

# Project Resource Planning and Performance of County-Funded Rural Road Projects in Nakuru County, Kenya.

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**Abstract :** *The main aim of the study was to determine the influence of project resource planning on the performance of county-funded rural road projects in Nakuru County. It was grounded on project management theory and conducted using a descriptive research design. The study targeted 135 rural road projects in 9 sub-counties (Naivasha, Subukia, Bahati, Molo, Njoro, Kuresoi North, Kuresoi South, and Rongai) carried out during the fiscal year 2022/2023 by the County Government of Nakuru. Hence, the units of analysis were the 135 projects, while the units of observation were 135 contractors, 9 engineers, and 9 project managers, making a population of 153 respondents. Primary data was collected using questionnaires. Data was entered and analyzed with SPSS version 25 statistical software. Both descriptive and inferential statistics were analyzed. Results indicated a strong positive and significant link ( $p=.000$ ,  $r=0.886$ ) between project resource planning and the performance of county-funded rural road projects. The regression analysis ( $R^2 = .573$ ) revealed that the independent variables as predictors, explain approximately 57.3% of the variance in project performance. This meant that the performance of rural road projects was collectively influenced by, project resource planning. The remaining 42.7% percent implied that there are elements that influence the performance of rural road projects that are not covered in this study. The study concluded that project resource planning influences the performance of county-funded rural road projects in Nakuru County.*

**Keywords:** Project performance, County funded, Rural roads projects, Resource planning,

## I. INTRODUCTION

### 1.1 Background

Roads play a crucial role in facilitating transport infrastructure, which is vital for the functioning and advancement of human society. Infrastructure development in Africa is widely recognised as a crucial determinant for the economic progress of the continent, since it enables higher levels of production, poverty reduction, and improved human well-being. Hence, the significance of infrastructure development in shaping the attainment of the Sustainable Development Goals (SDGs) is well recognised. According to Mbogo (2019), road construction is essential to Kenya's development, which may help to explain why it is one of the nation's largest industries, accounting for around 10% of the GNP. The transportation system that sustains mankind must include roads. They operate as crucial conduits between distribution centres, companies, and target markets. They encourage economic development by providing employment possibilities, as well as favourable social, health, and educational conditions that are all helpful in the fight against poverty. Road development delays in rural regions of Kenya, are thus regrettable and prevent the nation from achieving its Vision 2030 objectives. The ability to properly execute road-building projects has become crucial to governmental and business success, claim Viswanathan, Tripathi, and Jha (2020). The completion of road projects, however, is hampered by a number of expensive, frequent, dangerous, and challenging problems, including delays in the construction of roads. Any road construction project must adhere to the three constraints of time, money, and quality. Delays are not caused by a single calamity and can cost companies significant money. A detailed project plan is thus crucial for any project, regardless of its magnitude or density (Yap, Chow & Shavarebi, 2019).

Project planning is a discipline that focuses on completing a project within a set timeframe, with specific stages and resources. This involves breaking down the task into measurable objectives, identifying deliverables, and planning and scheduling tasks accordingly (Bencha, 2021). Project planning also assists teams anticipate and prepare for the future, clarify goals and vision, identify issues required to be addressed, choose between options, determine project feasibility,

allocate resources and responsibilities, and achieve the right results. For effective planning, the project team should outline the project's scope to make it easier to create a work breakdown structure, spell out the tasks and subtasks, develop a project schedule, plan for necessary resources, plan for the budget, specify the budgeted cost to be incurred at project completion, plan for procurement, plan for potential risks and take optional contingency plans and risk mitigation strategies into consideration, plan for quality assurance, and communication (Pellerin & Perrier, 2019).

Since 2013, the Nakuru County Government in Kenya has taken control of rural roads, leading to significant investments and improvements in the county's network, boasting over 9,000 kilometres of graded and gravelled roads. Initiatives like the Boresha Barabara program, now known as Imarisha Barabara, have been instrumental in enhancing accessibility to essential services and promoting economic growth, although further investment is needed to address remaining challenges. Collaboration between the national government and development partners is essential for continued progress (County Government of Kenya, 2021).

### **1.2 Statement of the Problem**

The significance of rural roads cannot be overstated, as they have a profound impact on rural communities, economies, and development in general. When road projects are planned and executed well, they improve connectivity and access to essential services, stimulate economic growth through trade and job opportunities, and play a critical role in reducing poverty and promoting agricultural development (Perez, 2020). In the Annual Progress Report of Nakuru County for the fiscal year 2020/2021, challenges with rural road infrastructure were identified as a persistent issue. Farmers face limited access to transport their agricultural produce, especially during adverse weather conditions. Moreover, the report pointed out that county-funded road projects have shown a lacklustre performance, with only 20% being completed to satisfaction. Consequently, the movement of people and farm products has become inefficient (County Government of Kenya, 2021). Following a study by Kimiti & Moronge (2019), it was discovered that the County of Nakuru lacks the capability to complete projects successfully. This is brought by a number of problems, such as a lack of resources and skilled labour. According to Wangai & Musembi (2023), there is also a risk of political interference in the project implementation process, which has the potential to reduce the projects' performance and results in projects being carried out for political reasons rather than county-wide benefits. Furthermore, bulk of road projects in Nakuru County were allegedly not completed on time, within budget, or to the required quality standards. The County Government of Nakuru must therefore face the problems it encounters in completing projects in order to address these issues.

Similar studies on project performance and planning have been conducted in a wide range of disciplines. Jared and Nyang'au (2021) investigated the effect of project planning on infrastructure project execution in Nairobi County, Kenya's public hospitals. Mwangi's (2019) study focused on the performance of county government projects, notably the Gatundu Modern Market in Kiambu County, Kenya. Wangai and Musembi (2023) focused on the execution of road development projects in Kenya's Nakuru City County. Musyula (2020) researched the elements that influence the success of non-governmental organisations in Kenya and discovered that strategic planning, governance, staff management, and financial stability were all positively associated to performance. The studies mentioned above indicate that no research has specifically examined the influence of project resource planning on the performance of county-funded rural road projects in Nakuru County, Kenya. In order to close this gap, the current study tries to do so.

### **1.2 Specific Objective**

To determine the influence of project resource planning on the performance of county-funded rural road projects in Nakuru County.

### **1.3 Research Hypotheses**

H<sub>01</sub>: Project resource planning has no significant influence on the performance of county-funded rural road projects in Nakuru County.

## **II. LITERATURE REVIEW**

### **2.1 Theoretical Review**

#### **2.1.1 Project Management Theory**

The Project Management Theory was brought forward by Koskela and Howell in 2002. Project management theory is split into three theories: project planning theory, project execution theory, and project control theory. To begin, planning theory proposes that a project has both a management and an effector aspect; the managerial aspect's primary function is planning, while the effector side's primary function is to put the ensuing ideas into action. There are two project planning theory pillars that acknowledge the present state of affairs: the desirable target state and permissible state

alterations that may be achieved by deeds, a set of activities that can infer the plan. Then the plan is converted into fact by the organization's effector element. (Cook,2019). Therefore, it is split into: management-as-planning and management-as-organizing. In management-as-planning, operational administration includes plan formulation, reorganisation, and execution. Management-as-planning was initially envisaged that there is an organisational component and an effector component in project planning . As opined by Knoepfel, (2020) management-as-organizing ensures the installation of the required resources (inputs: manpower, equipment, time and cash) to carry out the job specified. In construction projects, management entails customizing particular project specifications while organizing implies defining work duties, allocating them to positions, designing processes within the organization, and selecting appropriate actors for roles. Management-as-organizing is efficiently directed at gathering the required resources into a cohesive framework in compliance with the project schedule specifications (Weiss & Wysocki, 2021).

Second, the execution theory proposes that organisational implementation is all about assigning jobs to workstations. The concept behind this approach is that when the moment comes to begin carrying out the activity as planned, it is permissible to do so in speech or writing. It is assumed that the assignment's inputs and resources are available at the time of authorization, and that the work is well understood, restarted, and completed in line with the plan once authorised (Laboso,2019).

Finally, the notion of project control theory is that there is a system to be regulated, a performance measurement unit, a performance standard and a control unit (thermostat control). The control theory comprises of two systems: thermostat model and the model of science testing. The thermostat model stated a control mechanism, a measurement of performance unit, a standard for performance, and a control unit in the manufacturing process, whereas the scientific experimental control model focuses on identifying and addressing the causes of deviations rather than simply changing the performance level to achieve predetermined goals in the case. As a result, project control entails measuring achievement, identifying mistake, and understanding the sources of deviations, their consequences, and the best method to address them(Laboso, 2019).

As explained by Mwawasi (2019), the Project Management Theory is important in the performance of county-funded rural road projects. Incorporating this theory in the planning of county-funded rural roads projects is fundamental for achieving effective project performance. Incorporating project management principles and best practices within these key areas directly influences the performance of county-funded rural roads projects. Effective resource planning ensures the availability of necessary resources, proper time planning and management ensures project schedules are met, robust risk planning and management minimizes disruptions, and effective stakeholder planning ensures alignment with stakeholder interests and expectations. These aspects collectively contribute to positive project outcomes, including delivering high-quality rural road infrastructure within defined budgets and timelines, ultimately benefiting the communities and regions served by these projects

## 2.2 Conceptual Framework

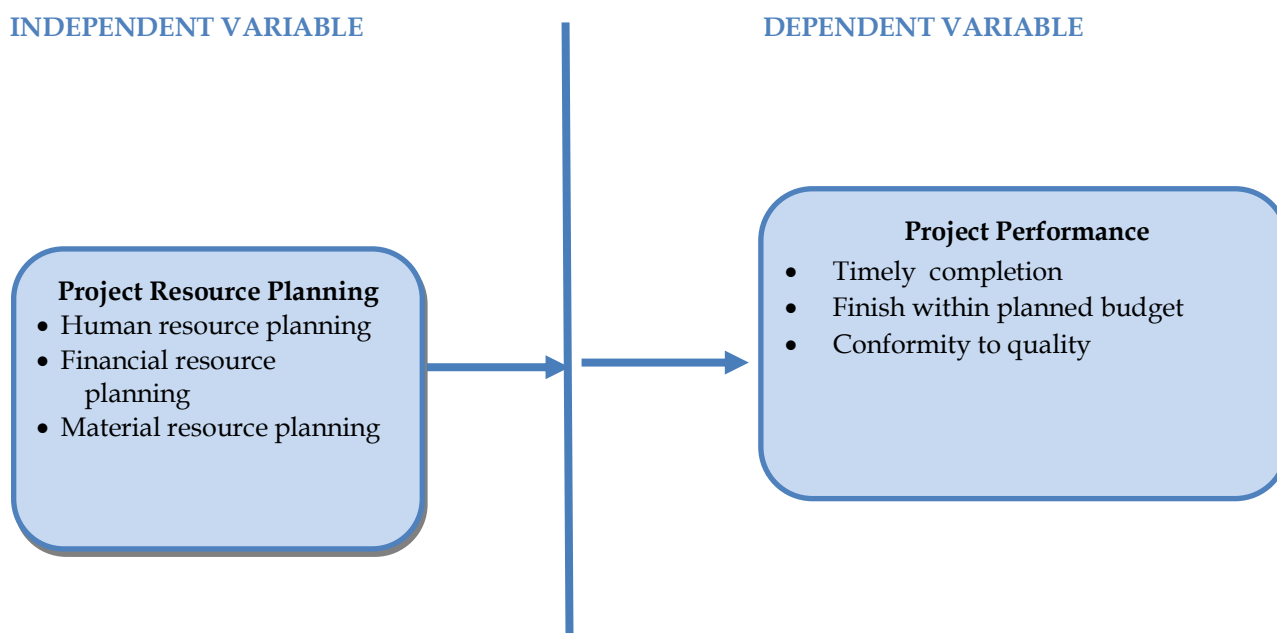


Fig 2.1: Conceptual Framework

### **2.3 Review of Literature on Variables**

Project resource planning refers to the process of planning for, distributing and utilizing various resources, such as personnel, machinery, and equipment, with the objective of optimizing resource efficiency. Additionally, resource planning provides a comprehensive overview of the availability and capacity of these resources. Resource planning encompasses the strategic allocation of appropriate tasks to suitable team members within specified timeframes, thus ensuring timely and conflict-free delivery of the desired project outcomes. Implementing an effective resource plan can contribute to cost reduction, enhance the accuracy of project expense forecasts, and ultimately improve project performance. Proper resource planning ensures that the correct resources are available at the right time to do the relevant tasks (Abdi, 2020).

A resource can encompass both actual and intangible assets, as well as several sorts of resources such as personnel, material, and financial resources. Human resources are often regarded as the major resource in project management, and they include workers, contractors, consultants, specialists, and other labourers involved in project execution. The project management office, along with other indirect personnel, can be viewed as part of the human resources inside a business. Material resources encompass two main categories: capital goods, which consist of equipment such as machinery, devices, cars, tools, and computers; and consumables, which comprise raw materials, components, and office supplies. These resources are essential for the effective execution of the project. The financial resources, such as equity, debt, and revenues, cover the budget allocated for a project (Projektron, 2023).

According to Gupta (2023) project resource planning entails the identification of human, financial, physical and technical resources and the organization of these resources in a manner that leads to successful project execution. Resource planning ensures efficient utilization of production factors like money, machinery, labour, and land for project development, ensuring timely deployment and utilization of resources. Prompt site access is crucial for contractors and agents to fulfil their obligations efficiently, avoid inefficient resource use, schedule, and cost overruns, and ensure timely completion of tasks.

Resources play a key role in the execution of every project. Resources can be categorised into two main types: tangible and intangible resources. According to the resource-based theory, capabilities are integral components that contribute to an organization's ability to gain a competitive advantage. Hence, the allocation of physical or materials, human, and financial resources plays a pivotal role in the project growth within an organisation. Construction projects often necessitate a substantial allocation of resources, including construction materials, financial backing from governmental entities, a skilled labour force, and machinery. Road projects are a component of infrastructural development initiatives that are mostly overseen and financed by the government at the county level (Chepng'eno and Kimutai, 2021).

### **2.4 Empirical review**

In Rwanda, Andinda (2023) examined the influence of resource planning strategies on the success of projects in Rwanda, specifically the upgrading of Kigali International Airport. The researcher specifically wanted to know how human resource planning methods, financial planning practices, and material and equipment planning practices affected project performance in Rwanda. The study found that human resource planning methods, financial resource planning practices, and material resource planning practices all had an impact on project performance.

Telsang and Raymond (2019) looked at how a project's planning stage affected how successful it turned out. The study employed a descriptive research method and concentrated on funding for Indian projects. The study found that planning involves defining phases, activities, financial goals, and performance indicators for successful project execution. It also recommended a list of personnel, tools, supplies, and infrastructure required for successful completion.

Additionally, Akuno and Wanyoike (2020) studied the effect of project resource planning on elephant conservation performance at Tsavo National Park. The two theories adopted were resource-based theory and planning theory. The study used a descriptive research approach and focused on 176 technical workers from the Administration department

(Finance and Procurement section), infrastructure development staff, security department, and Community Wildlife services in the Tsavo East Conservation Area. According to the study, resource planning has a significant impact on the efficacy of elephant conservation efforts. The association between resource planning and conservation project success was shown to be statistically significant.

Abdi (2020) did research in Wajir County, Kenya, analysing resource management practices and assessing the efficiency of road infrastructure initiatives. The study's analysis was based on a descriptive survey. The goal was to involve 193 project stakeholders, including 5 county officials from the County Transport and Infrastructure Department, 47 project managers, and 141 members of the Project Management Committee. These people jointly performed critical roles in directing the completion of 47 key road projects under the county administration. According to the study, resource planning provides a considerable advantage by supporting the efficient completion of job requirements inside businesses.

### III RESEARCH METHODOLOGY

#### 3.1 Research Design

This study was conducted using a descriptive research approach

#### 3.2 Population

The study targeted 135 rural road projects in 9 sub-counties (Naivasha, Subukia, Bahati, Molo, Njoro, Kuresoi North, Kuresoi South, and Rongai) carried out during the fiscal year 2022/2023 by the County Government of Nakuru. As a result, the units of analysis were the 135 projects, while units of observation were the 135 contractors, 9 engineers, and 9 project managers, making a population of 153 respondents.

#### 3.3 Sampling Frame

In this study, the sampling frame consisted of a list of contractors, engineers and project managers, who were the respondents. The motive behind selection of the respondents, was because they were in a better position to provide comprehensive and credible information about the topic under study.

#### 3.4 Sampling size and Sampling technique

To compute the sample size, the study utilized the Yamane formula as illustrated below:

$$n = \frac{N}{1 + N(e)^2}$$

Where; n = the sample size

N = population size

e = error tolerance (0.05)

$$n = \frac{153}{1 + 153(0.05)^2} = 110$$

Sample size = 110 respondents

To calculate the sample size of each category of respondents the following formula was used;

$$n_h = \left( \frac{N_h}{N} \right) \times n$$

$n_h$  = Sample size of stratum h

$N_h$  = population size of stratum

N = total population size

n = total sample size

**Table 3. 1:Sample Size of Each Category**

Category of respondents	Target Population	Sample Size
Contractors	135	98
Engineers	9	6
Project managers	9	6
<b>Total</b>	<b>153</b>	<b>110</b>

Sampling refers to the process of choosing representative units from a population. The study adopted stratified sampling technique under the three categories of respondents (contractors, engineers, project managers) who formed the strata. From the respective stratum, respondents were randomly selected in order to arrive at the 110 respondents.

### 3.4 Data collection instruments

Primary data was collected using questionnaires. Questionnaires are a cost-effective and efficient way to reach all study participants and make it easier to analyse the data gathered

### 3.5 Data analysis and presentation.

Data was entered and analysed with SPSS statistical software. The gathered data was quantitative in nature and provided in tables to facilitate comprehension of the information supplied. Both descriptive and inferential statistics were analysed. Means and standard deviations were used to analyze descriptive statistics, while hypothesis testing, correlation and regression analyses were used to investigate inferential statistics. The regression model that was used was as follows:

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

Where Y=Dependent variable and X1 is the independent variable,

Where; Y= Project Performance

X1= Project Resource planning

$\beta_0$ = is the constant or intercept

$\beta_1$ = is the regression coefficients of independent variables

$\varepsilon$ = Error term

Tables were then employed to present the data.

## IV.RESEARCH FINDINGS AND DISCUSSION

### 4.1 Response Rate

**Table 4.1 : Response Rate**

Responses	Frequency	Percentage
Expected Responses	110	100
Received Responses	97	88
Un-received Responses	13	12
<b>Total</b>	<b>110</b>	<b>100</b>

The researcher issued 110 questionnaires to the respondents, out of which 97 questionnaires were successfully filled and duly returned while unreceived responses were 13 in number. This represented a response rate of 88%, while those who

did not respond stood at 12% respectively. The response rate was deemed adequate for the purposes of the study as it surpassed the threshold of 75% recommended by Nulty (2019).

**4.2 Descriptive Analysis**

The study examined the perspectives of contractors, engineers, and project managers on how project resource planning affects the performance of county-funded rural road projects. The data was gathered and assessed using a 5-point Likert scale ranging from strongly disagree to strongly agree. The descriptive statistics used were percentages, means, and standard deviation.

**4.2.1 Descriptive Analysis for Project Resource Planning Practice**

The study sought to establish the influence of project resource planning on the performance of county rural-roads projects.

**Table 4. 2: Project Planning Practices**

<b>Statement</b>	<b>N</b>	<b>SA</b> (%)	<b>A</b> (%)	<b>N</b> (%)	<b>D</b> (%)	<b>SD</b> (%)	<b>Mean</b>	<b>Std. Dev</b>
At the planning stage, the project team determines the resources required for the projects.	97	61(63)	28(29)	0 (0)	5(5)	3(3)	4.43	0.967
Proper resource estimation is carried out for each project	97	38(39)	22(23)	0 (0)	19(20)	18(18)	2.73	1.490
Resources are allocated to specific tasks in accordance to their capacities	97	21(22)	42(43)	3(3)	13(13)	18(19)	3.36	1.437
The resources required to execute the projects are availed in a timely manner	97	13(13)	19(20)	4(4)	28(29)	33(34)	2.49	1.466
To keep projects on track, the use of resources is monitored and adjustments are made as needed	97	18(19)	70(72)	0(0)	4(4)	5(5)	1.51	1.032

Project resource planning influences the performance of road projects in the County	97	23(24)	30(31)	5(5)	21(22)	18(19)	3.20	1.484
	97							

From the study it was revealed that 92% agreed that at the planning stage, the project team determines the resources required for the projects. A study by AIMS (2023) found out that during the project planning phase, the scope of the project is defined by a work breakdown structure (WBS) and the project methodology to manage the project is decided on.

62% of the respondents agreed that proper resource estimation is carried out for each project (mean =2.73 ;standard deviation =1.490). According to eResourcerScheduler.com (2022), resource estimation helps identify the overall resource costs, timelines, risks related to the projects, and a lot more. It can help project managers to gauge various aspects of their future projects.

From the study findings 65% agreed that resources are allocated to specific tasks in accordance to their capacities. In their study, Rahman and Ayer (2019) found that based on prioritization, resources are allocated to specific projects or tasks. This step involves matching the identified resource requirements with the available resources. Specific engineers or job roles are assigned to projects based on their expertise and compatibility with project needs.

In addition, Majority (63%) of the participants disagreed if the resources required to execute the projects are availed in a timely manner (mean=2.49; std=1.466). Gupta (2023) found out that timely resource availability is critical in driving the success of project planning. Understanding resource availability is essential for managers to effectively plan, allocate, and utilize resources throughout the project lifecycle.

The findings further showed that 91% respondents agreed that to keep projects on track, the use of resources is monitored and adjustments are made as needed (mean=1.15;std=1.032). Finally, 55% of the respondents agreed that project resource planning influences the performance of road projects in the County (mean=3.20;std =1.484). The results support Abdi's (2020) conclusions that resource planning has a good and substantial impact on project performance and helps organisations become more efficient.

### 4.3 Inferential Statistics Findings

This part discusses the findings of the inferential statistics analyzed from the data collected regarding the influence of project resource planning on the performance of rural road projects.

#### 4.3.1 Correlation analysis between project resource planning and the performance of county-funded rural road projects

The researcher sought to establish the relationship between project resource planning on the performance of county-funded rural road projects in Nakuru County as shown in Table 4.3

**Table 4. 3: Pearson’s Correlation between Project Planning and Performance of Farm Forestry Project**

Variable	Project Performance	
Planning	Pearson Correlation	..886**
	Sig. (2-tailed)	0.000
	N	97

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



Based on the findings in Table 4.11, there is a strong positive and significant link ( $p=.000$ ,  $r=0.886$ ) between project resource planning and the performance of county-funded rural road projects. This conclusion is coherent with research by Akuno and Wanyoike (2020), which found a positive and substantial association between resource planning and elephant conservation project success ( $p=0.000, r=0.961$ ). Ogogo, Omwenga, and Paul (2019) found that resource planning improves the performance of government building projects in Kenya.

#### 4.4 Regression Analysis

##### 4.4.1 Regression Model Summary

The study conducted a regression analysis to find out the strength of the relationship between independent and dependent variables as shown in Table 4.4

**Table 4. 4:Regression Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	df1	df2	Sig. F Change
1	.754a	.573	.577	242.698	4	92	0.000

a. Dependent Variable: Performance of Rural Roads Project

b. Predictors: (Constant), Project Resource Planning

Results from Table 4.14 indicate an R square value of .573. This implied that the independent variable as a predictor, explains approximately 57.3% of the variance in project performance. It therefore meant that the performance of rural road projects was influenced by project resource planning. The remaining 42.7% percent implied that there are elements that influence the performance of rural road projects that are not covered in this study.

##### 4.4.2 Multi regression Analysis of Project Planning

The study also conducted a regression analysis to establish the regression coefficients. Table 4.5 shows the results

**Table 4. 5:Regression Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	.014	.202		.069	.945
	Performance of Rural Roads Project	.980	.177	1.215	5.542	.000

a. Dependent Variable: Project Performance

Table 4.5 demonstrates distinct but related statistical results. The indicated results were in tandem with the following regression model;

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

The results indicated the suitability of the regression model which was interpreted as follows.

$$Y = 0.014 + 0.980 X_1 + \epsilon$$

The findings shown above implied that a change of 1 unit in the performance of rural road projects was subject to a change of 0.980 unit in project resource planning while at the same holding other factors (0.014) constant. Thus, while holding all other factors (including the variables) constant, 0.980 unit in project resource planning would result in 1-unit change in performance of rural-road projects. The findings on the influence of project resource planning were consistent with research by Omondi (2019), which found that project resource planning influences the success of road-building projects. Akuno and Wanyoike (2020) argue that resource planning conservation project performance.

## V. CONCLUSION

According to the research, it was established that the performance of rural road projects funded by the county administration in Nakuru County can be attributed to the efficient planning of project resources. The study found that when resources are adequately planned and availed on time, there is a noticeable improvement in the overall performance of these projects. The positive impact of proper resource planning on rural road projects is significant and cannot be overlooked. This study provides valuable insights into the importance of project resource planning and its role in ensuring the successful completion of county-funded rural road projects in Nakuru County.

## VI. RECOMMENDATIONS

The study recommends that the county government should enhance resource planning by forecasting resource needs well in advance to minimize delays caused by resource unavailability. They should also develop comprehensive resource plans aligned with project timelines and requirements to ensure timely availability. The project managers should establish effective communication channels with relevant departments or stakeholders responsible for resource allocation. They should also foster collaboration between project managers and resource providers to streamline resource availability and allocation processes. Implement robust systems or tools for continuous monitoring of resource utilization and availability. They should also regularly assess resource needs against actual availability and make proactive adjustments to allocation as needed to prevent project delays.

The study was performed to determine the influence of project planning on the performance of county-funded rural road projects in Nakuru County, Kenya. It focused on county-funded rural road projects and hence, its findings may not be generalized to urban roads or other regions with different conditions. It is therefore recommended that comparative studies be done across counties or regions to assess the effectiveness of project planning practices in various rural road projects, identifying best practices and areas for improvement. Longitudinal studies should also be undertaken to evaluate the long-term impact of enhanced risk management strategies on project outcomes and resilience against unforeseen challenges. Further, studies should be done to analyse task dependencies dynamically throughout project lifecycles, considering how dependencies evolve and impact project outcomes. Finally, a study should be done focusing on cross-cultural or multi-stakeholder engagement approaches in rural road projects, highlighting strategies to navigate diverse stakeholder interests and expectations

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