

# EFFECT OF RISK MANAGEMENT PRACTICES ON THE PERFORMANCE OF INFRASTRUCTURE PROJECTS IN KITUI COUNTY, KENYA

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**Abstract:** The general objective in this study was to examine the effect of risk management practices on the performance of infrastructure projects within Kitui County. The main objectives included; determining the effect of risk identification on infrastructure projects performance; to examine the effect of risk mitigation on the performance of infrastructure projects; to determine effect of the risk monitoring on the performance of infrastructure projects and finally, finding out the effect of risk assessment on the performance of infrastructure projects. The study used descriptive design because it enhanced systematic description that is as accurate, valid and reliable as possible regarding the responses. The target population therefore comprised of 484 respondents who were drawn from the infrastructure companies from Kitui County. This study utilized a sample size of 145. The response rate was drawn from 121 questionnaires that were fully filled and returned. The researcher used questionnaires as the research instrument to gather the relevant data. The quantitative data was analyzed using descriptive statistics as well as multiple regression analysis. The analysis was conducted scientifically through SPSS (Statistical Package for the Social Sciences). The findings of the study concluded that risk identification has the highest positive influence on the performance of infrastructure projects in Kitui County, followed closely by risk mitigation. The study also concluded risk monitoring and risk assessment had significant and a positive effect on infrastructure projects in Kitui County. The study recommends that the management of infrastructure companies of Kitui County should put in place cost-effective measures for timely risk identification to ensure that their performance of infrastructure projects are not impacted negatively. Among the recommendations to be considered, include proper risk mitigation planning, and putting in place risk control and monitoring management strategies. Moreover, the companies should consider having a risk analysis and evaluation management strategy to enhance performance of infrastructure projects.

**Keywords:** risk identification, risk mitigation, risk monitoring and risk assessment.

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## 1. INTRODUCTION

Risk management practice (RMP) is a concept that is popular in all industries and hence not unique to the sector of construction. To achieve certain objectives each of the industries has created their own RMP standards but the similar thing is the idea of risk reduction. Project Management Institute (PMI) (2004) noted that risk management of any project remains a significant aspect during the commissioning and execution of a project. Nevertheless, Bakker & Wortmann (2012) noted that RMP is the most challenging aspect in the management of construction. The construction enterprise operates in a completely unsure environment wherein situations can exchange because of the complexity of every mission. The goal of each organization is to be successful and RM can facilitate it. However, it need to be underlined that chance management is not a tool which ensures success however as a substitute a device which allows to boom the probability of accomplishing achievement. Threat management is therefore a proactive as opposed to a reactive idea. Many preceding research were conducted in the field of RMP but each presents a one of a kind approach to this idea. The research in this master thesis focuses on the construction industry and the way the problem is practiced in the everyday operation (Wenk, 2010).

**Statement of the Problem:**

When the complexity and size of the infrastructure increases, coordination becomes complex meaning that the capability of managing risks via the construction process becomes significant in prevention of consequences that might be unwanted (Maytorena et al. 2017). SOU (2010), notes that there is need to allocate different risks depending on the qualifications of the project actor. Nonetheless, there has been evidence to reveal tendencies by some actors not reacting to the risk but leaving them for others within the value chain which is dangerous. When this happens, it means critical deviations in terms of the quality, cost, and time.

Kitui County has seen a significant rise in infrastructure developments in the recent past, especially in the fields of transport, energy and power projects. However, many projects have failed to achieve success due to increased risk and uncertainty. Since the advent of devolution, Kitui County initiated many development projects. Some of them are still ongoing; others failed to achieve the intended objective. This is despite there being talk of project risk management integrated into the projects. For instance there are more than 2000 infrastructure projects drawn in the County that have been undertaken since 2013 (CSK, 2017) and 68% of those infrastructure projects have experienced project failure despite adoption of project risk management strategies (KPMG, 2017). According to World Bank (2017), 60% of the county respondents complained that the infrastructure products from the county did not satisfy their requirements while 35% depicting the final infrastructure service failed to achieve the objective intended. ADB (2017) also indicated that almost 52% of these development projects registered loss forcing the County firms to decline in performance.

Despite previous studies focusing on roads, offices construction, gated communities, bridge works, and hospitality institutions among others, none has focused on the influence of risk management practices in the context of the performance of infrastructure projects in Kitui County. This has created a shortage in empirical evidence and studies on the local scene. This study sought to fill this gap by investigating the influence of risk management practices on the performance of infrastructure projects in Kitui County.

**Objectives:**

- i. To determine how risk identification influences performance of infrastructure projects in Kitui County
- ii. To establish the influence of risk mitigation on the performance of infrastructure projects in Kitui County
- iii. To assess how risk monitoring influences the performance of infrastructure projects in Kitui County
- iv. To find out the influence of risk assessment on the performance of infrastructure projects in Kitui County

**2. THEORETICAL REVIEW****Prospect theory:**

The prospect theory depicts that area normally influences chances of propensity. On the other hand, losses possess additional emotional effects as compared to equivalent sums of profits; therefore, they highly influence our sense of selection (Tversky & Kahneman, 1975). Making decisions means that a choice maker has to multiply the value of each final result depending on the weight of a decision. Significantly, the selection weights serve a small role as determinants of ascertained outcomes but can constitute to evaluations that are empirically derived from the manner in which humans reach their feelings of likelihood. One important attribute of weighting is the fact that low possibilities get overweighed while medium and high possibilities are instinctively underweighted (Tversky & Kahneman, 1979).

**Stakeholder Theory:**

Freeman (1984) developed the stakeholder theory as a tool for business management; however, the theory has further evolved into the grounded theory which elaborately explains risk management. The theory focuses on corporate policy determinants and how they influence the equilibrium of stakeholder interests. The implicit contract theory acts as an extension of employment to alternative contracts that include financing and sales (Cornell and Shapiro, 1987); in other words, it acts as an avenue to strategic risk management. Klimczak (2005) points out that strategies for corporate risk management influence reductions in future costs as well as the company's value risks. In other words, the stakeholder theory offers advanced insight into the relevance of improved risk management. Smith & Stulz (1985) investigated the financial distress hypothesis and provided indirect evidence only. This theory is significant in understanding risk management because it offers an overview on the relevance of customer trust as well as financial strain costs to projects.

Moreover, the stakeholder theory provides insight to the study because of its emphasis on the relevance of risk management in projects as well as its significance in enhancing a project's value. Nonetheless, the theory fails to show how risk management influence performance and the emerging association between both variables; it only suggests that risk management results in growth in the value of a project.

#### Network theory:

A network is referred to as an abstract shape which projects the simplest fundamentals of all connection styles. Given the fact that there is a generalized sample, the tools that have evolved for reading, knowledge and modeling networks may be executes theoretically across all disciplines. On the other hand, the community theory has an originality that demonstrates its indicators to the field of challenge hazard control (Olsson, 2008). The tools which are currently being used for regular danger assessment are enough but the limitations of the computational energy and version complexity can influence danger assessors to limit additional causal connections as well as account for the Black Swan event influencers. Through applying the network principle techniques to risk assessments, the computational obstacles can be eliminated and the final outcome reflected on a wider range of events that have narrower uncertainty varieties. Selection-making techniques lack importance in routine threat examinations; however, they assume a critical role in these kinds of techniques. Consequently, it is essential for the risk assessors to limit affirmation bias through exhausting their analysis and revealing outcomes with little involvement of external components that include advocates, media, and politics.

#### Dynamic Risk Management Theory:

The dynamic risk management concept forms a continual time, limitless horizon version of a company that dynamically and endogenously adjusts the risk management contract which is usually the role of a firm's exogenic product price (Frank, 2003). The methodology can be characterized by courses of events like: At time zero, a levered firm picks to start the hazard administration contract (ensures an assortment of forward costs that are intended for a specific part of the organization's yield) or pick its development (Carter, 2004). In each resulting time interim, a firm creates a solitary unit of the item at settled expenses and later understands that the money streams which are typically impacted by a present spot value; this likewise ensures he cost in light of the hazard administration contract and if the firm is encountering budgetary misery. Therefore, a firm could default depending on the debt holders recover case in terms of the value of the firm.

#### Conceptual framework:

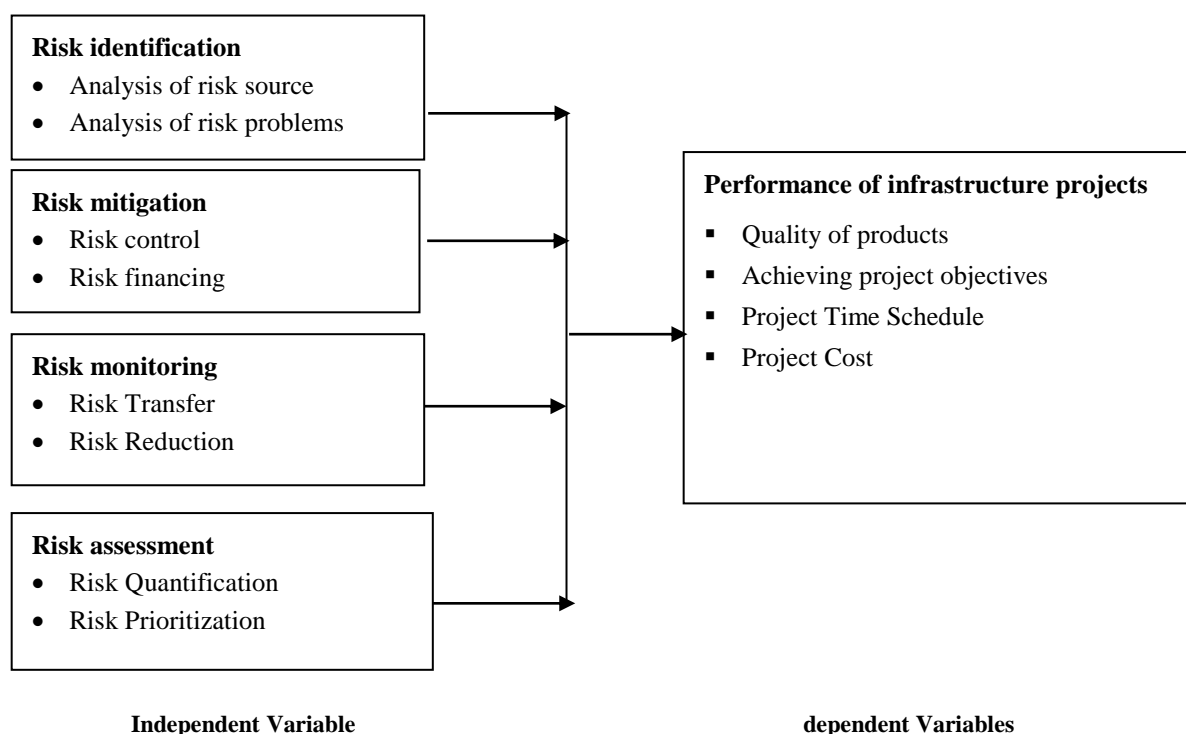


Figure 2.1: Conceptual framework

**Critique of Literature Reviewed:**

It is apparent from the literature review that there is no common view of risks among the different players in the infrastructure projects. The estimation of orderly hazard administration of undertaking movement is not completely perceived by the foundation business (Walewski, Gibson, and Vine, 2002). Since no regular perspective of hazard exists, proprietors, financial specialists, originators, and constructors have contrasting goals and unfavorable connections between the gatherings are normal. The writing survey demonstrates that most scientists have concentrated on various strategies for hazard administration and the job of hazard management in foundation ventures. While most literature acknowledge that risk management is a process, the issue of how this process should be adapted to the construction process is not very clear. Most literature approaches the infrastructure process as an organized and standardized production process like manufacturing.

However the infrastructure process often has special features for every project that burden the process and makes changes leading to process improvement difficult. In many of the infrastructure projects, the duration for production processes is long which means it increases the chances of uncertainty and risky events both on schedule and costs involved. When process time is long, often many several years, risk management becomes theoretical and the only other way is to add an arbitrary contingency sum. While a lot of literature is accessible on risk calculation, there is less positive reception of the fact that extended process durations brings about risks that cannot be accurately analyzed and quantified.

While the infrastructure industry continues to mechanize, the fact that a lot of work is still manual makes change and process improvement slow compared to other industries. Most literature on infrastructure risk management does not address the need for other employee performance theories such as motivation theories as part of risk management. General production processes anticipate general or often unknown clients. Products are generally developed then marketed. However the infrastructure process is unique in that the client is known and plays a pivotal role in project success is often inexperienced. The investor or client stipulates the location, quality, size and purpose of a project and is therefore the first source of risk. Most literature ignore this source of risk and the fact that often these risks have to be accepted and may cause project failure.

**Summary of Literature:**

In summary, the purpose of this chapter was reviewing relevant literature on the topic under investigation. The researcher has explored theories that explain the nature of risk management in addition to explaining the study's conceptual framework.

**Research Gap:**

A large portion of the studies assessed distinguish and organize risks through observational investigations with a specific end goal to propose relieving measures. In spite of the fact that they are critical to clients for future activities, the examinations neglect to offer any structure for peril administration from framework endeavor point of view. While there are a couple of research that have got structure of risk administration framework industry advancement, the majority of them are exhibited from customers' points of view and almost no endeavor has been made to coordinate this with the infrastructure industry improvement cycle. Reviewed literature on results of risk control methods on errand execution demonstrates that ground-breaking danger control systems affect decidedly on mission by and large execution. The review shows that risk undertakings are part and package of project improvement. In any case, the extent of hazard fluctuates with multifaceted nature, length both as far as motivation and spending plan, and territory. Extension creep, absence of know-how of inconveniences, equivocal necessities, and nonattendance of assets, equipment, systems administration, and insurance issues are some of the basic danger components in framework improvement assignments. In this way, there's a need to embrace actualize risk control strategies in framework industry change challenge

**3. RESEARCH METHODOLOGY**

The research design used in this study was descriptive research design. The study was undertaken at Kitui County. The target population therefore comprised of 484 respondents who were drawn from the infrastructure companies from Kitui County. These respondents included project managers, contractors, engineers and sub-contractors. The study targeted a sample of 145 respondents who were drawn from the infrastructure companies of Kitui County. The researcher conducted a pilot test to test the legitimacy and unwavering quality of the surveys in social occasion the information required for reasons for the examination. The information gathered from the respondents was of a qualitative and quantitative nature. The data was summarized and then analyzed by the use of descriptive statistics comprising of tables, graphs and percentages.

**Model:**

Analysis of data used multiple regressions to test the research questions

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

Where,

Where,

Y= Performance of infrastructure projects

X1: Risk identification

X2: Risk mitigation

X3: Risk monitoring

X4: Risk assessment

$\beta_0$  is the constant or intercept while  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$ , are the corresponding coefficients for the respective independent variables.  $E$  is the error term depicting residual or disturbance factors.

**Correlation of the study variables:**

The Table 4.11 depicts the correlation matrix between the independent and dependent variables. The purpose or goal of correlation is exploring the relationship that exists between a numbers of variables in a research. In determining the correlation, the researcher is successful in Multicollinearity testing where it is the undesirable condition where the correlations among the independent variables are strong. When the values of the correlation are not near -1 or 1, it is an indication that the factors are sufficient dissimilar measures of variables which are different and also an indication of the lack of multicollinearity. When there is no multicollinearity, the researcher has the green light of using the independent variables.

Based on the results from the table below, it is clear that all the independent variables had a positive and significant correlation with the dependent variable that was the infrastructure performance of the projects. For instance, there was a positive and significant correlation between risk identification and performance infrastructure project shown as ( $r=0.704$ ,  $p=0.000$ ). In addition, the correlation between risk mitigation and performance of infrastructure projects was positive ( $r=0.690$ ,  $p=0.000$ ). All the relationships are considered significant since their p values are less than 0.05. The ranking of the independent variables is as follows; risk identification (70.4%), contributed more to the performance of an infrastructure project, followed by risk mitigation (69.0%), risk assessment (66.3%), and finally, risk monitoring (59.4%).

**4. REGRESSION RESULTS****Table 4.1: Correlation of the study variables**

		<b>Risk Identification</b>	<b>Risk Mitigation</b>	<b>Risk Monitoring</b>	<b>Risk Assessment</b>	<b>Project Performance</b>
Risk Identification	Pearson Correlation	1	.738**	.472**	.635**	.704**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	121	121	121	121	121
Risk Mitigation	Pearson Correlation	.738**	1	.472**	.610**	.690**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	121	121	121	121	121
Risk Monitoring	Pearson Correlation	.472**	.472**	1	.523**	.594**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	121	121	121	121	121
Risk Assessment	Pearson Correlation	.635**	.610**	.523**	1	.663**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	121	121	121	121	121
Project Performance	Pearson Correlation	.704**	.690**	.594**	.663**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	121	121	121	121	121

Firstly, the study was to determine how risk identification influences performance of infrastructure projects in Kitui County. From the table coefficients, it can be clearly noted that there was significant and positive relationship between risk identification and the performance of project ( $\beta = 0.196$ ,  $t = 3.152$ ,  $P \text{ value} = 0.002$ ). the results it further shows that a unit change in risk identification causes project success to increase by 0.196 units

Secondly, the research sought to establish the influence of risk mitigation on the performance of infrastructure projects. The analyzed data showed that there was a positive relationship between risk mitigation and the project performance ( $\beta = 0.167$ ,  $t = 2.837$ ,  $P \text{ value} = 0.005$ ). the results further reveals that a unit increase in risk mitigation can cause 0.167 increase in performance of projects.

Thirdly the research was trying to assess how risk monitoring influences the performance of infrastructure projects. Results in table 4.14, shows that project performance and risk monitoring had positive relationship ( $\beta = 0.135$ ,  $t = 3.518$ ,  $P \text{ value} = 0.001$ ). this implies a unit change in risk monitoring has potential to cause 0.135 increase in project performance.

Lastly the study sought to find out the influence of risk assessment on the performance of infrastructure projects. From the analyzed data, it's evident that there is positive and significant association between risk assessment and infrastructure project performance ( $\beta = 0.129$ ,  $t = 2.770$ ,  $P \text{ value} = 0.007$ ). this implies that a unit change in risk assesment causes project performace to increase by 0.129 units

**Table 4.2: Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.071	.115		.612	.541
Risk Identification	.196	.062	.277	3.152	.002
Risk Mitigation	.167	.059	.244	2.837	.005
Risk Monitoring	.135	.038	.236	3.518	.001
Risk Assessment	.129	.047	.215	2.770	.007

Using the results from the multiple regressions above, the equation;

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$  become:

$Y = 0.071 + 0.196X_1 + 0.167X_2 + 0.135X_3 + 0.129X_4$  Where:

Y= Performance of infrastructure projects

X1: Risk identification

X2: Risk mitigation

X3: Risk monitoring

X4: Risk assessment

Based on this equation, when the independent factors are held constant, then performance of infrastructure projects becomes 0.71. When all the other independent variables are held at zero, a unit increased in risk identification, risk mitigation, risk monitoring, and risk assessment will lead to 0.196, 0.167, 0.135 and 0.129 increments in performance of infrastructure projects respectively.

## 5. CONCLUSION

This study came into a conclusion that risk identification had influenced the infrastructure projects carried out in Kitui County in a positive way. Organizations begin with the unknown which means that risk identification has to be one of the most significant starting points, when using a risk management program. Secondly, the research showed that risk mitigation had positively impacted infrastructure projects carried out in Kitui County. Furthermore, this means that risks can be controlled using risk management methods which mitigate the loss exposures by risk financing and control thereby improving the results production of infrastructure projects. Thirdly, the study came into a conclusion that risk monitoring

had important effects on the infrastructure projects of Kitui County. Therefore, when the organization undertakes appropriate risk monitoring, the expected product pricing with the estimated risk put in place is achieved thereby influencing a positive performance of the infrastructure projects. Finally, the research concluded that risk assessment had positive and significant impact on the infrastructure projects established in Kitui County. This means that risk assessment allows the organizational management to separate risks which threaten the project's existence from those which can cause a few damages

## 6. RECOMMENDATIONS

From the study, risk identification was found to have the highest impact on the performance of infrastructure projects. The study therefore, recommends that the management of infrastructure companies of Kitui County should put in place cost-effective measures for timely risk identification so as to ensure that their performance of infrastructure projects are not impacted negatively.

The study also recommends that infrastructure companies of Kitui County should put proper risk mitigation planning in place. Some of the activities that the planning should be involved in include identification, evaluation, and selection of appropriate levels of risk. Risk mitigation was found to have the second highest impact on project performance.

The study further recommended that infrastructure companies of Kitui County should put in place risk control and monitoring management strategies. They should embrace use of risk monitoring practices. This means adoption of the best innovations and technologies to keep track of the records.

Finally, it was recommended that infrastructure companies of Kitui County should put in place a risk analysis and evaluation management strategy to enhance performance of infrastructure projects. Companies should appoint individuals who are responsible for continuous assessment of the underlying risks for maximum mitigation

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