

## **QUALITY MANAGEMENT PRACTICES ON IMPLEMENTATION OF ROAD CONSTRUCTION PROJECTS IN NAROK COUNTY, KENYA**

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### **ABSTRACT**

**Purpose of the Study:** The study examined the influence of quality management practices on the implementation of road construction projects in Narok County, Kenya. Specifically, the study assessed the effect of quality planning, quality control, quality improvement, and quality assurance on the implementation of road construction projects.

**Statement of the Problem:** Road infrastructure projects undertaken by county governments in Kenya often experience delays, cost overruns, poor workmanship, and stalled implementation. In Narok County, several road projects have failed to meet planned timelines and quality expectations, reducing value for public resources invested in infrastructure development. These challenges have been linked to weak quality management practices, creating the need to examine how quality planning, quality control, quality improvement, and quality assurance influence the implementation of road construction projects.

**Research Methodology:** The study adopted a descriptive research design. The target population comprised 150 employees and stakeholders involved in road construction projects within Narok County. Stratified random sampling was used to select 110 respondents. Primary data were collected using structured questionnaires administered physically and online. A total of 82 questionnaires were filled and returned, representing a response rate of 75.0%. Data were analyzed using descriptive and inferential statistics, including correlation and multiple regression analysis.

**Findings:** The regression results showed that quality management practices had a moderate positive relationship with the implementation of road construction projects, with  $R = 0.579$  and  $R^2 = 0.435$ . This implies that quality planning, quality control, quality improvement, and quality assurance explained 43.5% of the variation in road construction project implementation. The overall model was statistically significant,  $F = 3.530$ ,  $p = 0.019$ . Quality planning had a positive and significant effect on implementation of road construction projects ( $\beta = 0.408$ ,  $p = 0.010$ ), quality control also had a positive and significant effect ( $\beta = 0.127$ ,  $p = 0.029$ ), while quality improvement had a positive and significant effect ( $\beta = 0.123$ ,  $p = 0.004$ ). Quality assurance had a positive but borderline insignificant effect ( $\beta = 0.340$ ,  $p = 0.053$ ).

**Conclusion:** The study concludes that quality management practices are important drivers of road construction project implementation in Narok County. Quality planning, quality control, and quality improvement significantly enhanced project implementation, while quality assurance had practical value despite not being statistically significant at the 0.05 level. The findings show that road construction projects are more likely to meet timelines, scope, budget, and stakeholder expectations when quality management practices are properly institutionalized.

**Recommendations:** The study recommends that Narok County should strengthen quality planning by setting clear quality objectives, standards, and project requirements before implementation begins. The county should also enhance quality control through regular inspections, monitoring, testing, and correction of defects. In addition, project teams should promote continuous quality improvement by reviewing defect reports, using project data, and applying corrective and preventive actions. Quality assurance should also be improved through regular audits, qualified auditors, compliance checks, and quality reporting to support transparency and successful road project implementation.

**Keywords:** *Quality management practices, quality planning, quality control, quality improvement, quality assurance, road construction projects, project implementation, Narok County, Kenya*

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## BACKGROUND OF THE STUDY

Road construction projects are essential infrastructure investments that influence economic growth, mobility, trade, access to services, and regional development. Roads create critical links between markets, production centres, factories, schools, health facilities, and social

services, thereby supporting employment creation and poverty reduction (Samanta, 2022). Because road infrastructure projects consume large amounts of public resources, their implementation is expected to meet planned timelines, budgets, technical specifications, and quality standards. A road project is therefore considered successful when it is completed within the approved schedule and budget while conforming to functional and technical requirements (Berechman, 2020; Kerzner, 2022).

In Kenya, road construction is a shared responsibility between the national and county governments. The national government is responsible for national trunk roads, while county governments manage county roads through construction, rehabilitation, and maintenance (Osman & Kimutai, 2023). Devolution was expected to improve infrastructure delivery because county governments are closer to local communities and better positioned to understand grassroots transport needs (Ng'etich, 2022). However, many county road construction projects continue to experience implementation challenges, including delayed completion, cost escalation, poor workmanship, and failure to meet project objectives.

Quality management practices are central to the successful implementation of road construction projects. When quality is properly planned, controlled, improved, and assured throughout the project lifecycle, road projects are more likely to meet design specifications, stakeholder expectations, safety requirements, timelines, and budget targets (Chin-Keng, 2021). Quality management practices in project management include quality planning, quality control, quality improvement, and quality assurance, all of which are generally applicable to construction projects (Steyn, 2020). However, existing literature often focuses on broad quality management processes rather than the specific practices, tools, and techniques used under each process and how they affect project implementation.

Globally, construction projects continue to face implementation difficulties linked to funding constraints, cost uncertainty, poor management, delays, and quality concerns. In the United States, project owners have reduced or abandoned some capital construction projects due to inadequate financing, cost uncertainty, poor management, and concerns about delays that may affect project viability. In Australia, studies have emphasized the importance of contractors delivering complete road facilities within agreed costs, timelines, and quality standards. Similarly, studies in the United Kingdom have shown that construction projects often face conflicts between cost, time, and quality objectives, highlighting the importance of effective

project scheduling, cost management, and quality control in successful project implementation (Fapohunda & Stephenson, 2010).

Regionally, road construction projects in Africa also experience delays, cost overruns, and quality-related implementation challenges. In Sudan, Omran, Abdalrahman, and Pakir (2012) observed that cost overruns had become common in road construction projects of different sizes. In Ghana, Gaba (2021) reported that many road construction projects failed to meet project objectives due to rising costs and delayed completion. In South Africa, Olatunji (2010) found that weak understanding of project requirements by clients and project teams affected road project performance. Similarly, in Nigeria, Aibinu and Jagboro (2012) noted that delays had become common in road construction and significantly affected both project time and cost. These regional experiences show that road construction performance is strongly connected to how quality, time, cost, and project scope are managed.

In Narok County, road construction projects have also experienced delays, cost overruns, and quality concerns. Several road projects have not been completed within their planned schedules, while others have been completed later than expected and at higher costs due to scope changes and price variations. For example, the Kisiriri–Mwisho wa Lami Road project was expected to be completed in five years but took seven years, resulting in additional costs. Some road improvement projects have also been completed with poor workmanship, raising concerns about the quality of road infrastructure delivery in the county (World Bank, 2023). These challenges create the need to examine how quality planning, quality control, quality improvement, and quality assurance influence the implementation of road construction projects in Narok County, Kenya.

## **STATEMENT OF THE PROBLEM**

Generally, the successful measure of a project is defined by completing it within specified cost, time, scope and quality. Nwachukwu et al (2010), termed a road project to be successfully completed if it passed four success test criteria i.e. the time criterion – completed on time; the cost or money criterion – completed within budget; the effectiveness criterion – completed in accordance with the original set performance and quality standards; and client's satisfaction criterion – accepted by the intended users or clients whether the client is internal or from outside the organization.

Worldwide, devolution has been recognized as a key factor driving significant infrastructural development transformation more in perennially underserved regions. In Kenya, however, the situation in many counties has been far from what was envisioned. Road infrastructure projects in Kenyan county governments are rarely completed within the timeframes (World Bank: World Bank Funded Projects in Counties, Kenya., 2023). A large proportion of these projects are completed late, that is, two to five years later and some even end up stalled (Atibu, 2015) (Osman, M. A., Kimutai, G., 2023). The Narok County Government in its development plans has channeled vast amounts of resources to implement road infrastructure projects. Nonetheless, the number of projects stalling or falling behind schedule has persistently increased. A review of the implementation of the County Integrated Development Plan 2017-2022 showed that only 40% of the initiated road projects were implemented, the execution of a large number of these projects having been delayed (NCG, 2020). The report by the Auditor General for the financial year ending in 2021 paints this picture, revealing that road projects costing 360 million had been delayed, whereby, 9 months after the elapse of the stipulated completion date, only 47% to 64% of the physical works had been completed, an indication of poor project performance.

The Auditor General's report of 2022 also noted that though the Narok County Government had paid over 207 million to contractors towards works meant to improve roads in Narok Town to bitumen standards, physical verification carried out in September 2022 revealed that all the projects had stalled and further, that the respective contract periods lapsed in July 2021. The county management also did not provide any tangible plans to revive and complete the projects. Hence, the county residents did not get the value expected for the monies invested in these projects. These issues are a serious point of concern given that most of the roads in the county are still rendered impassable during the rainy season thus curtailing all movements by road within the county (NCG, 2020). The Office of the Auditor General notes that the above concerns are a result of avoidable issues and therefore, quality management practices must be prioritized in the execution of road projects in Narok County as this will ensure project requirements and specifications are met.

This study therefore sought to determine the extent to which quality management practices have been adopted in Narok County and how they relate to the implementation of road construction projects. Although previous studies have recognized quality planning, quality assurance, quality control, and quality improvement as key processes in project quality management, limited attention has been given to the specific practices under these processes

and how they influence project performance. For instance, Agbenyega (2019) assessed quality management practices among building construction firms in Ghana, Kwasira, Wambugu, and Wanyoike (2021) examined quality management practices and successful completion of building construction projects in Nakuru Town, Kenya, while Bete (2019) explored project quality management practices in the 40/60 Housing Project in Addis Ababa. Similarly, Zafarani (2021) and Jainendrakumar (2021) described quality management practices under different quality management processes but did not empirically test their effect on project implementation. Other scholars, including Muiruri and Were (2019) and Oni, Amusan, Owolabi, and Akinbile (2020), focused on drivers of effective project quality management practices rather than their influence on road project implementation. The study addressed these gaps by focusing on road construction projects in Narok County, a relevant setting because the county has experienced project delays, cost overruns, and other implementation failures.

### **OBJECTIVES OF THE STUDY**

- 1 To assess the relationship between Quality Planning on implementation of roads construction projects in Narok County, Kenya.
- 2 To examine the relationship between Quality Control on implementation of roads construction projects in Narok County, Kenya.
- 3 To analyze the relationship between Quality Improvement on implementation of roads construction projects in Narok County, Kenya
- 4 To determine the relationship between Quality Assurance on implementation of roads construction projects in Narok County, Kenya.

### **LITERATURE REVIEW**

This chapter reviews the relevant literature regarding project quality management practices in road construction projects narrowing it down to Narok County.

#### **Theoretical Framework**

The theoretical framework of this study was based on Systems Theory and the Project Management Body of Knowledge (PMBOK) framework. These theories provide a basis for understanding project quality management practices in road construction projects. The PMBOK Framework, established by the Project Management Institute, provides a structured

approach to project management through initiation, planning, execution, monitoring and controlling, and closure. The framework informed the variable of quality planning because road construction projects require clear project goals, defined scope, work breakdown structures, schedules, budgets, resource allocation, and performance standards before implementation begins. In this study, PMBOK supports the view that proper quality planning improves road construction project implementation by ensuring that project activities are organized, resources are allocated efficiently, quality requirements are defined early, and implementation is guided by clear standards.

Systems Theory explains that a project operates as a system made up of interconnected parts working together toward a common goal. The theory informed the overall relationship between quality management practices and implementation of road construction projects because quality planning, quality control, quality improvement, and quality assurance do not operate in isolation. In road construction, activities such as earthworks, drainage works, surfacing, supervision, resource use, and stakeholder coordination are connected. Therefore, Systems Theory supports the argument that effective implementation depends on how well different project components and quality practices are coordinated to achieve timely completion, budget adherence, scope compliance, and stakeholder satisfaction.

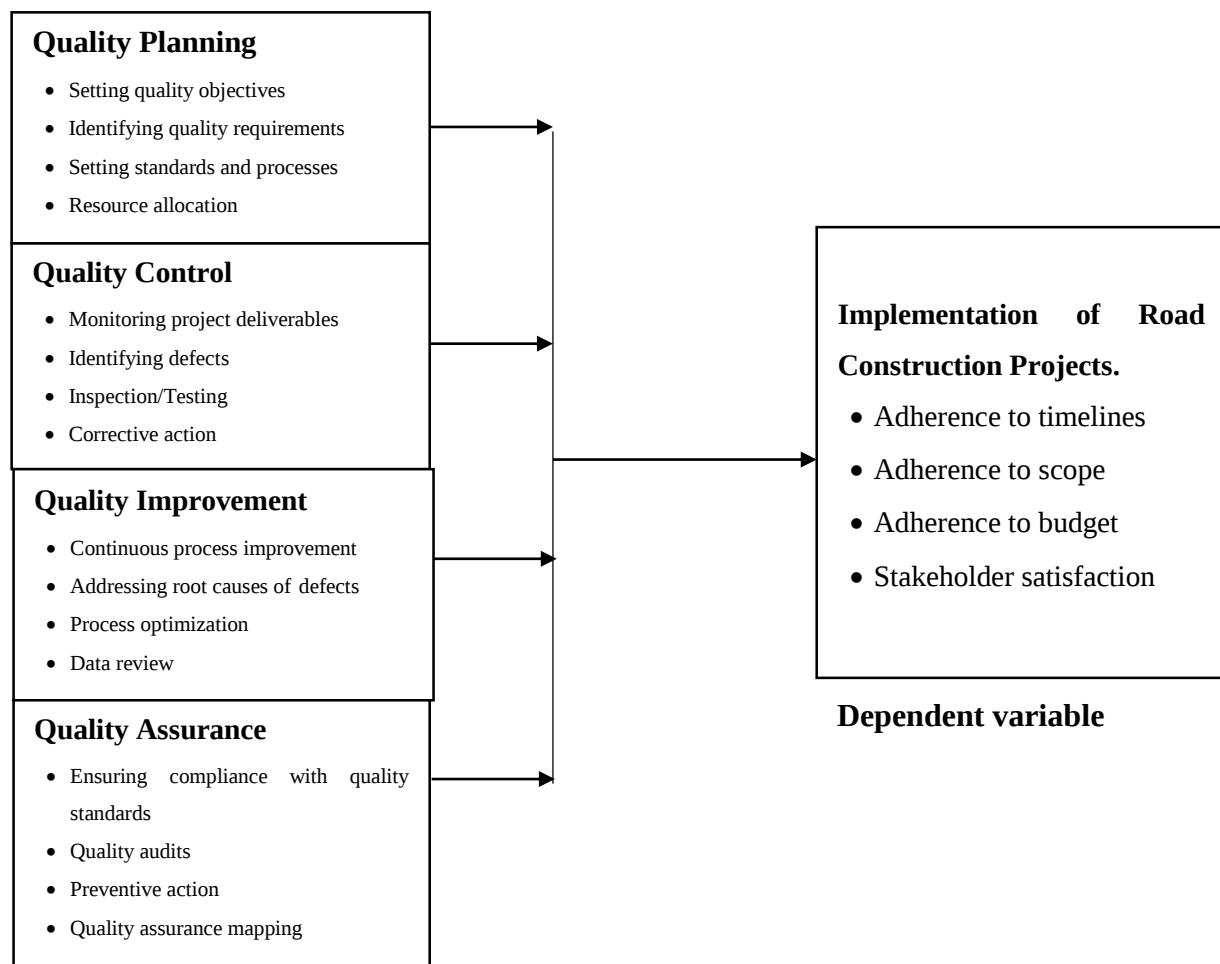
Total Quality Management Theory emphasizes organization-wide commitment to quality, customer satisfaction, employee involvement, continuous improvement, and doing things correctly from the beginning. The theory informed the variable of quality improvement because road construction projects require continuous review of processes, correction of weaknesses, reduction of defects, and improvement of project practices throughout the project lifecycle. In this study, TQM supports the idea that continuous quality improvement enhances road project implementation by reducing waste, improving efficiency, strengthening staff commitment to quality, and ensuring that project outputs meet stakeholder expectations.

Contingency Theory argues that there is no single best way to manage a project because the best management approach depends on internal and external conditions. The theory informed the variable of quality assurance because assurance practices must be adapted to the specific project environment, contractor capacity, regulatory conditions, leadership style, stakeholder expectations, and site conditions. In road construction projects, quality assurance may require audits, compliance checks, preventive actions, and quality mapping suited to the project context.

Juran's Quality Theory emphasizes quality planning, quality control, and quality improvement as the foundation of effective quality management. The theory informed the variables of quality planning, quality control, and quality improvement because it explains how organizations define quality goals, monitor processes, detect deviations, correct defects, and continuously improve performance. In road construction projects, Juran's theory supports the need to identify quality requirements, inspect project outputs, apply corrective actions, and improve processes based on evidence. Therefore, the theory is central to this study because it links quality management practices directly to successful implementation of road construction projects in terms of timelines, scope, budget, and stakeholder satisfaction.

### Conceptual Framework

The figure below shows the conceptual framework for the study:



### Independent Variable

Figure 1: Conceptual Framework

## **Empirical Review**

Herbold et al. (2018) examined the effect of quality planning on project implementation using a sample of twenty innovation technology projects in Northeast England. The study found that quality planning improved project efficiency when combined with project management learning, training, education, ambition, and human resource management. The findings showed that quality planning enabled project managers to set clear procedures and performance measures, which contributed to operational excellence. Similarly, Akimova et al. (2018) studied the effect of quality planning on project performance in Europe and found that quality planning improved project productivity by helping project teams identify project standards, adopt best interventions, and align project activities with project objectives. In Kenya, Odeck (2023) examined the influence of project planning on road construction project performance in Uasin Gishu County and found that cost budgeting, activity scheduling, work breakdown structures, and risk identification significantly and positively affected project success among road projects. These studies show that quality planning improves road project implementation by clarifying project standards, guiding resource allocation, supporting scheduling, and reducing implementation uncertainty.

Abdullahi et al. (2019) assessed quality management practices in the Nigerian construction industry following the collapse of major road projects in Abuja. The study found that inspection was the main quality control method used by construction managers, while quality auditing was not commonly practiced. The study further found that poor quality plans, weak communication, and inadequate training were major challenges affecting quality management in construction projects. Smallwood and Rossouw (2018) examined quality management systems in South African construction firms and found a positive and significant relationship between quality control, quality planning, and construction project implementation. However, the study found no significant relationship between quality assurance and performance. Levy (2018) studied the effect of quality auditing on performance in a waste management project in Kosovo and showed that auditing could influence performance through project-related factors such as size, age, investment, debt, capital resources, cash flow, and profitability. Kerzner (2022) also emphasized that understanding project quality challenges is necessary for meeting stakeholder expectations and ensuring public value in infrastructure projects. The study found that poor client competence, procurement weaknesses, inspection gaps, and assessment challenges contributed to quality problems in infrastructure transportation projects. These studies indicate that quality control improves implementation by strengthening inspection,

defect identification, corrective action, communication, training, and compliance with project standards.

Mungu (2021) evaluated the effect of continuous improvement strategies on road construction projects in Kenya, focusing on road engineers, supervisors, inspectors, surveyors, and contractors. The study found a significant positive relationship between project management approaches and road project delivery. The findings further showed that continuous improvement methods accounted for 77.20% of road project performance, meaning that continuous improvement was a major contributor to project success. The study also found that project planning had the strongest effect, followed by project monitoring and evaluation, project financing, and risk assessment. Nicholas et al. (2020) examined the effect of continuous improvement approaches on road infrastructure projects in Abuja, Nigeria. The study found that project planning, project scheduling, project reporting, and minimal waste processes had a positive and significant influence on road construction project success. The study further emphasized daily tracking of project performance indicators, backward scheduling, expenditure planning, quality standards, and delivery procedures as important improvement practices. These studies show that quality improvement enhances implementation by promoting continuous review, process improvement, proper reporting, waste reduction, better scheduling, and corrective action throughout the project lifecycle.

Wu et al. (2021) studied the influence of quality assurance on performance in engineering projects in China. The study found that early detection and removal of faulty construction materials reduced future operating costs and improved project performance. The authors further found that quality assurance was most effective when the relationship between screening time, inspection cost, and fault detection accuracy was properly understood. The study emphasized that failure to detect defects early could lead to loss of time, resources, and money during later project phases. Schmitt et al. (2020) examined the effect of inspection on the performance of education projects in Entebbe, Uganda. The study found that inspection was a key component of quality management across all project phases and that project quality was significantly correlated with project management practices, including quality inspection. The study also showed that inspection cost, inspection quantity, inspector competence, and inspection timing influenced project quality outcomes. These studies suggest that quality assurance improves road construction project implementation by supporting compliance

checks, early defect detection, inspection planning, quality audits, and prevention of costly errors before they affect project timelines, budgets, and stakeholder satisfaction.

## **RESEARCH METHODOLOGY**

The study adopted a descriptive research design to examine the influence of quality management practices on the implementation of road construction projects in Narok County, Kenya. The target population comprised road construction projects in Narok County, while the units of observation included County Engineers, Quantity Surveyors, Construction Project Managers, Architects, and Site Agents who were directly involved in the projects. The sampling frame consisted of road construction projects sourced from the Kenya Roads Board, and a census approach was used because the population was manageable. Primary data were collected using well-structured closed-ended questionnaires measured on a Likert scale. A pilot study was conducted on five road construction projects involving ten respondents to test the validity and reliability of the instrument.

Reliability was measured using Cronbach's alpha, and all variables recorded values above the recommended threshold of 0.700, with an overall reliability score of 0.900, confirming strong internal consistency of the research instrument. Before data collection, the researcher obtained authorization from the University and a research permit from NACOSTI. The questionnaires were administered using the drop-and-pick method, while confidentiality and ethical use of data were assured. Data were processed and analyzed using SPSS version 25 through descriptive statistics, including means, percentages, and standard deviations, and inferential statistics using multiple linear regression analysis. The regression model tested the effect of quality control, quality planning, quality improvement, and quality assurance on the implementation of road construction projects, measured in terms of timelines, scope, budget, and stakeholder satisfaction.

## **FINDINGS AND DISCUSSIONS**

This section outlines the key findings and discussions for Quality Planning, Quality Control, Quality Improvement, Quality Assurance and Implementation of Road Construction Projects in Narok County, Kenya. This chapter includes both the study's descriptive and inferential findings.

### **Response Rate**

The study population comprised 110 personnel in implementation of road construction projects in Narok County. 110 questionnaires were issued to the respondents. 82 questionnaires were

filled out and returned, equivalent to a 75.00% response rate. Gray (2024) highlights that a 70.00% response rate is adequate for research.

## **Descriptive Results**

### **Objective One: Quality Planning and Implementation of Road Construction Projects**

The first objective sought to assess the relationship between quality planning and the implementation of road construction projects in Narok County, Kenya. The descriptive findings showed that respondents generally agreed that quality planning practices were applied in road construction projects. The highest mean score was recorded for the statement that quality requirements were identified and a quality management plan was developed for road project implementation, with a mean of 4.030 and a standard deviation of 0.937. This was followed by the statement that systems existed to handle risks facing road project implementation, with a mean of 3.849 and a standard deviation of 0.857. Respondents also agreed that Narok County had set quality standards for road construction projects, with a mean of 3.818 and a standard deviation of 0.999. However, the statement on the existence of set quality objectives recorded a slightly lower mean of 3.667 and a standard deviation of 0.841. These findings imply that quality planning contributed to road project implementation by supporting the identification of quality requirements, development of quality management plans, risk handling, and setting of quality standards.

### **Objective Two: Quality Control and Implementation of Road Construction Projects**

The second objective examined the relationship between quality control and the implementation of road construction projects in Narok County, Kenya. The results showed that respondents generally agreed that quality control practices were used during road project implementation. The highest mean score was recorded for the statement that identified defects were promptly corrected during implementation, with a mean of 4.091 and a standard deviation of 1.055. This was followed by the statement that regular data collection and testing were conducted for defect identification, with a mean of 4.061 and a standard deviation of 0.736. Regular inspection to identify defects also recorded a positive mean of 3.727 and a standard deviation of 0.930. However, frequent monitoring during project implementation had the lowest mean of 3.333 and a standard deviation of 0.943, indicating moderate agreement. These findings suggest that quality control influenced road construction project implementation

through defect identification, testing, inspection, and prompt correction of defects, although frequent monitoring still requires strengthening.

### **Objective Three: Quality Improvement and Implementation of Road Construction Projects**

The third objective sought to analyze the relationship between quality improvement and the implementation of road construction projects in Narok County, Kenya. The descriptive findings indicated that quality improvement practices were positively perceived by respondents. The highest mean score was recorded for the statement that collected data were analyzed to ensure continuous improvement of processes during implementation, with a mean of 4.152 and a standard deviation of 0.783. Review of defect reports to address root causes recorded a mean of 4.000 and a standard deviation of 0.853, while project close-out meetings and reports aimed at quality improvement recorded a mean of 3.970 and a standard deviation of 0.834. The implementation of corrective and preventive actions on identified defects had a mean of 3.667 and a standard deviation of 0.765. These results indicate that quality improvement supported road project implementation through continuous data analysis, defect report review, root cause correction, preventive action, and project close-out learning.

### **Objective Four: Quality Assurance and Implementation of Road Construction Projects**

The fourth objective sought to determine the relationship between quality assurance and the implementation of road construction projects in Narok County, Kenya. The descriptive findings showed that respondents agreed that quality assurance practices were applied in road construction projects. The highest mean score was recorded for the statement that there were qualified and competent auditors to carry out audits, with a mean of 4.121 and a standard deviation of 0.769. Quality audits carried out on a timely basis to allow improvements or corrections recorded a mean of 4.000 and a standard deviation of 0.779, while quality audit reports on the progress of works also recorded a mean of 4.000 and a standard deviation of 0.739. Compliance with set quality standards had a mean of 3.789 and a standard deviation of 0.769. These findings imply that quality assurance contributed to project implementation by promoting compliance with quality standards, use of competent auditors, timely audits, audit reporting, and continuous correction of project weaknesses.

### **Implementation of Road Construction Projects**

The descriptive findings on the implementation of road construction projects showed moderate agreement among respondents regarding project performance outcomes. The highest mean

score was recorded for the statement that projects were implemented on time, with a mean of 3.636 and a standard deviation of 0.810. Stakeholder expectations recorded a mean of 3.515 and a standard deviation of 0.925. Implementation within budget and implementation within outlined scope both recorded a mean of 3.364, with standard deviations of 1.039 and 0.881 respectively. These findings suggest that road construction projects in Narok County achieved moderate success in terms of timeliness, budget adherence, scope compliance, and stakeholder satisfaction. However, the relatively lower mean scores for budget and scope indicate that more effort is needed to strengthen quality management practices in order to improve overall project implementation.

### Inferential Findings and Discussions

Inferential statistics were utilized to establish the relationship between the study's independent and dependent variables. This analysis included Pearson's correlation coefficient to assess association strength and multiple regression analysis to examine predictive relationships.

### Correlation Analysis Findings and Discussions

Correlation analysis determined the relationship between quality management practices and implementation of road construction projects. Table 1 below shows the results:

**Table 1: Correlation Analysis**

| Implementation of road construction projects |                     | Implementation of road construction projects | Quality Planning | Quality Control | Quality Improvement | Quality Assurance |
|----------------------------------------------|---------------------|----------------------------------------------|------------------|-----------------|---------------------|-------------------|
| Implementation of road construction projects | Pearson Correlation | 1.000                                        |                  |                 |                     |                   |
|                                              | Sig. (2-tailed)     |                                              |                  |                 |                     |                   |
| Quality Planning                             | N                   | 33                                           |                  |                 |                     |                   |
|                                              | Pearson Correlation | 0.517**                                      | 1.000            |                 |                     |                   |
|                                              | Sig. (2-tailed)     | 0.002                                        |                  |                 |                     |                   |
|                                              | N                   | 33                                           | 33               |                 |                     |                   |
| Quality Control                              | Pearson Correlation | 0.555**                                      | 0.260*           | 1.000           |                     |                   |
|                                              | Sig. (2-tailed)     | 0.001                                        | 0.017            |                 |                     |                   |
|                                              | N                   | 33                                           | 33               | 33              |                     |                   |
| Quality Improvement                          | Pearson Correlation | 0.411*                                       | 0.296            | 0.164           | 1.000               |                   |
|                                              | Sig. (2-tailed)     | 0.016                                        | 0.094            | 0.263           |                     |                   |
|                                              | N                   | 33                                           | 33               | 33              | 33                  |                   |
| Quality Assurance                            | Pearson Correlation | 0.483**                                      | 0.277**          | 0.258           | 0.203               | 1.000             |
|                                              | Sig. (2-tailed)     | 0.004                                        | 0.008            | 0.083           | 0.098               |                   |
|                                              | N                   | 33                                           | 33               | 33              | 33                  | 33                |

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

\* Correlation is significant at the 0.05 level (2-tailed).

The correlation results showed that all quality management practices had positive and statistically significant relationships with the implementation of road construction projects. Quality control had the strongest positive correlation with implementation of road construction projects ( $r = 0.555$ ,  $p = 0.001$ ), indicating that frequent monitoring, regular inspection, data collection, testing, and prompt correction of defects play an important role in improving project implementation. Quality planning also had a significant positive relationship with implementation of road construction projects ( $r = 0.517$ ,  $p = 0.002$ ), suggesting that setting quality standards, defining quality objectives, identifying quality requirements, and establishing risk-handling systems contribute to better project outcomes.

Quality assurance showed a moderate positive and significant relationship with project implementation ( $r = 0.483$ ,  $p = 0.004$ ), implying that compliance with quality standards, use of competent auditors, timely audits, and audit reports support transparency, correction of weaknesses, and project success. Quality improvement also had a positive and significant relationship with implementation of road construction projects ( $r = 0.411$ ,  $p = 0.016$ ), showing that data analysis, defect report reviews, corrective actions, preventive actions, and project close-out reports help improve implementation. Overall, the findings imply that quality planning, quality control, quality improvement, and quality assurance are important in enhancing the implementation of road construction projects in Narok County, particularly in relation to time, budget, scope, and stakeholder satisfaction.

### Regression Analysis Findings and Discussions

The regression analysis determines the relationship between quality management practices, and implementation of road construction projects. The regression model summary, analysis of variance results, and the regression coefficients are shown in Table 2, Table 3, and Table 4 below:

**Table 2: Regression Model Summary**

| Model | R                  | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|--------------------|----------|-------------------|----------------------------|
| 1.    | 0.579 <sup>a</sup> | 0.435    | 0.340             | 0.272                      |

a. Predictors (Constant), Quality Planning ( $X_1$ ), Quality Control ( $X_2$ ), Quality Improvement ( $X_3$ ), and Quality Assurance ( $X_4$ ).

From Table 2 above, the findings in the regression model summary underscore the importance of quality planning in explaining variations in implementation of road construction projects,

aligning with recent literature on project management. According to Smith and Zhang (2023), quality management practices significantly enhance project control and responsiveness, allowing teams to address issues proactively and maintain alignment with project goals. This proactive approach can explain the model's moderate positive correlation ( $R = 0.579$ ), where monitoring improvements contribute to better project performance outcomes.

Moreover, the model's R Square value of 0.435 suggests that while quality management practices notably influence implementation, other factors also likely contribute. Studies emphasize that team collaboration, effective communication, and resource allocation impact implementation outcomes (Walker & Lee, 2024). This is consistent with the adjusted R Square of 0.340, which accounts for the number of predictors and indicates that quality management practices alone explain about one-third of the variance in project outcomes. Therefore, although quality management practices are essential, integrating additional management practices could enhance implementation further.

Finally, the standard error of the estimate (0.272) suggests relatively accurate predictive capability, though some variation remains unaccounted for. This finding aligns with recent research, which indicates that while predictive accuracy improves with quality management practices, complete precision is often challenging due to external and unforeseen factors (Johnson & Clarke, 2023). Thus, while quality management practices strengthen project control, a comprehensive approach, including robust risk management and adaptability, is needed to effectively address all sources of variance.

**Table 3: Analysis of Variance (ANOVA)**

| Model |            | Sum of Squares | df | Mean Square | F     | Sig.               |
|-------|------------|----------------|----|-------------|-------|--------------------|
| 1.    | Regression | 10.727         | 4  | 2.682       | 3.530 | 0.019 <sup>b</sup> |
|       | Residual   | 21.273         | 28 | 0.760       |       |                    |
|       | Total      | 32.000         | 32 |             |       |                    |

a. Dependent Variable: Implementation of road construction projects

b. Predictors (Constant), Quality Planning ( $X_1$ ), Quality Control ( $X_2$ ), Quality Improvement ( $X_3$ ), and Quality Assurance ( $X_4$ ).

From Table 3 above, the ANOVA findings provide insights into the significance of the regression model used to analyse the relationship between quality management practices and implementation of road construction projects. With an F-value of 3.530 and a significance level

(Sig.) of 0.019, the regression model is statistically significant at the 5% significance level, indicating that at least one of the predictor variables contributes meaningfully to predicting implementation of road construction projects. This is consistent with findings by Murphy and Green (2023), who emphasized that quality management practices can substantially enhance implementation outcomes by enabling timely adjustments and resource optimization.

The Sum of Squares for the regression (10.727) and the residual (21.273) reveal that while a notable portion of the variance in implementation of road construction projects can be attributed to the predictors, a considerable amount remains unexplained. This residual variance aligns with findings by Lee and Santos (2024), who argue that while quality management practices significantly support implementation improvement, additional factors—such as team dynamics, external influences, and strategic decision-making—impact implementation outcomes. The Mean Square values for regression (2.682) and residuals (0.760) illustrate that the variance explained by the model’s predictors is meaningful but not exhaustive, suggesting that adding complementary management strategies could further enhance implementation outcomes. Recent studies corroborate this view, emphasizing that while quality management practices are essential, success often relies on a balanced integration of adaptive planning, effective stakeholder communication, and ongoing risk assessment (Johnson et al., 2024).

**Table 4: Regression Coefficients**

| Model               | Unstandardized Coefficients |            | Standardized Coefficients | t     | Sig.  |
|---------------------|-----------------------------|------------|---------------------------|-------|-------|
|                     | $\beta$                     | Std. Error | Beta                      |       |       |
| (Constant)          | 0.283                       | 0.152      | -                         | 0.659 | 0.013 |
| Quality Planning    | 0.408                       | 0.184      | 0.316                     | 2.766 | 0.010 |
| Quality Control     | 0.127                       | 0.082      | 0.115                     | 2.532 | 0.029 |
| Quality Improvement | 0.123                       | 0.170      | 0.125                     | 2.725 | 0.004 |
| Quality Assurance   | 0.340                       | 0.065      | 0.437                     | 3.865 | 0.053 |

The regression coefficients in Table 4 above reveal insights into the contributions of quality management practices to overall implementation of road construction projects, as represented by both unstandardized ( $\beta$ ) and standardized (Beta) coefficients. These values were interpreted using the regression model:  $Y = A + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$ ;

$$Y = 0.283 + 0.408X_1 + 0.127X_2 + 0.123X_3 + 0.340X_4$$

Starting with quality planning, the analysis demonstrates a positive, statistically significant effect on implementation of road construction projects, with an unstandardized coefficient ( $\beta$ ) of 0.408 and a Beta of 0.316 ( $p=0.010$ ). This confirms quality planning's substantial influence on project success, aligning with Wang and Liu (2023), who highlight the importance of quality standards and clear quality objectives established early in the project. This significant outcome reinforces that structured; well-monitored quality planning is essential for meeting project scope and stakeholders' expectations.

The analysis for quality control reveals a statistically significant positive impact on implementation of road construction projects, with an unstandardized coefficient ( $\beta$ ) of 0.127, a Beta of 0.115, and a p-value of 0.029. This finding suggests that quality control positively influences outcomes when reinforced by frequent monitoring and regular inspections. As Thompson and Valdez (2024) argue, quality control sets the project's alignment, but its effectiveness materializes when integrated with adaptive strategies. The positive impact seen here implies that quality control is beneficial, especially when it allows for anticipatory adjustments that prepare the project for smooth execution.

In the case of quality improvement, the data show a positive and statistically significant association with project performance ( $\beta=0.123$ ; Beta=0.125;  $p = 0.004$ ). These findings indicate that quality improvement directly affects implementation of road construction projects, likely due to analysis of collected data and review of the defect reports. Williams and Chen (2023) observe that quality improvement is crucial for implementing plans, especially when coupled with agile responses to data. These findings suggest that quality improvement is most effective when it facilitates quick, performance-oriented adaptations that keep projects on track.

Lastly, quality assurance positively influences implementation of road construction projects, with an unstandardized coefficient ( $\beta$ ) of 0.340 and a Beta of 0.437, albeit with a borderline significance level ( $p=0.053$ ). Although the effect is insignificant, the near-threshold p-value suggests meaningful, practical benefits, particularly in capturing project insights and ensuring quality completion. Chang and Rahman (2024) emphasize that thorough quality assurance contributes to continuous improvement by complying to the set quality standards. Additionally, Garcia et al. (2024) indicate that quality assurance enhances project success by facilitating transparency and stakeholder satisfaction. These results imply that, even without statistical

significance, quality assurance supports long-term project value by embedding critical lessons and reinforcing trust.

## **CONCLUSION**

The study concludes that quality management practices play a significant role in the implementation of road construction projects in Narok County, Kenya. Quality planning was found to provide the foundation for successful project implementation by enabling project teams to set quality standards, define quality objectives, identify quality requirements, engage stakeholders, and prepare for possible risks. This helped align project activities with available resources, project scope, timelines, and stakeholder expectations. Quality control also emerged as a key contributor to project success by supporting regular monitoring, inspection, defect identification, corrective action, and informed decision-making. Through quality control, project managers were able to optimize resources, reduce disruptions, improve transparency, and keep project activities aligned with the intended objectives.

The study further concludes that quality improvement and quality assurance are important in strengthening road construction project implementation. Quality improvement supported continuous data review, defect analysis, corrective and preventive action, project close-out learning, and timely response to emerging challenges. This enhanced operational efficiency, cost control, stakeholder trust, and adherence to project objectives. Quality assurance also contributed to project implementation by promoting compliance with set quality standards, use of competent auditors, timely audits, audit reporting, and continuous learning. Overall, the findings confirmed that quality management practices influence implementation outcomes such as budget control, schedule adherence, scope management, and stakeholder satisfaction. However, the study also concluded that quality management practices should be integrated with other project management strategies, including resource allocation, team coordination, and stakeholder engagement, to achieve stronger and more sustainable road construction project outcomes.

## **RECOMMENDATIONS**

To enhance the implementation of road construction projects in Narok County, it is essential to integrate quality management practices aspects. Quality management practices provide crucial insights into project progress, enabling effective resource allocation and swift identification of issues before they escalate. By incorporating quality management practices from the outset, projects can stay on track, meeting objectives within the set timelines, budget,

and scope. This approach ensures that any challenges, such as delays or cost overruns, are detected early, minimizing their impact and allowing for timely corrective actions.

Capacity building and stakeholder engagement are equally vital for improving the effectiveness of quality management practices. It is essential to train project managers, field staff, and local community members on modern technologies like mobile apps, GPS, and data analytics, which can significantly enhance data collection and decision-making processes. Empowering stakeholders with the necessary skills and knowledge ensure more accurate and efficient monitoring, leading to better management of road construction projects. Moreover, fostering collaboration among all involved parties, including government agencies and local communities, helps maintain alignment with project goals, enhances transparency, and promotes ownership of road construction projects outcomes.

Lastly, quality assurance, though showing marginal significance, remains crucial for assessing the success of road construction projects efforts and ensuring long-term sustainability. By incorporating these recommendations, implementation of Narok County's road construction projects can be more efficient, transparent, and ultimately more successful in achieving their goals.

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