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PROJECT PLANNING AND PERFORMANCE OF MAINTENANCE PROJECTS ON TRUNK ROADS IN KENYA

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ABSTRACT

Road infrastructure plays a vital role in a nation's socio-economic advancement by facilitating mobility and trade. Kenya's Vision 2030 underscores infrastructure development as one of the basic pillars of economic growth. Globally, the development and maintenance of infrastructure are recognized as catalysts for sustainable socio-economic progress. Effective project planning optimizes the allocation and utilization of resources for a better outcome. This study sought to establish the influence of project planning on the performance of maintenance projects on trunk roads in Kenya. The specific objectives were: to evaluate the relationship between project scope planning and the performance of maintenance projects on trunk roads in Kenya and to analyze the relationship between project risk planning and the performance of maintenance projects on trunk roads in Kenya. The study utilized the census survey research approach and the target population comprised of 226 engineers, surveyors, and inspectors in KeNHA who are involved in the planning of maintenance projects in KeNHA. Data was distributed to 226 respondents using a questionnaire out of which 210 responded and returned the questionnaire representing a 93% response rate. Descriptive and inferential statistics were engaged to scrutinize data and SPSS version 25 and MS Excel was adopted to expedite data analysis. The results of the study point out that: project scope planning and project risk planning had a positive and substantial impact on project performance. The study concluded that project planning significantly influenced project performance among trunk road maintenance projects in Kenya. The study recommended that aspects of project planning (scope and risk) must be put into consideration when planning for maintenance.

Key Words: Project Planning, Performance of Maintenance Projects, Project Scope Planning and Project Risk Planning

Background of the Study

Infrastructure is a fundamental element in the socio-economic progress of a country and ensures the mobility of citizens and produce across different locations. The preservation and improvement of infrastructure has been globally acknowledged as a facilitator of maintainable socio-economic development (Haller & Moller, 2019). Countries worldwide have therefore invested huge sums of money into the development of infrastructure so as to reduce poverty which will in turn improve the quality of its citizens. Rail and water transport are limited by the geography of an area and thus it is necessary to supplement them with road transportation (Chai & Yusof, 2013). Roads are initially designed for a certain period (10-20 years) following which reconstruction or rehabilitation is undertaken. However, defects may occur at some sections of the road before the design life lapses which necessitates timely maintenance to improve the lifespan of the road and hinder the defects from spreading to other road sections. A maintenance strategy can be defined as a sequence of activities that are adopted to safeguard the condition and function of infrastructure through protective and extrapolative conservation (BS EN 13306, 2010). The maintenance of roads will ensure that roads are preserved in their original condition which will lead to the increased number of persons and products moving across the country which will in turn grow the economy.

Project planning is an important aspect of road maintenance that ensures that finances and other resources allocated for this purpose are effectively utilized for a better outcome. A project plan incorporated formal documentation and description of the implementation and regulation procedures of a project (Pellerin & Perrier, 2019). The project administration plan comprises of; scope, schedule, cost, quality, resource, risk, and procurement management plans among others (PMI, 2017). The planning phase of a project involves the procedures that outline and refine the objectives; develop the strategies need to attain the objectives and determine the total scope of the effort (PMI, 2017). At the end of the preparation stage those involved in the execution of the project should be well informed about their roles and responsibilities within the project and the time they are required to take to deliver their mandates (Ahamed, 2010). Prosperous conclusion of any project within the specified schedule and without exceeding the budget is crucial for any organization. Project planning guides and directs the execution process thus increasing work efficiency and the likelihood of a successful project outcome (Pellerin & Perrier, 2019).

Project Scope Planning can be termed as the procedure of establishing the initial project pathway which outlines how the assignment will be demarcated, authenticated and controlled (PMI, 2017). Scope planning incorporates requirements collection where the needs of all stakeholders should be identified before defining the scope (Al-Rubaiei, Nifa, & Musa, 2018). Early identification of stakeholders' requirements minimizes the likelihood of them disapproving of the deliverables thus reducing scope changes (Pheng, 2018). Plan Procurement Planning entails selecting a competent and experienced seller and this will increase the likelihood of the project deliverables adhering to the stipulated standards (Krähmer & Strausz, 2011). Project procurement involves preparing the procurement statement of work which concisely, and completely describes the project (Eriksson & Vennström, 2009). Project resource management is the procedure that describes how to approximate, obtain, control, and use capitals (PMI, 2017). The resources include workers, financial resources, materials, apparatus, amenities and facilities. Ndayisaba and Mulyungi (2018) demonstrated that effective resource organization has a great influence on project success

execution. Project risk planning aims at declining the probability and/or consequence of adverse risks thus accumulating the possibility of the project being completed on time (Urbański, Haque, & Oino, 2019). Hwang, Zhao, and Toh (2014) discovered a positive correlation between risk planning and improvement in quality, budget, and timeline advancement of projects. These studies have demonstrated that project planning processes are key in ensuring that a project is successful. Trunk road maintenance projects therefore require meticulous planning to intensify the probability of the project efficacy.

The Kenyan the Government is investing heavily in road construction and maintenance in the country. Roads in Kenya are categorized into; International Trunk, National Trunk, Primary, Secondary, and Minor Roads (Ministry of Works, 1979). Trunk roads connect regions of international prominence which cross international boundaries or terminate at international ports. Furthermore, they connect centers of national importance such a major towns and urban centers. Primary roads link centers of provincial importance to one another or to higher class roads. Secondary roads connect local key areas or more important areas. Minor roads are roads that link minor centers e.g. markets/local centers. (Ministry of Works, 1979). There is a high volume of heavy good vehicles that continuously traverse trunk roads thus subjecting them to a lot of wear and tear. It is crucial that these roads are well maintained to increase their durability and longevity.

Wafula (2017) observed that adequate financial resources, technical resources and skilled project managers greatly enhanced the completion of road projects. Kagiri (2017) observed that poor planning and unrealistic expectations led to more expenses in building assigments. Hussein & Kisimbii (2019) opined that 21% of the road developments in Garissa County were completed as scheduled and within budget. Kikuvi (2016) noted that stakeholder disagreements, unskilled staff and improper selection of contractors hindered the successful completion of projects in Kenya. Ondara (2017) observed that construction projects in Kenya were characterized by poor risk planning and management measures that increased vulnerability to failure. Therefore, it is evident that project planning is a necessary element in projects and thus ought to be taken into consideration when planning for trunk road maintenance projects. This study therefore intends to find out whether project planning practices have in any way contributed to the deterioration or quality maintenance of these roads in the country.

Statement of the Problem

The importance of roads to the economy and the budget allocated to their construction necessitates its maintenance. Roads promote intra-and inter-national trade; financial development and poverty reduction. The government of Kenya expended Kshs 1.5 trillion to construct over 11,000km of paved road between 2013 – 2022 (Musalia, 2022). As of 2021 the total length of unpaved roads was 140,007 km while the total length of paved roads was 21,826 km (KNBS 2022). The transportation sector's 2021 output to the economy totaled 2.3 trillion, with 77.9% originating from the road subsector, amounting to 1.8 trillion (KNBS 2022). Preserving road condition, mitigating wear from use and weather, and bolstering safety and efficiency drives the significance of road maintenance (Janstrup, Moller, & Pilegaard, 2019). The need for maintenance increases with the aging of the pavement layers and the intensification in the number of vehicles traversing the route (Zwikael, 2009).

Given substantial global annual investments in road construction, governments must prioritize road maintenance. 38% of the road infrastructure in Kenya is deteriorated due to a backlog in the implementation of maintenance projects which is attributed to the absence of road maintenance

plans (Cukia, 2021). KRB estimates that Kshs 1.2 trillion is needed to sufficiently clear the maintenance backlog over the next five years (Thuita 2021). KRB however only distributed Ksh 617 billion to the various road agencies from 2017 to 2022 (KNBS, 2022). There is, therefore, a need for a meticulous planning process to ensure that the roads are well maintained despite the limited funding and without quality being comprised. Constructing roads without properly maintaining them compromises their purpose.

Prior researchers have extensively examined project management's role in road project success. Ondiek (2020) measured the effects of project management on road construction success in Uasin Gishu County and discovered a significant link between the accomplishment of road construction projects and timely organization, scope definition, budgeting, and risk preparation. Ochenge (2018) examined project administrative approaches' effects on the Lake Region road construction projects, establishing that factors like capital allocation, supervision, valuation, and risk planning significantly influenced project success. Ouru (2019) explored paramount project supervision tactics in the Kiambu-Nairobi Intercounty Road reconstruction, unveiling a notable correlation between task execution and project administration, scope management, cost control, monitoring, and evaluation.

The above literature has revealed that the impacts of project planning on road projects has largely been investigated. However, the majority of these investigations have focused mainly on the consequence of project planning and the successful outcome in road construction activities and not on road maintenance. This study, therefore, sought to fill the study gaps by establishing the influence of project planning on the success of maintenance initiatives on trunk roads in Kenya.

General Objective

The overall objective of this study was to establish the influence of project planning on the performance of maintenance projects on trunk roads in Kenya.

Specific Objectives

i. To establish the relationship between project scope planning and the performance of maintenance projects on trunk roads in Kenya.
ii. To analyze the relationship between project risk planning and the performance of maintenance projects on trunk roads in Kenya.

Theoretical framework

Theory of change (TOC)

The approach is fundamentally an encompassing framework of the means and factors a desired change is expected to occur within a specific context. The model concentrates particularly on mapping out the requisite programs or change initiatives that lead to the achievement of targeted goals (Guarneros-Meza, Downe & Martin, 2018). The model centers on describing all of the essential and appropriate situations necessary to achieve long term objectives. This approach operates by first ascertaining the preferred long-term objectives and then working to identify the requirements to be used to set the goals to be achieved. This holistic approach is crucial in project planning, where the alignment of objectives with resources and expertise is pivotal for timely goal attainment (Ahamed S.R, 2010).

The foundation of the TOC lies in its Outcomes structure, which not only outlines the necessary actions or interventions for the desired outcome but also elucidates the intricate connection between actions and the fulfillment of long-term goals. This model ensures a comprehensive understanding of the change process, leading to robust planning that enables effective assessment of progress toward long-term objectives (Serrat, 2017). The TOC utilizes backward mapping mandating project planners to navigate from long-term objectives to the intermediary and then early-stage modifications effectively forming a "pathway of change" (De Silva, Breuer & Lee, 2014).

This theory assumes a pivotal role in explicating the indispensable project planning considerations within trunk road maintenance. As these roads are already established but require sustained upkeep, the Theory of Change can guide maintenance project planners in strategizing optimal interventions for each road. This participatory model necessitates engagement from all stakeholders, ensuring that the change process is underpinned by their collective insights (Ahamed S.R, 2010)..

There are three important types of assumptions in the change model which are similar assumptions in project planning that should be adopted in trunk roads project maintenance. The first assumption is regarding the linkage between long-term, intermediate, and initial outcomes which map the trajectory of progress and are crucial for monitoring project advancement. Second is the confirmation of identified prerequisites for project effectiveness, which is essential to preempt potential delays, highlighting the need for comprehensive stakeholder involvement in projects. Third is the rationalizations connecting project activities to anticipated outcomes provide a tracking mechanism to ensure the project stays aligned with its objectives (Alp & Stack, 2012).

The structured approach of the TOC model not only ensures systematic planning but also offers an evaluation framework that enhances project performance (Serrat, 2017). The TOC model is therefore pertinent to this investigation because it will outline how scope planning and risk planning can influence the performance of trunk road maintenance projects.

Rational Choice Theory (RCT)

The Rational Choice Theory (RCT), initially proposed by Codd in 1969, provides a structured approach to decision-making that emphasizes the utilization of particulars, evidence, and a gradual process to arrive at a choice (Codd, 1969). It falls within a category of four decision-making approaches and is distinguished as a highly refined method compared to other alternatives (Sato, 2013). By employing the Rational Choice Theory (RCT) as a lens through which to examine decision-making in maintenance projects, a structured framework is used to assess the multifaceted aspects of project planning and execution

The RCT is based on the belief that before making a decision, there must be deliberations on the various available options that can fit the purpose they are intended for. The decision-makers will choose the option that is anticipated to yield the most desirable outcomes (Kroneberg & Kalter, 2012). In the context of maintenance projects, where resource allocation and timely execution are paramount, RCT underscores the importance of methodical evaluations. Additionally, this theory forms a strong base for this study, especially on the aspects of procurement planning within maintenance projects. When road managers are selecting the contractors who will maintain trunk

roads in Kenya, they need to make a rational choice based on the most qualified bidders. In the absence of sound decision-making, the maintenance of these roads could be compromised, perpetuating poor road conditions.

The principle of rational choice will aid the decision-makers in the trunk road management committees in taking decisions under certainty on what available alternatives and the potential result each option has on road maintenance. The rational choice model not only aids in problem identification and solution generation but also offers a systematic approach to analyzing and selecting the most suitable alternative (Dowding, 2011). By implementing such decisions, these committees can ensure the effective maintenance of trunk roads, leading to consistently improved road conditions. The Rational Choice Theory provides a robust foundation for your study's exploration of decision-making processes in maintenance projects. Through its structured approach, decision-makers within trunk road management committees can navigate complex choices with greater confidence, ensuring the continuous upkeep of trunk roads in optimal conditions.

Conceptual Framework

It is a diagram that illustrates the interconnection of research main components. The following conceptual framework will show the interactions of study variables that show the effects of project planning on the performance of maintenance projects on the trunk roads. The framework shows the connection between the independent and dependent variables. The conceptual framework below shows the project planning as the independent variable which is indicated by; project scope planning (requirement collection, scope definition, create a WBS), and project risk administration (identification, analysis, response). The framework also indicates that the dependent variable is the performance of road maintenance projects.

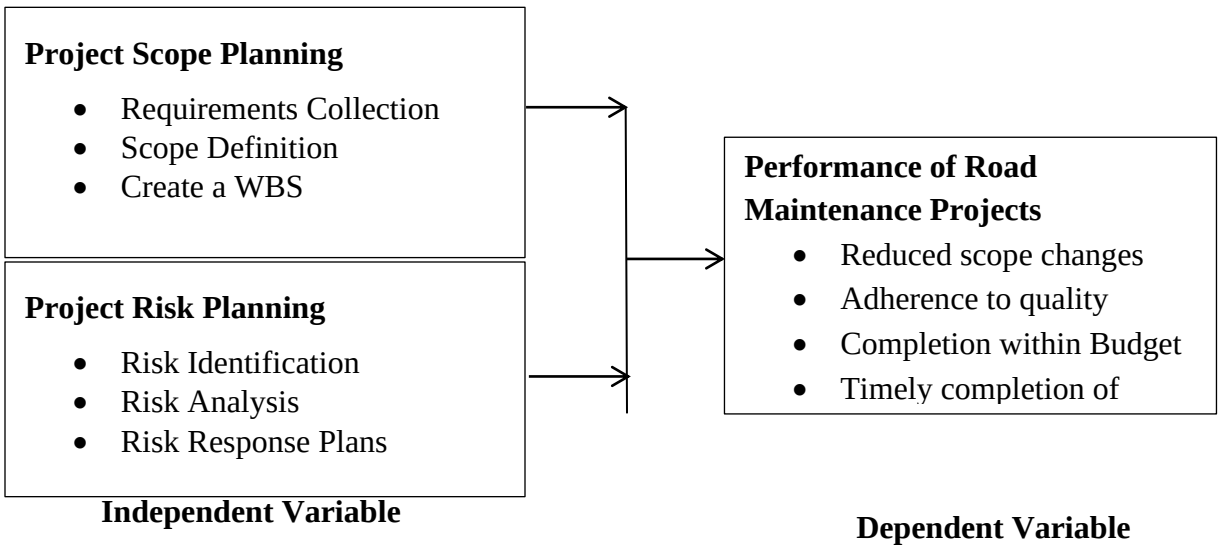

Figure 1: Conceptual Frame work

Empirical Review

Project Scope Planning

Alp and Stack (2012) researched and analyzed scope planning and change control approaches to establish prevailing proficiencies and insufficiencies for scope planning and change control for big and complicated schemes on a fast-track schedule in USA. The results of the investigation exhibited that 78% of the sample reported that unauthorized scope creep leads to project budget overruns. Further, 62% of respondents agreed that between 41% and 100% of projects are implemented at a fast-tracked pace for the engineering, construction, and architectural industries.

Banda and Pretorius (2016) measure the link between scope demarcation and enactment of rural road programs in Malawi. The investigation utilized a mixed techniques and a sample of 12 projects. The findings illustrated that there was a substantial link between scope definition and the effective completion of rural road construction initiatives in Malawi. The results also revealed that well-designed projects documented better performance while poorly-designed projects revealed poor performance.

Ngala (2019) examined the consequences of scope alterations on project achievement on road building initiatives in Nairobi. The examination engaged descriptive study method and targeted 350 contractors and engineers. The results of the survey illustrated that changes in scope greatly impacted on project completion. Julius and Yussuf (2021) evaluated the function of scope administration in the efficacious completion of rural road erection programs by the KeRRA in Nyeri County, Kenya. It targeted 107 project administrators for every of the projects executed by the KeRRA in Nyeri County between 2015 and 2019 and employed a census study approach. The study findings revealed that scope preparation, description, regulation, and change administration had a substantial influence on the completion of road building assignment.

The above literature review revealed that project scope planning significantly affects the completion of road building tasks. However, the literature has exposed that a majority of studies concentrate on road construction projects and not road maintenance. Additionally, none of the studies reviewed was specific to trunk roads hence this study intends to cover the above-exposed gaps.

Project Risk Planning

Diab, Varma, and Nassar (2012) analyzed and evaluated the various risk determinant in highway building programs in the US. Thirty-one substantial risk determinants, picked from past researches, evaluated, and assessed for this investigation. The researchers utilized a questionnaire to gather information from accomplished transport infrastructures in the US. The investigation employed a descriptive survey approach and engaged a sample of 660 experts selected from 29 states. The outcome of the analysis illustrated that the implementation of risk evaluation initiative positively impacted on the execution of the construction projects.

Perera, Rameezdeen, Chileshe, and Hosseini (2014) identified the risks precarious for planning of road building schemes in Sri Lanka. The study involved a sample of 33 Sri Lankan road building professional. The investigation discovered that the building and planning stages are predisposed to various main risks. Additionally, it was determined that several main risks could happen in

several phases of the project lifetime, emphasizing the essentiality of controlling these risk elements as a requirement for assignment accomplishment.

Armed (2019) assessed the risk administration and project realization in Somalia. The investigation utilized a correlation research model. The study findings discovered a considerable association between risk recognition and project success in Mogadishu, Somalia. Additionally, the results showed a correlation between risk control and regulation and project success. Further, a link between reacting to the risk and project attainment was established.

Kirira, Owuor, Liku, and Mavole (2019) inspected the influence of risk control approaches on road building initiatives' performance, particularly on KeNHA, Coast Region. The investigation was founded on the risk management theory and agency model. The investigation engaged the introspective survey approach. The study targeted individuals engaged in the sampled nine (9) construction projects done in KeNHA Coast Province from 2007 and a sample of 159 respondents. The outcome indicated that risk recognition, managers' acuity of risk assessment, and managers' risk extenuation perceptions swayed the completion of KeNHA road building initiatives in the Coast Province.

The above studies reviewed the consequence of program risk organization on the performance of maintenance projects on trunk roads and have revealed that globally, risk planning impacts the accomplishment of road construction schemes. However, the reviewed literature has shown that the majority of researchers have focused majorly on road construction projects leaving a gap for road maintenance projects hence the current study intends to cover this study gap.

RESEARCH METHODOLOGY

This study adopted a descriptive research design to establish the influence of project planning on the performance of trunk road maintenance projects. For this investigation, the target population consist of of 226 engineers, surveyors, inspectors in KeNHA who are involved in the planning of maintenance projects. The aforementioned are distributed across 14 regions in the entire country. A sample is a representation of a larger population. Gujarati (2017) argued that a sample is considered apposite when it encompasses the physiognomies of the population satisfactorily. Whichever assertions made regarding the sample must be factual about the target population (Orodho, 2022). This study applied the census survey approach whereby all 226 participants were engaged in the data collection procedure.

In this study, the investigator carefully constructed the questionnaire guided by the research objectives. The questionnaire gathered information on the consequence of project planning on the performance of maintenance projects on trunk roads in Kenya. A pilot study is essential as it can bring insights on barriers the researcher might encounter during the main investigation and also show sections of the tool that need adjustments (Nassiuma, 2019). The questionnaire was used in piloting where 10% of the sample size were tested, 23 sample members were used for piloting. The pilot results helped in improving the questionnaire to ensure its validity.

Data processing and scrutiny are critical to make sure that every pertinent information is collected for making anticipated appraisals and analyses (Mugenda & Mugenda, 2003). Data analysis can be classified into descriptive; exploratory or inferential.

Descriptive data analysis was accepted for this investigation as descriptive inquiry is utilized to expound the primary characteristics of the collected data. It offers simple summations of the sample and the measures (Kothari, 2017). Inferential statistics expedite interpretations from sample data to population status (Mangal and Mangal (2013). The research applied SPSS version 25 and MS Excel to assist the analysis of data. SPSS is utilized to carry out calculations on the data. SPSS was also applied in the development of a regression model to make interpretations on the consequence of every of the independent component on the dependent components.

RESEARCH FINDINGS AND DISCUSSIONS

Descriptive Statistics

Descriptive Statistics on Project Scope Planning

Respondents were obligated to point out the magnitude to which they agreed with items concerning to project scope planning on a 5 point Likert scale (Strongly disagree-1, Disagree-2, Neutral-3, Agree-4, Strongly agree-5). The summation of descriptive results is illustrated in table 1.

Table 4.1: Project Scope Planning

Project Scope Planning	SD	D	N	A	SA	Mean	Std. Dev
Internal and external stakeholders are consulted when collecting project requirements	7	5	19	74	105	4.26	0.958
Maintenance requirements are prioritized based on their urgency/needs.	0	2	8	111	89	4.37	0.605
The project scope comprises of major deliverables, assumptions and constraints.	9	15	28	81	77	3.96	1.082
The work breakdown structure provides a clear way of budget estimation and determining the contract period	6	11	31	79	83	4.06	1.003
A systematic process is set up to approve any scope changes and it's effect on cost, time and quality	11	23	42	77	57	3.7	1.135

From table 4.1, participants agreed that internal and external stakeholders are consulted during scope definition as observed by a mean of 4.26; Maintenance requirements are prioritized based on their urgency as shown by a mean of 4.37; The work breakdown structure provides a clear way of budget estimation and determining the contract period as shown by a mean of 4.06 and project scope comprises of major deliverables, assumptions and constraints as shown by a mean of 3.96. Data was further analyzed to determine the major factor that is taken into consideration when deciding project scope planning. The summary of findings is presented on figure 4.2.

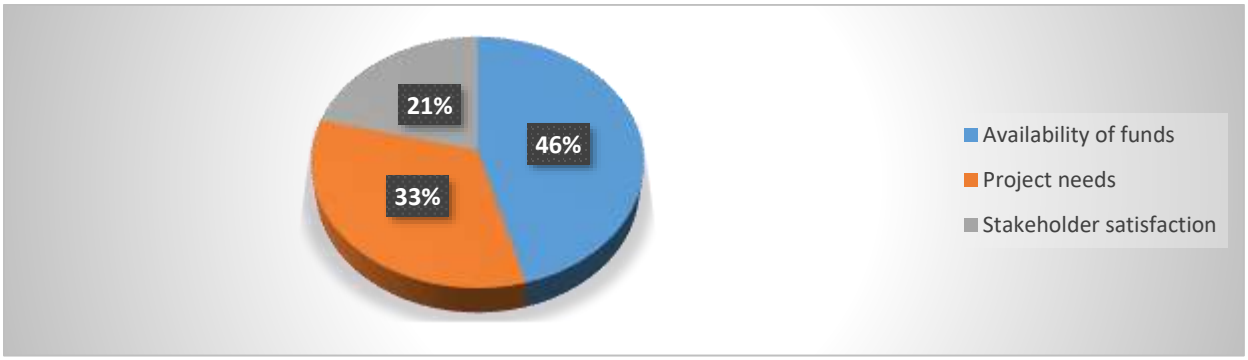

Figure 4.1 *Determinants of project scope planning*

As shown in figure 4.2, 46% of the participants indicated that availability of funds is a major factor when determining project scope planning. This finding show that finances play a great part in projects even from the planning stage. Funds dictate what is planned to be done hence the available funds influence project scope planning. This findings align with past researchers who have already established that finances influence the project scope planning, for instance, Bundi and Omwenga (2016) in their study discovered that financial resources affected the project deliverables. Additionally, the outcome of the investigation indicated that 33% indicated that project needs was a major factor. Past researchers concur with the later finings that project requirements determine scope planning. For example, Berbec (2014) stated that project delineation, supplies administration and scope management, were vital practices in guaranteeing a configuration between the project scope and the business approach.

Descriptive Statistics on Project Risk Planning

Respondents were needed to point out the magnitude to which they agreed with statements relating to project risk planning on a 5 point Likert scale (Strongly disagree-1, Disagree-2, Neutral-3, Agree-4, Strongly agree-5). The descriptive results is outlined in table 2.

Table 2: Project Risk Planning

Project Risk Planning	SD	D	N	A	SA	Mean	Std. Dev
A risk breakdown structure is used to identify potential risks that may impact the project.	11	12	18	81	88	4.06	1.096
Risk champions are assigned to monitor the status of identified risks in a project.	8	26	12	80	72	3.92	1.110
The probability impact matrix is used to prioritize the risks that have a high probability and high impact of occurring.	0	5	14	91	100	4.36	0.712
Quantitative risk analysis is undertaken using specialized risk assessment software	19	22	33	82	63	3.68	1.257
A cost benefit analysis is carried out when developing the risk response plans	5	11	33	63	98	4.13	1.015

As shown on table 2, participants agreed that the probability impact matrix is used to prioritize the risks that have a high prospect and high impact of occurring as indicated by a mean of 4.36, a cost benefit analysis is carried out when developing the risk response plans as indicated by a mean of 4.13 and a risk breakdown structure is used to identify potential risks that can affect the project as shown by a mean of 4.06.

These findings imply that assessing the project risks before beginning the project helps mitigate the risks even before they happen and also allocate the necessary resources to counter the risks during the project implementation process. Junkes, Tereso, and Afonso (2015) in their study documented that the risk appraisal phase consist of both categorization and scrutiny of project risks and aids the project execution group in decision making to manage the scrutinized risks. Further, Norris, Perry, and Simon (2000) explained that risks assessment results in an augmented comprehension of the project, which consecutively results in the establishment of more achievable ideas, considering both the financing and timeline aspects.

Data was further analyzed to determine the biggest challenge faced when implementing risk response strategies. The summary of findings is presented on figure 4.5.

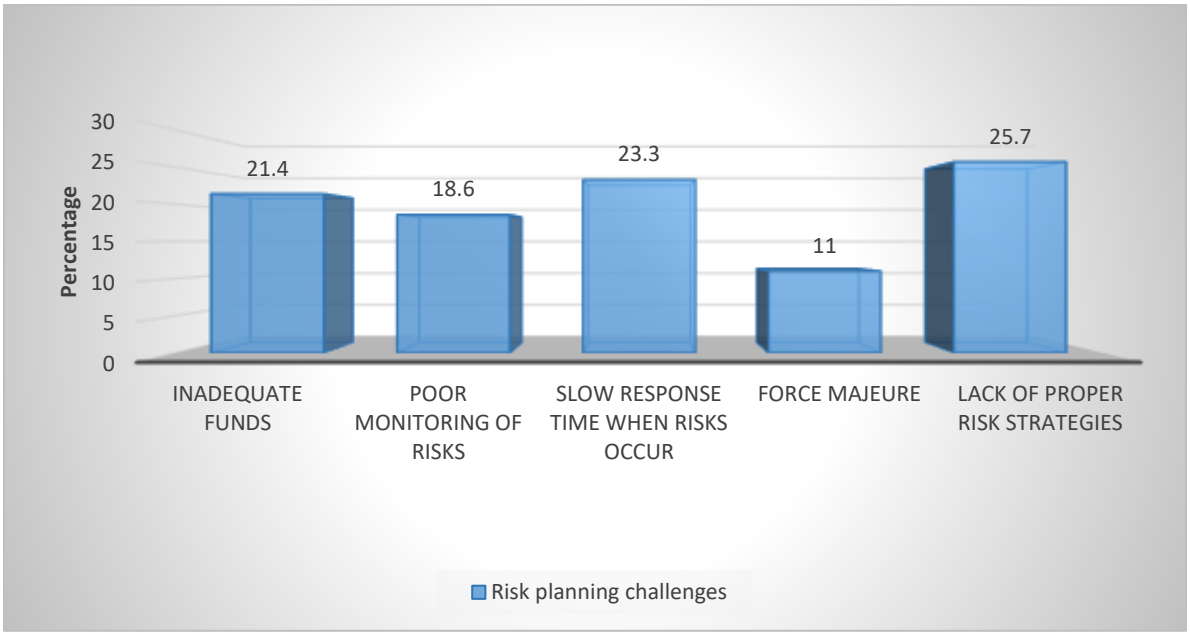

Figure 2: *Challenges in Project Risk Planning*

From figure 4.5, 25.7% of the participants noted that lack of proper risk strategies was a major challenge in risk planning. This finding indicate that sometimes, companied are not prepared to handle the risks which impacts on the projects. For instance, Kolisi (2015) in his study exposed that poor risk administration has a negative effect on project progress and completion. 23.3% indicated that slow response when risks occur was a challenge. This findings show that responding to risk timely very important because it affects the completion time. An investigation by Gitau (2015) showed that slow response to project risks results in unfinished and scanty design and delay in construction works. Further, 21.4% noted that inadequate funds was a major challenge in risk planning, meaning that many projects do not have financial allocation for risks and therefore when a risk occurs, it becomes difficult to manage the risky.

Inferential Statistics

Inferential statistics were conducted via Pearson correlation coefficient, linear regression and multiple regression.

Pearson Correlation Analysis

The Pearson correlation coefficient, abbreviated as r, measures how strongly and in what direction two continuous variables are correlated. A perfect negative linear relationship would have a value of -1, and a perfect positive linear relationship would have a value of +1. There is no relationship between two variables when the value is zero (zero) (Boslaugh, 2012).

Table 3 ***Correlation Findings***

		Project performance	Project scope	Risk planning
Project performance	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	210		
Project scope planning	Pearson Correlation	.893**	1	
	Sig. (2-tailed)	.000		
	N	210	210	
Project risk planning	Pearson Correlation	.885**	.810**	1
	Sig. (2-tailed)	.000	.000	
	N	210	210	210

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

From the findings on table 3, there was a statistically significant positive relationships between project performance and project scope planning and project risk planning respectively, (r=0.893, p=0.000) and (r=0.885, p=0.000).

Multiple Regression

A standard multiple regression is an extension of a simple linear regression that makes it possible for a researcher to predict a dependent variable based on a number of independent factors. The overall fit (variance explained) of the model and the relative contributions of each predictor to the overall variance explained may both be ascertained using this method (Kelley & Bolin, 2013). The summation of results is outlines in the subsequent tables.

Table 4 *Model Summary*[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.852[a]	.805	.804	1.473	2.063

a. Predictors: (Constant), Project scope planning, Project risk planning

b. Dependent Variable: Project performance

As shown on table 4.4, project scope planning and project risk planning accounted for 80.5% of the variation in project performance as shown by the adjusted R square value.

Table 5: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1200.915	2	642.979	411.11	.000[b]
	Residual	323.699	207	1.564		
	Total	1812.614	209			

a. Dependent Variable: Project performance

b. Predictors: (Constant), Project scope planning and Project risk planning

From table 5, the regression model was a good predictor for project performance from project scope planning and project risk planning, $F(3.040) = 411.11$, $p < 0.05$.

Table 6 *Regression Coefficients*

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
		B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound
1	(Constant)	11.423	1.484		.874	.003	.531	1.377
	Scope planning	.814	.037	.334	7.871	.000	.220	.367
	Risk planning	.865	.058	.328	5.925	.000	.229	.457

a. Dependent Variable: Project performance

Findings on the multiple regression established that project scope planning and risk planning had a statistically substantial impact on project performance $F(3.040) = 411.11, p < 0.05$.

From the Coefficient, the following regression equation was computed:
$Y = 11.423 + 0.814X_1 + 0.865X_2$Where:
$Y =$ Project performance; $X_1 =$ Scope planning; $X_2 =$ Risk Planning

The above regression equation indicates that project scope planning and risk planning to a constant zero; the variables will considerably impact project performance as illustrated by constant value of 11.423.

Project scope planning had a statistically substantial impact on project performance (β = 0.814, P = 0.000). This implies that scope planning had a momentous positive correlation with project performance. Therefore, a unit upturn of scope planning resulted to an upturn in project performance by 0.814.

Risk planning had a statistically substantial impact on project performance (β = 0.865, P = 0.000). This implies that risk planning had a weighty positive relationship with project performance. Therefore, a unit upsurge of risk planning resulted to an upturn in project performance by 0.865.

Conclusion of the Study

The primary objective of this research was to investigate how project planning influences the performance of maintenance projects on trunk roads in Kenya. Based on the findings and the comprehensive literature review conducted during the study, it is irrefutably evident that project scope planning assumes a paramount role in enhancing the performance of maintenance projects on trunk roads in Kenya. The meticulous delineation of project details, the establishment of well-defined timelines, and the proactive engagement of stakeholders collectively converge to shape the project's scope. This approach not only reduces scope changes but also exerts a profound influence on the overall project performance.

The research findings underscore the indispensable role of proactive risk planning in achieving the success of trunk road maintenance projects. By preemptively identifying and preparing for potential risks, project managers can adeptly navigate unforeseen disruptions, ensuring an uninterrupted project continuum. Additionally, the appointment of risk owners to monitor the status of identified risks is imperative. Comprehensive risk identification, rigorous risk analysis, and proactive risk responsiveness are integral components that contribute significantly to the timely and efficient completion of the project.

Recommendations

This segment outlines recommendations made following the research objectives. Resulting from the findings and conclusion, the recommendations are hence offered deliberately to enhance the performance of road maintenance projects in Kenya.

The study underscores the pivotal role of project scope planning in determining the success of trunk road maintenance projects. Consequently, it is recommended that project managers prioritize stakeholder engagement at the project's outset, ensuring their active involvement and consultation during the planning phase. This proactive approach will ensure that all factors are put into consideration and everyone is in agreement with every aspect before the commencement of the project.

Lastly, the research underscores the critical importance of early risk identification and analysis in project success. Timely implementation of risk response plans is imperative to prevent project delays. The appointment of a designated risk owner, tasked with monitoring risk status, ensures the timely completion of projects.

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