RISK MANAGEMENT STRATEGIES INFLUENCE ON ROAD CONSTRUCTION PROJECT PERFORMANCE: IMPLEMENTER INSIGHTS OF KENYA NATIONAL HIGHWAY AUTHORITY (KENHA), COAST REGION PROJECTS

Dominic Kumina Kirira
Catholic University of Eastern Africa, Kenya
Dr. Bethwell Owuor
Catholic University of Eastern Africa, Kenya
Cornelia N. Liku
Catholic University of Eastern Africa, Kenya
Dr. Johnson N. Mavole
Catholic University of Eastern Africa, Kenya

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ABSTRACT

Road construction projects environment is one of the most challenging and dynamic industries in Kenya. Traditionally risk management performed in the road construction sector has been intuitive or series of hit and miss oftenly with–risks either ignored or handled in an arbitrary way. Because of the complex nature of road construction projects, this approach has resulted to delays in projects delivery, litigation and cost overruns. This study focused on examining the influence of risk management strategies on road construction project performance with specific focus on KeNHA Coast Region. The main goal was to validate the influence of risk identification, implementer perception of risk appraisal, implementer risk mitigation perspectives and implementer risk control and monitoring insights on road construction project performance. The study was guided by the risk management theory and agency theory. Introspective survey design was used in this study. The target population of the study were key persons involved in selected nine (9) construction projects undertaken in KeNHA Coast Region in the last ten years since the year 2007. Stratified random sampling technique was used to select the sample. The sample size of 159 was obtained by use of Morgan and Krejcie (1970) model. Data was collected from the identified respondents using questionnaires. To ascertain their validity a pilot testing was conducted using 16-questionnaire, representing 10% of the sample size, and random sampling method was used to select the pilot group. Data was then analyzed using Statistical Package for Social Sciences (SPSS Version 25.0). Multiple regression analysis was used to establish the relations between the independent and dependent variables. The study found that risk identification, implementer perception of risk appraisal, implementer risk control and monitoring insights and implementer risk mitigation perspectives influence the Performance of KeNHA road construction projects in the Coast Region greatly, positively and significantly. The study concluded that risk identification had the greatest influence on performance of KeNHA road construction projects in the Coast Region followed by implementer perception of risk appraisal then implementer risk mitigation perspectives while implementer risk control and monitoring insights had the least influence on the performance of KeNHA road construction projects in the Coast Region. The study recommends that the project managers should increase engagement in capacity building activities in risk management and construction project management in general. There should also be a higher level of involvement of construction sector professionals charged with offering expert advice and assistance on implementation of risk management strategies. In a nutshell the study concluded that Risk Management is a very important aspect that greatly determine the performance of construction projects in Coast Region, KeNHA and the Construction industry in general.

***Key Words**: project performance, risk management strategies, implementer perception of risk appraisal, implementer risk mitigation perspectives and implementer risk control and monitoring insight*

INTRODUCTION

In recent times, the nature, incident and impact of risk in road construction projects have become a topic of interest because of the effects on quality, time and cost of road construction projects. According to K. Abhinaya & S.P Nidhu (2017) construction projects often face a lot of uncertainties, which places road construction projects at the risk of cost and time overruns as well as poor quality delivery and scope reduction. Njogu (2015) assessed the effects of construction risks on project delivery among Contractors in Kenya. Risk is important to contractors as well as clients and consultants within the road construction projects; however, the problems of risk assessment are complex and poorly understood in practice. Today every organization faces uncertain events that occur in different environments and with different characteristics and impacts. These uncertain events can generate more or less severe consequences for the organization. Road construction projects are no exception in being exposed to these uncertainties, which are complex and diverse risks. An effective use of project management techniques such as risk and value management are considered as key supporting processes and to add to them quality, cost, time and change control, all together generate an integrated approach to the project success (Zhao *et al*, 2013).

Risk management has become an important part of the management process for any road construction projects. Managing risks involve identifying, assessing and prioritizing risks by monitoring, controlling, and applying managerial resources with a coordinated and economical effort so as to minimize the probability and/or impact of unfortunate events and so as to maximize the realization of project objectives (Douglas, 2009). Having systematic risk management results in the early detection of risks where there is no more need for contingency plans to cover almost every eventuality (Olga, 2017) In fact, risk management came into the foreground of road construction projects during the last two decades of the 20th century. A risk management strategy provides a structured and coherent approach of identifying, assessing and managing risk. It has become an essential requirement for road construction projects and in construction generally where its process includes; identification, risk assessment, risk mitigation and risk monitoring (Douglas 2009). It is the systematic process of identifying, analyzing and responding to project risk, and it includes maximizing the probability and impact of positive attributes (also known as opportunity) and minimizing the probability and consequences of attributes adverse to project objectives. Major roles undertaken by any project manager is to deal with contingencies or risks that occur continuously during the management of a project and this role is particularly complex and inefficient if risk management has not been performed or supported adequately since the start of the project (Tummala & Schoenherr, 2011).

Globally, road construction projects are faced with challenges of risk management. In the United States, over 900 people die every year in automobile crashes in highway work zones.. In addition, 40,000 motorists involved in highway work zone crashes suffer from injuries, and 52,000 are involved in property damage (Abhinaya & Nidhu, 2017). In Africa, risks are shared among the actors in the road construction projects is largely determined by the choice of procurement option. In Kenya, road construction projects run a high risk of budget overrun

and significantly late in delivery. While some degree of poor cost derivation and time schedule performance is inevitable in road construction projects, it is possible to improve through adoption of sound risk management strategies to minimize likelihood of their negative impact and thus improve the overall project performance. One of the reasons of the poor performance is that the road construction sector in Kenya is among of riskiest of all business types. This has among other things provoked increased interest in the nature and mechanism of risk analysis and management (Talukhaba, 2014). KeNHA is responsible for the management, development, rehabilitation and maintenance of national trunk roads comprising of classes S, A, and B roads, totaling approximately 18,549km (KeNHA Annual Report – 2016/2017). KeNHA aims at upholding the following guiding principles: quality service, good corporate Governance that include efficiency, effectiveness, transparency and integrity. KeNHA endevours to develop, manage, rehabilitate and maintain national trunk roads taking into consideration environmental safeguards (KeNHA Strategic Plan 2013 – 2017).

THE PROBLEM

The risk management performed in the road construction sector has traditionally been instinctive or based on unwritten rules where most of the times risks have either been ignored or handled in an arbitrary way (Mbatha, 2011; Talukhaba, 2014). Because of the complex nature of road construction projects, this approach has resulted to cost overruns, delays and litigation. This ineffective and lax institutional framework and enforcement mechanisms for risk management have characterized the road construction projects. In KeNHA Coast Region it has been observed that some road projects have had major challenges due to execution by ill-equipped Contractors resulting in compromised quality of work executed, projects running behind schedule as well as having high cost overruns. At present, Coast Region and indeed the entire Authority, lack risk management framework for dynamic risks that occurs with no degree of regularity thus less predictable. Subsequently risk management in a particular project is dealt with through experience of the project execution team comprising of the KeNHA Engineers, supervising Consultants and the key persons of the Contractor with no commonly agreed upon procedures and framework. Various studies have been done on several aspects of risk management strategies and project performance (Ikiao, 2015; Serpella, et al., 2014; Wabomba's, 2015; Njogu, 2015). Evidently, none of these studies focused on the risk management strategies and road construction project performance which is the knowledge gap this study seeks to bridge by focusing on KeNHA Coast Region.

GENERAL OBJECTIVE

The main aim of this study was to examine the influence of risk management strategies on road construction project performance with specific focus on project implementer experiences and insights for the KeNHA road construction projects in the Coast region.

SPECIFIC OBJECTIVES

1. To affirm the influence of risk identification on performance of KeNHA road construction projects in the Coast Region
2. To assess implementer perception of risk appraisal on performance of KeNHA road construction projects in the Coast Region
3. To assess implementer risk mitigation perspectives on performance outcomes of KeNHA road construction projects in the Coast region
4. To examine implementer risk control and monitoring insights on performance of KeNHA road construction projects in the Coast Region

THEORY FRAME

This study was grounded on risk management theory and agency theory. Risk management theory, according to Vaughan (1997), attempts to explain the rationale behind companies puting in place the right level of controls for all material models supporting their business and decision-making processes. Considering this classification, risk would be created by the dynamic change in the economic environment and would depend on both, the evolution of external variables - the economy, competitors, industry membership and consumers – and the decisions taken internally by the organization (Forestieri, 2003). Nonetheless, dynamic risk could affect a great number of persons and they would believe to be less predictable than static risks, because they don't occur with any extent of regularity. Unlike dynamic, static risks are predictable and would occur with some regularity (Perrow, 2011).

This theory is relevant in this study as it assists in explaining how the contractors and Project owners manage risks they come across during project implementation. KeNHA road construction projects are prone to many risks and it's the responsibility of the contractors and project managers to find ways of assessing the risks, controlling them as well as strategizing on how to mitigate those risks. Risk management strategies helps the contractors and project managers to mitigate the risks hence enhancing the road construction project performance in KeNHA Coast Region.. Risk management theory is inadequate in explaining implementation of risk controls that can involve changes to operations orders standing operating procedures and drills or rehearsals. However the theory has a strength on static risks that are not dependable on the evaluation of the competitive environment in which the organization operates but would rest merely on the internal factors of the entity.

The Agency theory is directed at the ubiquitous agency relationship based on Floricel and Lampel (1998), in which one party, the principal, delegates work to another party, the agent, who performs that work. In building projects this relationship defined by the clients and the contractor. Agency theory is concerned with resolving two problems that occur in agency relationships. The first is the agency problem that arises when (a) the desires or goals of the principal and agent conflict and (b) it is the difficult or expensive for the principal to verify what the agent is actually doing.

This theory fits in this study as it helps to understand the relationships between Contractors and Project owners or clients. The Contractor represents the Client in a particular business transaction and is expected to represent the best interests of the Client without regard for self-interest. The different interests of Clients and Contractors may become a source of conflict, as some Contractors may not perfectly act in the Clients' best interests. A supposition that explains the relationship between Client and contractors in a road construction project. It is concerned with resolving problems that can exist in agency relationships due to unaligned goals or different dislike levels to risk. In this case, KeNHA as the Client hires a Contractor to construct a road on its road corridor under agreed terms and conditions.

EMPIRICAL REVIEW

A summary review of various studies global, regional and national level studies reveal interesting approaches and views which are relevant to this study. Firstly, the need for risk identification, Abd El-Karim, El Nawawy and Abdel-Alim (2015) in their study on identification and assessment of risk factors affecting construction projects stated that the unexpected increase in cost and delays in construction projects are caused by owner, contractor, environments, etc. in which several types of risk factors may occur concurrently. The influence of cost overrun and schedule overrun do not only influence the construction industry but the overall economy as well. Even though construction project increasing in cost and schedule has received extensive attention of researchers, but because of continuous changes and development in the field, the study considered of added value to the construction industry in Egypt, in addition to risk strategy and plan analysis. In order to meet the deadline of a project and due to the complex nature of construction projects, cost and scheduling should be flexible enough to accommodate changes without negatively affecting the overall project cost and duration. As such, the objectives of the presented research in this paper are to identify, study, and assess the influence of the factors that affect cost and time contingency.

The presence of uncertainty in everyday life as well as in organizations has become an important issue at present and to achieve its appropriate management has become a challenge. Due to the dynamic and complex environment that exists around organizations, uncertainty becomes an important issue that must be considered for the realization of any project (Rohaninejad & Bagherpour, 2013). Alongside this, in many occasions the identification of risks is done only during the preparation of the program and budget, but they are not monitored appropriately during project implementation. Other barriers that impact risk management are the lack of a common language (Aven, 2010), insufficient resources to carry out the risk management process and the lack of formalization of this process in construction projects.

A study by Serpell, Ferrada, Rubio and Arauzo (2015) focused on cconstruction organizations in developing countries with a focus of South Africa, approach risk management in construction projects by using a set of practices that are normally insufficient, produce poor results often, and limit the success of project management. The paper describes the development of an instrument based on an organizational maturity model for evaluating the risk-management capability of construction organizations. This instrument has been

applied to both, clients and contractors and is part of a general knowledge-based system. Outcomes of this research allow a client or contractor first, to develop or improve its project risk management capability based on international and local best practices and second, to continuously improve the performance of this function along the realization of new projects.

Kinyua (2015) did a study on influence of risk management strategies on project performance of small and medium information communication technology enterprises in Nairobi, Kenya. The A descriptive research design was adopted. An effective risk management practices encourages the ICT enterprises to identify and quantify risks and to consider risk containment and risk reduction policies. The study established that there existed a positive relationship between risk management strategies influencing project performance and ICT project performance for SMEs in Kenya and were statistically significant at 0.05 level. The study concluded that many (ICT) enterprises in Nairobi, Kenya have realized the importance of risk management practise in ICT project management to achieve process success. They carry out risk management to maximize the performance. ICT enterprises that manage risk effectively and efficiently enjoy financial savings and greater productivity, improved success rates of new projects and better decision making.

These studies on risk management have concentrated on cost and risk reduction, risk allocation, time and cost overruns leaving other important risk factors such as risk management strategies and policy issues in construction projects. Further, these studies were carried out when the operating environments were not as turbulent as at the time of this study thus the need to carry out another research that would account for changes in operating environment encountered in construction projects in this country. This study therefore sought to fill the existing research gap by carrying out a study on influence of risk identification on performance of KeNHA road construction projects in the Coast Region.

Secondly, the studies on the influence of risk appraisal and assessment reveal several scenarios. Jun, Qiuzhen and Qingguo (2010) have presented risk management as a series of interconnected processes involving specific techniques and tools and emphasized on project risk planning, risk identification, qualitative risk analysis, quantitative risk analysis, risk responses planning and risk monitoring and control to improve project success. Project managers should have a project risk management programme plan to contribute to project success. This project risk plan should describe risk identification, risk analysis and risk handling. Risk project planning process enable project managers to distinguish between situations and to deal with risks accordingly. There can be sufficient project risk management with risk planning as this influence defining of requirements and specifications, estimating cost and time, scheduling and risk analysis (Jun, Qiuzhen & Qingguo, 2010). Evaluation of project outcomes on overall success in regards to qualitative benefits, financial benefits, time and costs was not determined.

Diab, Varma and Nassar (2012) did a study using risk assessment to improve highway construction project performance. Thirty-one significant risk drivers, identified from previous studies, were chosen, analyzed, and evaluated for this study. This paper presents the study findings regarding the process of using of risk assessment techniques and tools for

determining its impact on construction cost and schedule performance ratings of highway projects. The analyses included project information and characteristics as well as project risks' cost and schedule impact ratings. The analyses were carried out based on the responses from highway construction related professionals from both the public and the private sectors to a survey. The responses provided both quantitative and qualitative data from several highway construction projects completed in the past. The statistical dependency correlation analyses showed that the use of risk assessment in the reported projects has improved project and construction management practices.

Tipili and Ilyasu (2014) evaluated the impact of risk factors on construction projects cost in Nigeria. In view of the foregoing, the objectives are to establish a relative significance index score for the most important risk factors influencing the Performance of the projects. A self-administered questionnaire was employed to the construction industry professional for their responses on the likelihood of occurrence of risk factors and the impact of these risk factors on project performance. A total of 78 questionnaires were sent to construction industry professionals which comprises of Contractors, Architects, Quantity Surveyors and Engineers but 58 was return which was later analyzed using descriptive statistic and analyses of variance (ANOVA) and subsequently exposure rating levels were determined which enable the categorization of the probability- impact score in Low, medium and high levels. Results of the study indicate a disparity of the ranking of the degree of occurrence and impact among the group. Based on the composite of risk factors, the cost related risk and time related risk was found to be the most likely to occur and have the most impact on project, whereas environmental risk factor was found to be low weighted risk, as it had the least likelihood to occur and the least impact score.

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Thirdly, the subject of the influence of risk mitigation on performance has been researched . Byoun, Kim and Yoo (2013) developed a model for phase-wise project budgeting and scheduling under uncertainty. Conversely, projects which involve cross-cultural teams working together from remote locations often require an overall plan and budget which is implemented through intertwining of phase-wise planning and budgeting Berkley (2014) discusses the importance of Contingency plans that constitutes a serious threat to the successful completion of a software development project. Riley (2012) suggest that Contingency plans help project teams to deal with uncertainties such as, handling new product development, enforcing innovative actions, increase plan flexibility. There are many potential risks that a project can be exposed to, and which can impact success (Yakup & Asli,

2010). This is why risk management is required in the early stages of a project instead of dealing with the damage after the occurrence of the risk (PMI, 2010). The avoidance means that by looking at alternatives in the project, many risks can be eliminated. If major changes are required in the project in order to avoid risks, Kargi (2011) suggest applying known and well-developed strategies instead of new ones, even if new ones may appear to be more cost efficient. In this way, the risks can be avoided and work can proceed smoothly because strategy is less stressful to the users.

Crawford (2013) list some activities that can help to avoid potential risk: More detailed planning, alternative approaches, protection and safety systems, operation reviews, regular inspections, training and skills enhancement, permits to work, procedural changes, preventive maintenance. Communication between project head and management is crucial to the successful implementation of project. This is generally influenced by the principal–agent relationship between the parties and the contract type chosen (Alan, 2011). A study conducted by Ameer (2010) introduces the models of instrumental and transformative participation and the way they influence flow and communication between project manager and other stakeholders. Abid and Mseddi (2010) argues that knowledge transfer, communication, and shared understanding between project stakeholders are important requirements to projects.

Kaliti (2015) did a study on the influence of risk management practices on performance of firms in the hospitality industry in Nairobi County, Kenya. The objective of the study was to assess the influence of the risk management practices on the performance of firms in the hospitality industry in Kenya. This study was significant to tourism firms, general public, students and the government as it offered valuable contributions from both a theoretical and practical perspective. Hospitality industry in Kenya has had difficult times over the years, particularly a prolonged period of lackluster performance in the 1990s. A post-election period of civil unrest in 2008 and the global economic crisis in 2009 only made inbound international tourism business more challenging. Then in the recent past is the threat of terrorism in which Kenya has lost both its citizens and the tourists to the Al-shabab from Somalia. The study found that risk assessment, risk response, innovation and quality had positive significant effects while internal environment and control activities had positive significant effects on the financial performance of firms in the hospitality industry in Nairobi County. Overall risk management practices accounted for almost all of the variance in financial performance of the firms. Thus, the study concludes that the risk management practices influence the financial performance of firms in the hospitality industry to a very large extent.

Fourthly and finally is the issue of the influence of risk control and monitoring on project performance. An overview over the whole project helps identify problems which are causing damage. In order to reduce the risk, the exposed areas should be changed (Potts, 2008). This is a way of minimizing the potential risks by mitigating their likelihood (Grace, 2010). One way to reduce risks in a project is to add expenditures that can provide benefits in the long term. Some projects invest in guarantees or hire experts to manage high-risk activities. Those experts may find solutions that the project team has not considered (Potts, 2008). Risk control

is all about understanding those risks that can impact adversely the objectives of the organization and taking the appropriate steps to reduce the risks to an acceptable level. Strategies can be achieved at the overall project level by re-planning the project or changing its scope and boundaries.

According to (Hillson, 2015), this is an investment of funds to reduce the risk on a project. On international projects, companies will often purchase the guarantee of a currency rate to reduce the risk associated with fluctuations in the currency exchange rate. A project manager may hire an expert to review the technical plans or the cost estimate on a project to increase the confidence in that plan and reduce the project risk. Assigning highly skilled project personnel to manage the high-risk activities is another risk reduction method. Mitigation strategies can include contingency planning, quality assurance, separation or relocation of activities and resources, Contract terms and conditions, Crisis management and disaster recovery plans. Those project risks which should be reduced can also be shared with parties that have more appropriate resources and knowledge about the consequences (Thomas, 2009).

Sharing can also be an alternative, by cooperating with other parties. In this way, one project team can take advantage of another's resources and experience. It is a way to share responsibilities concerning risks in the project (Potts, 2008). Experts managing a high-risk activity can often predict problems and find solutions that prevent the activities from having a negative impact on the project. Reducing the risk in order to make it more acceptable to the project or organization, by reducing its impact can be termed as mitigation of risk. Hillson (2015) identify several mitigation strategies as risk response solutions. As a mitigation strategy the authors suggest escalating risk issues to top management obtain signoff on commitments and stop the project and discuss with sponsor and management on further steps. In case there is lack of commitment from the management or the customer, the authors also suggest working with them to understand the reasons for indifference.

The importance of a cost-benefit analysis on existing risks in the project suggesting use of a sensitive analysis to identify risk parameters that may impact during project development and operational period and may lead to failure and varied points in the project life cycle. Funding plays a crucial role to conduct risk mitigation activities and enabling the system to restore its usual functioning (Hecker, 2012). According to Goble and Bier (2013), periodic project risk assessment results can mitigate risks in projects. According to the authors risk assessments are repositories of structured information and a medium for communication. Hence, the judicious use of project risk assessment tools with adequate communication can mitigate risks to a great extent (Hecker, 2012). The responsibility for project risk reduction lies with the management. Risks must be controlled and monitored once the management team and board have designed a management plan and the project is underway. The plan can subsequently be modified as more causes of risk are identified Loo, Abdul-Rahman & Wang, (2013).

Ogal (2015) looked at Influence of risk management in building projects in Kenya: A case of building projects in Westlands sub-county. The research design presented in this research project report is a descriptive survey design. The target population for the study included

clients, contractors and consultant in building projects within Westlands sub - county in Nairobi. Mutua (2011) puts more emphasis that project performance can be assessed using various performance indicators that include time, cost, quality, client satisfaction and health and safety. The critical performance measures applied by firms to examine performance of infrastructure projects include quality, cost and time. Another approach of examining performance of projects is through adoption of a similar set of indicators. Ezeldin and Sharara (2012) indicates that contract period and cost factors highly depended on the nature of the project, procurement processes, coordination of the implementation team, contractor-client relationship, traits of the designing team and external conditions.

Aimabale (2015) did a study on effects of risk management methods on project performance in Kenyan construction industry. Risks are very common in construction sector. Risk is the Possibility of suffering loss and the impact on the involved parties. As a result, project risk management methods must be built into the management of projects and should be used throughout the project lifecycle. Many construction projects fail because organizations assume that all the projects would succeed and they therefore do not identify, analyze, and provide mitigation or contingencies for the risk elements involved in the project. Pressure is exerted on project managers to minimize the chance of project failure. This increasing pressure for performance which suggests that it is prudent for anyone involved in a project to be concerned about the associated risks and how they can be effectively managed. Traditionally, performance of a project is analyzed on the criteria of quality, budget and time of completion. Furthermore, using risk management methods effectively to manage risk should be continuously undertaken throughout the project lifecycle to enhance project performance. Risk management methods are thus an important tool to cope with such substantial risks in projects performance.

These studies on risk management have concentrated on cost and risk reduction, risk allocation, time and cost overruns leaving other important risk factors such as risk management strategies and policy issues in construction projects. Further, these studies were carried out when the operating environments were not as turbulent as at the time of this study thus the need to carry out another research that would account for changes in operating environment encountered in construction projects in this country. This study therefore sought to fill the existing research gap by carrying out a study evaluate how risk control and monitoring influence performance of KeNHA road construction projects in the Coast Region.

RESEARCH METHODS

Introspective survey design following (Kpolovie 2016) was used in this study. The target population of the study was Key persons involved in selected nine (9) construction projects undertaken in KeNHA Coast Region in the last ten (10) years since the year 2007. These included Project Managers/Directors/Coordinators, Construction Site/Deputy Agents, Construction Supervisors, Projects Resident/Deputy Engineers, Supervision Specialists and Project Supervision Engineers in KeNHA Head Office. The population further included 90 representatives of Project Affected Persons (PAPs) such as boda boda riders, matatu operators and other roadside development business owners from the nine projects.

Stratified random sampling technique was used to select the sample which gave each item in the population an equal probability chance of being selected and the sample size of the study was 159 obtained by use of Morgan and Krejcie (1970) model. Primary data was obtained using self-administered questionnaires. The questionnaire is made up of both open ended and closed ended questions. After obtaining the introductory letters from the university and the National Council for Science Technology and Innovation (NACOSTI) which was presented to KeNHA for endorsement to enable collection of necessary data from the respondents, drop and pick method was preferred for questionnaire administration so as to give respondents enough time to give well thought out responses. Follow up was made to ensure tool response completion. How many were answered?

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 25.0). All the questionnaires received were referenced and items in the questionnaire were coded to facilitate data entry. After data cleaning, descriptive statistics namely frequencies, percentages, mean score and standard deviation were estimated for all the quantitative variables and information therein presented inform of tables. Multiple regression analysis was used to establish the relations between the independent and dependent variables. Since there were four independent variables in this study the multiple regression model generally assumes the following equation;

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where: **Y**= Performance of road construction project; β_0=constant, β_1, β_2, β_3 **and** β_4, = Regression coefficients; X_1= Risk identification; X_2= Implementer perception of risk appraisal; X_3= Implementer risk mitigation perspectives; X_4= Implementer risk control and monitoring insights; ε = Error term.

RESEARCH FINDINGS

The study established the influence of risk identification on performance of KeNHA road construction projects in the Coast Region. The study found that Project risks identification is so critical that it distinguishes a successful project from the rest right from it's conception. It is a continuous process that has to be undertaken at the onset of each Project Stage. This calls for a dedicated team to be put in place with clear working schedule and a reporting line all the way to the top management. The study found that risk identification influence the Performance of KeNHA road construction projects in the Coast Region to a great extent. The study revealed that risk rating and collateral, establishing standards and inspection by managers greatly influence performance of KeNHA road construction projects in the Coast Region. The study found that financial statement analysis lowly influence performance of KeNHA road construction projects in the Coast Region

Assessment of the influence of risk appraisal or assessment on performance of KeNHA road construction projects in the Coast Region was accomplished. The study found that Carrying out a construction project management is difficult without carefully assessing the likely risks. The study found that risk appraisal or assessment greatly influences the Performance of

KeNHA road construction projects in the Coast Region. Further the study revealed that quality of risk measurement and frequency of risk measurement influence performance of KeNHA road construction projects in the Coast Region greatly while risk measurement approaches influence performance of KeNHA road construction projects in the Coast Region moderately.

The influence of risk mitigation on performance of KeNHA road construction projects in the Coast Region was also investigated. It was found that over the years failure of the persons responsible for road project construction in Coast Region, to carryout comprehensive risk mitigation measures as pertains to the compulsory land acquisition has resulted to substantial delays in project execution and subsequent cost overruns mainly because the citizens are much more enlighten on their constitutional rights nowadays. The study found that risk mitigation influences the Performance of KeNHA road construction projects in the Coast Region moderately. The study found that transferring risk, prevention to reduce vulnerability to risk, eliminating/reducing risk and establish contingency plans influence performance of KeNHA road construction project in the Coast Region to a great extent. In addition, the study found that to provide warning and foreign exchange hedging moderately influence performance of KeNHA road construction project in the Coast Region while use of quality assurance lowly influence performance of KeNHA road construction project in the Coast Region.

Finally, the study evaluated how risk control and monitoring had a bearing on the performance of KeNHA road construction projects in the Coast Region. The study revealed that stakeholders have always observed that for the various road construction projects in Coast Region that has been executed within the contract cost and time with no or with minimal alteration to the initial scope; had engaged dedicated risk expert(s) as part of key Project Management team members. The study found that risk control and monitoring greatly influence the Performance of KeNHA road construction projects in the Coast Region. The study found that responses in place and controls in place greatly influence performance of KeNHA road construction project in the Coast Region. Additionally, the study found that risk control meetings and performance based management influence performance of KeNHA road construction project in the Coast Region to a great extent while reporting and review lowly influence performance of KeNHA road construction project in the Coast Region.

INFERENTIAL STATISTICS

This was conducted to determine the relationship between the variables (dependent and independent variables). The results were as presented in Table 1, Table 2 and Table 3 below.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.846	0.716	0.706	1.467

From the study results, Table 1 is a model fit which establish how fit the model equation fits the data. The adjusted R^2 was used to establish the predictive power of the study model and it

was found to be 0.706 implying that 70.6% of the variations in performance of KeNHA road construction projects in the Coast Region are explained by changes in risk identification, implementer perception of risk appraisal, implementer risk mitigation perspectives and implementer risk control and monitoring insights.

Table 2: Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Sign.
1	Regression	608.032	4	152.008	68.735	.000
	Residual	241.056	109	2.212		
	Total	849.088	113			

The probability value of 0.000 indicates that the regression relationship was highly significant in predicting how the risk identification, implementer perception of risk appraisal, implementer risk mitigation perspectives and implementer risk control and monitoring insights influenced performance of road construction projects in KeNHA Coast region. The F calculated at 5 per cent level of significance was 68.735. Since F calculated is greater than the F-critical (value = 2.455) and p-value was less than 0.05, the overall model was significant.

Table 3: Regression Coefficients

	Un standardized Coefficients		Standardized Coefficients	t	Sig (p-Value)
	B	Std. Error	Beta		
(Constant)	0.864	0.112		7.714	.000
Risk identification	0.995	0.393	0.921	2.532	.013
Implementer perception of risk appraisal	0.775	0.339	0.718	2.286	.025
Implementer risk mitigation perspectives	0.717	0.244	0.664	2.939	.004
Implementer risk control and monitoring insights	0.679	0.178	0.629	3.815	.000

The regression equation obtained from this outcome was:

$$\mathbf{Y = 0.864+0.995X_1 +0.775X_2 + 0.717X_3 + 0.679X_4}$$

As per the study results, it is indicative that if all independent variables were held constant at zero, then the performance of KeNHA road construction projects in the Coast Region will be 0.864. From the findings the study revealed that a unit increase in risk identification would lead to 0.995 increase in performance of KeNHA road construction projects in the Coast Region. This confers with Kinyua (2015) who did a study on influence of risk management strategies on project performance of small and medium information communication technology enterprises in Nairobi, Kenya and established that there existed a positive relationship between risk management strategies affecting project performance and ICT project performance for SMEs in Kenya and were statistically significant at 0.05 level.

The study indicate that if all other variables are held constant, a unit change in the score of implementer perception of risk appraisal would lead to a 0.775 change in performance of

KeNHA road construction projects in the Coast Region. This is in line with Diab, Varma and Nassar K (2012) not in references who did a study using risk assessment to improve highway construction project performance and the statistical dependency correlation analyses points out that the use of risk assessment in the reported projects has improved project and construction management practices.

The study further revealed that a unit change in implementer risk mitigation perspectives would lead to 0.717 units change in performance of KeNHA road construction projects in the Coast Region. These findings concur with Hecker (2012) who noted the importance of a cost-benefit analysis on existing risks in the project suggesting use of a sensitive analysis to identify risk parameters that may impact during project development and operational period and may lead to failure and varied points in the project life cycle. Funding plays a crucial role to conduct risk mitigation activities and enabling the system to restore its usual functioning

Finally, the study revealed that a unit change in implementer risk control and monitoring insights would change the performance of KeNHA road construction projects in the Coast Region by 0.679. These findings are similar to those of Potts (2008) who noted that risk control is all about understanding those risks that can impact adversely the objectives of the organization and taking the appropriate steps to reduce the risks to an acceptable level. Strategies can be achieved at the overall project level by re-planning the project or changing its scope and boundaries.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that identification of the risks has the greatest influence on KeNHA road construction projects performance in Coastal Region. This study attributes the influence of identification of the risks to the risk rating and collateral, project standards and inspection establishment by managers. Further, the implementer perception of risk appraisal was concluded to influence performance of KeNHA road construction projects in the Coast Region greatly and positively. For the KeNHA road construction projects in the Coast Region to perform better, the study found that quality of risk measurement and frequency of risk measurement have to be considered since they influence performance of KeNHA road construction projects in the Coast Region greatly.

Implementer risk mitigation perspectives was also concluded to influence the KeNHA road construction projects in the Coast Region performance moderately and significantly. It was clear that transferring risk, prevention to reduce vulnerability to risk, eliminating/reducing risk and establish contingency plans influence performance of KeNHA road construction project in the Coast Region greatly. Finally, implementer risk control and monitoring insights was concluded to greatly and significantly influence the Performance of KeNHA road construction projects in the Coast Region. The study found that responses in place and controls in place greatly influence performance of KeNHA road construction project in the Coast Region.

The study recommends that management in road construction project should increase level of project risk identification as it enhances the risk management activities on each significant risk. Project managers should facilitate a distinctive project risk identification effort as they undertook risk identification for the purposes of mitigating risk facing projects to a very great extent. The study recommends further that the project managers should increase engagement in capacity building activities in risk management and construction project management in general. The study recommend that management of roads construction projects should come up with risks mitigation strategies on a bid to enhance opportunities and reduce threats to project objectives. The study also recommends that the project managers should encourage awareness among the project stakeholders in order to optimize the benefits of risk management practice implementation, through increased uptake and compliance.

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