportunities to provide feedback on project progress reports. These findings concur with Tuyishime and Nyambane (2021) findings that engaging stakeholders in project management are essential to ensure the project's success and to minimize risks and issues during the project lifecycle. The respondents also agreed with a mean of 4.022 (Std. Deviation = 0.934) that their project teams utilize project results to inform decision-making. In addition, the respondents agreed with a mean of 3.948 (Std. Deviation = 0.705) that their project teams effectively identifies relevant indicators to measure project progress. Further, the respondents agreed with a mean of 3.948 (Std. Deviation = 0.705) that indicators provide information on the progress or success of a project. The findings agree with Majumder et al. (2022) findings that indicators generated play a key role in showing the progress or success of a project.

With a mean of 3.874 (Std. Deviation = 0.510) the respondents agreed that the use of technology helps in generating project progress reports. The respondents further agreed with a mean of 3.807 (Std. Deviation = 0.674) that indicators of project monitoring are specific and measurable. The respondents also agreed with a mean of 3.866 (Std. Deviation = 1.208) that their project teams ensure that project results were aligned with project objectives and goals. These findings concur with Muute and James (2019) findings that project teams ensure that project results were aligned with project objectives and goals. With a mean of 3.355 (Std. Deviation = 1.254) the respondents were neutral on the statement indicating that project teams ensure that project results were communicated to stakeholders in a clear and understandable manner. However, respondents disagreed with a mean of 2.385 (Std. Deviation = 1.158) that their project teams effectively communicates any issues or challenges related to project progress. The standard deviations for all the statements ranged from 0.510 to 1.158, which indicates concurrence around the means.

**Table 3: Project Monitoring**

| | Mean | Std. Deviation |
|---|---|---|
| Indicators of project monitoring are specific and measurable | 3.807 | .674 |
| Indicators provide information on the progress or success of a project. | 3.948 | .705 |
| Our project team effectively identifies relevant indicators to measure project progress. | 3.948 | .705 |
| The use of technology helps in generating project progress reports | 3.874 | .510 |
| Our project team effectively communicates any issues or challenges related to project progress | 2.385 | 1.158 |
| Stakeholders are given opportunities to provide feedback on project progress reports. | 4.022 | .651 |
| Our project team utilizes project results to inform decision-making | 4.022 | .934 |
| Our project team ensures that project results were aligned with project objectives and goals. | 3.866 | 1.108 |
| Our project team ensures that project results were communicated to stakeholders in a clear and understandable manner. | 3.355 | 1.154 |
| **Average** | **3.692** | **.844** |

**Performance of Road Construction Projects**

The respondents were asked to indicate their level of agreement with various statements on performance of road construction projects in Kenya. The results were as presented in Table 5. The respondents agreed with a mean of 4.140 (Std. Deviation = 0.839) that some projects in their organization incur cost overrun. In addition, the respondents agreed with a mean of 4.029 (Std. Deviation = 1.165) that some projects in their organization take a shorter period to be completed. Further, the respondents agreed with a mean of 4.014 (Std. Deviation = 0.657) that the project was completed to a high standard of quality. Also, the respondents agreed with a mean of 3.881 (Std. Deviation = 0.743) that the beneficiaries are satisfied with the road projects. The respondents disagreed with a mean of 2.192 (Std. Deviation = 0.873) that the project met all of the specified requirements and objectives. These findings agree with Kisavi (2019) observation that most of the projects do not meet their set objectives. The respondents also agreed with a mean of 3.733 (Std. Deviation = 0.802) that projects in their organization are completed within the set budget. The respondents agreed with a mean of 3.666 (Std. Deviation = 0.977) that some projects in their organization have been left incomplete due to insufficient budget.

Further, the respondents agreed with a mean of 3.5556 (Std. Deviation = 1.136) that they are satisfied with the time taken to complete projects. In addition, the respondents agreed with a mean of 3.525 (Std. Deviation = 0.827) that the financiers are satisfied with the quality of the road projects. Also, the respondents agreed with a mean of 3.511 (Std. Deviation = 0.836) that their organization has put proper strategies to ensure projects are completed within the set budget. However, with a mean of 3.392 (Std. Deviation = 1.140) the respondents were neutral with the statement indicating that some projects in their organization take a longer period to be completed than required. The respondents disagreed with a mean of 2.400 (Std. Deviation = 1.102) with the statement indicating that projects in their organization are completed within the schedule. These findings agree with Ochieng and Ochieng (2021) findings that cost overruns and delays were common in road construction projects in Kenya, with an average cost overrun of 45% and an average delay of 21 months. The standard deviations for all the statements ranged from 0.743 to 1.165, which indicates concurrence around the means.

**Table 4: Performance of Road Construction Projects**

| | Mean | Std. Deviation |
|---|---|---|
| Projects in our organization are completed within schedule | 2.400 | 1.102 |
| Some projects in our organization take longer period to be completed than required | 3.392 | 1.140 |
| Some projects in our organization take shorter period to be completed | 4.029 | 1.165 |
| I am satisfied with the time taken to complete projects | 3.5556 | 1.136 |
| Projects in our organization are completed within the set budget | 3.733 | .802 |
| Some projects incur cost overrun | 4.140 | .839 |
| Some projects in our organization have been left incomplete due to insufficient budget | 3.666 | .977 |
| Our organization has put proper strategies to ensure projects are completed within the set budget | 3.511 | .836 |
| The beneficiaries are satisfied with the road projects | 3.881 | .743 |
| The financiers are satisfied with the quality of the roads projects | 3.525 | .827 |
| The project was completed to a high standard of quality | 4.014 | .657 |
| The project met all of the specified requirements and objectives | 2.192 | .873 |
| **Average** | **3.590** | **.971** |

### 4.2 Correlation Analysis

Correlation analysis is a statistical technique used to quantify the strength and direction of the relationship between two or more variables. In this study, correlation analysis was used to show the relationship between project planning practices and performance of road construction projects. As shown in Table 6, there is a significant positive correlation between project planning practices and the performance of road construction projects (r = 0.726, p-value=0.000). This indicates that robust project planning practices are associated with better performance outcomes in road construction projects. The findings agree with Majumder et al. (2022) argument that effective construction planning has a positive effect on project performance improvement in India. The findings also agree with Tuyishime and Nyambane (2021) findings that there is a positive relationship between planning and project performance in public institutions in Rwanda.

**Table 5: Correlation Analysis Results**

| | | Performance of Road Construction Projects | Project Planning Practices |
|---|---|---|---|
| Performance of Road Construction Projects | Pearson Correlation | 1 | |
| | Sig. (2-tailed) | | |
| | N | 135 | |
| Project Planning Practices | Pearson Correlation | .726** | 1 |
| | Sig. (2-tailed) | 0.000 | |
| | N | 135 | 135 |

### 4.3 Regression analysis

Linear regression analysis was conducted to examine the influence of the project planning practices on the performance of construction projects in Kenya. The r-squared, in the model summary, shows the variation in the dependent variable that can be explained by the independent variables. As depicted in Table 6, the R-squared for the relationship between project planning practices and performance of construction projects was 0.334 which means that 33.4% of the variation of dependent variable (performance of construction projects in Kenya) can be explain by project planning practices.

**Table 6: Model Summary for Project Planning Practices and Project Performance**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .578[a] | 0.334 | 0.301 | 0.8978 |

a. Predictors: (Constant), Project Planning Practices

As shown in Table 6, the F-calculated (294.105) was greater than F-critical from F-distribution table (3.920). In addition, the p-value (0.000) was less than the significance level of 0.05. Therefore, the model is a good fit for the data and hence can be used to examine the influence of project planning practices on the performance of road construction projects in Kenya.

**Table 7: ANOVA for Project Planning Practices and Project Performance**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 17.465 | 1 | 17.465 | 294.105 | .000[b] |
| | Residual | 7.898 | 133 | 0.059 | | |
| | Total | 25.363 | 134 | | | |

a. Dependent Variable: Performance of Road Construction Projects
b. Predictors: (Constant), Project Planning Practices

Regression equation for the unstandardized coefficients was;

$Y = 0.544 + 0.385X_4$

The results show that project planning practices have a positive and significant effect on the performance of road construction projects ($\beta_1 = 0.385$, $p = 0.00$). Project planning practices exhibit a highly significant effect on the performance of road construction projects, with a p-value much less than 0.05. For each unit increase in project planning practices, there is a substantial increase of 0.385 units in the performance of road construction projects. The findings agree with Muute and James (2019) argument that project planning practices have a positive effect on performance of construction projects in Kenya. The findings are also in line with Mwanza et al. (2020) argument that project planning practice has a positive effect on performance of construction projects in Kenya.

**Table 8: Coefficients for Project Planning Practices and Project Performance**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 0.544 | 0.124 | | 4.387 | 0.000 |
| | Project Planning Practices | 0.385 | 0.095 | 0.365 | 4.053 | 0.000 |

a. Dependent Variable: Performance of Road Construction Projects

## Moderating Effect Analysis

Moderating effect analysis is used to explore how the relationship between an independent variable (IV) and a dependent variable (DV) changes when a third variable, known as a moderator, is introduced. The moderator can strengthen, weaken, or change the direction of the relationship between the IV and DV. In Model 1, the R-squared was 0.334, which means that 33.4% of the variability in the performance of road construction projects can be explained by the predictor (project planning practices). In Model 2, the R-squared was 0.388. This indicates that 38.8% of the variability in the performance of road construction projects can be explained by the predictor when including Project Monitoring and the interaction terms (Project Planning Practices * Project Monitoring). The increase from 33.4% (Model 1) to 38.8% (Model 2) suggests that adding Project Monitoring and its interaction terms provides a better fit to the model, explaining an additional 5.4% of the variability in the performance of road construction projects.

**Table 9: Model Summary for Project Monitoring Practices, Project Monitoring and Project Performance**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .578[a] | 0.334 | 0.301 | 0.8978 |
| 2 | .623[b] | 0.388 | 0.361 | 0.2545 |

a. Predictors: (Constant), Project Planning Practices

b. Predictors: (Constant), Project Planning Practices, Project Monitoring, Project Planning Practices * Project Monitoring

In Model 1, as shown in Table 10, the F-calculated (17.465) was greater than the F-critical (3.841) and the p-value (0.000) was less than the significance level (0.05). This indicates that the predictor (project planning practices) explain a significant amount of the variance in the performance of road construction projects.

In Model 2, the F-calculated (6.373) was greater than the F-critical (2.680) and the p-value (0.000) was less than the significance level (0.05). The F-statistic, while lower than that of Model 1, still indicates that the extended set of predictors (including project monitoring and interaction terms) explains a significant amount of the variance in the performance of road construction projects. Both models have highly significant F-statistics and p-values, indicating that the predictor used in the model significantly explain the variance in the Performance of Road Construction Projects.

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**Table 10: ANOVA for Project planning Practices, Project Monitoring and Project Performance**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 17.465 | 1 | 17.465 | 294.105 | .000[b] |
| | Residual | 7.898 | 133 | 0.059 | | |
| | Total | 25.363 | 134 | | | |
| 2 | Regression | 19.119 | 3 | 6.373 | 103.159 | .000[c] |
| | Residual | 8.093 | 131 | 0.062 | | |
| | Total | 27.212 | 134 | | | |

a. Dependent Variable: Performance of Road Construction Projects
b. Predictors: (Constant), Project Planning Practices
c. Predictors: (Constant), Project Planning Practices, Project Monitoring, Project Planning Practices * Project Monitoring

In Model 1, project planning practices ($\beta_1$ = 0.385, p = 0.000) demonstrate significant positive effects on the performance of road construction projects.

Regression equation for the unstandardized coefficients was;

$$Y = 2.671 + 0.323X_1 + 0.788Z + 0.195X_1Z + \varepsilon$$

The results demonstrate the moderating effects of Project Monitoring on the relationship between the independent variable (IV) and the dependent variable (DV), Performance of Road Construction Projects. In Model 2, the coefficients for the interactions between the IV and Project Monitoring indicate the extent to which the effect of the IV on the DV is modified by the presence of Project Monitoring. Specifically, Project Planning Practices * Project Monitoring ($\beta_{1z}$ = 0.195, p = 0.009) exhibit significant interactions. These results suggest that project monitoring plays a moderating role in enhancing the impact of project planning practices on the performance of road construction projects. The findings agree with Maendo, James and Kamau (2018) findings that project monitoring and evaluation has a significant relationship with performance of road infrastructure projects constructed by local firms in Kenya.

**Table 11: Regression Coefficients for Project Planning Practices, Project Monitoring and Project Performance**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 0.044 | 0.224 | | 0.196 | 0.844 |
| | Project Planning Practices | 0.385 | 0.095 | 0.365 | 4.053 | 0.000 |
| 2 | (Constant) | 2.671 | 1.222 | | 2.186 | 0.031 |
| | Project Planning Practices | 0.323 | 0.127 | 0.31 | 2.543 | 0.024 |
| | Project Monitoring | 0.788 | 0.333 | 0.789 | 2.366 | 0.020 |
| | Project Planning Practices * Project Monitoring | 0.195 | 0.073 | 1.163 | 2.671 | 0.009 |

a. Dependent Variable: Performance of Road Construction Projects

## 5.0 Conclusions

The study concludes that project planning practices have a positive and significant effect on the performance of road construction projects in Kenya. The study found that identification of stakeholders, project objectives and project scope have an effect on the performance of road construction projects in Kenya. This shows that an improvement in project planning practices would lead to an improvement in the performance of road construction projects in Kenya. The study also concludes that project monitoring has a moderating effect on the relationship between project planning practices and performance of road construction projects in Kenya.

## 6.0 Recommendations

### Recommendations for Policy

To improve the performance of road construction projects in Kenya, policymakers should prioritize the establishment of comprehensive project planning practices that include clear stakeholder identification, well-defined project objectives, and a precise project scope. It is essential to develop standardized guidelines for project planning to ensure consistency and effectiveness across various projects. Additionally, implementing robust project monitoring frameworks will enhance the relationship between planning practices and project performance, facilitating timely feedback and necessary adjustments. Training programs for project managers and stakeholders on effective planning and monitoring techniques should be mandated to foster a culture of excellence in project execution. By strengthening these practices, the government can significantly elevate the quality and success rate of road construction projects throughout the country.

### Recommendations for Practice

The study found that the project scope is flexible enough to accommodate changes as the project progresses. It is recommended to continue leveraging this flexibility by implementing a formal change management process that includes clear procedures for evaluating and incorporating scope changes. This process should involve assessing the impact of changes on project timelines, resources, and costs. Ensuring that all scope adjustments are documented and communicated to relevant stakeholders will help maintain project alignment and manage expectations effectively.

The study established that the work breakdown structure (WBS) enabled the project team to identify dependencies and ensure timely completion of tasks. To build on this, it is recommended to regularly review and update the WBS to reflect any changes in project scope or requirements. Incorporate feedback from team members to refine the WBS and improve its accuracy in tracking project progress. Utilizing advanced project management tools that integrate WBS with scheduling and resource management can further enhance its effectiveness in managing dependencies and task completion.

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