



RISK MANAGEMENT PRACTICES AND PERFORMANCE OF INFRASTRUCTURAL PROJECTS IN NAKURU COUNTY, KENYA

¹Maina Loise Gathigia, ²Dr. Mungai Anne-Marie Wairimu

¹ MsC., Project Management, Jomo Kenyatta University of Agriculture and Technology, Kenya

²Lecturer, Jomo Kenyatta University of Agriculture and Technology, Kenya

ABSTRACT

The objective of project risk management is to increase the likelihood and impact of positive events and decrease the likelihood and impact of negative events on the project. Project risk has its origins in the uncertainty present in all risks. The objective of the study was to examine effect of risk management practice on performance of infrastructural projects in Nakuru County, Kenya. The specific objectives were; to determine the effect of risk mitigation and risk control on performance of infrastructural projects in Nakuru County, Kenya. The study will be anchored on uncertainty theory, prospect theory, and enterprise risk management theory, and portfolio theory. The study adopted a cross-sectional survey design. The unit of observation was 201 project managers of the infrastructural projects. Yamane sampling was used to sample 134 project managers. Data was collected using questionnaires. A pilot was conducted with 13 project managers representing 10% of the sample size. The study used content and construct validity. Reliability was tested using Cronbach's Alpha Coefficient. Descriptive and inferential statistics were analyzed using SPSS version 28. Findings were tabulated. Findings show a strong significant relationship between risk mitigation and project performance ($r = 0.457$, $p\text{-value}=0.005$), and a strong relationship between risk control and project performance was ($r = 0.525$, $p\text{-value}=0.000$). The study recommends that; projects managers should mitigate risks through diversification, and project managers should apply a system of policies and strategies in order to control the risks of running out of project funds provided their resources are applied effectively.

Key Words: risk mitigation, project performance, risk control, risk management practice

INTRODUCTION

Project risk management can be defined as the art and science of identification, analysis and responding to the uncertainties that emerges during the life period of a project in such a way as to achieve the project objectives by satisfying all the stakeholders (Schwalbe, 2016). Risk management begins during project planning phase. During this process, potential risks are assessed and mitigated. Project risk management involves understanding potential problems that might occur on the project and how they might impede project success. The project manager must be able to recognize and identify the root causes of risks and correlate them to their effects on project performance (Urbanski, Haque & Oino, 2019).

The objective of project risk management is to understand project and programme level risks, minimize the likelihood of negative events and maximize the likelihood of positive events on projects and programme outcomes. Project risk management is a continuous process that begins during the planning phase and ends once the project is successfully commissioned and turned over to operations. It includes processes for risk management planning, identification, analysis, monitoring and control. Many of these processes are updated throughout the project lifecycle as new risks can be identified at any time. It's the objective of risk management to decrease the probability and impact of events adverse to the project. On the other hand, any event that could have a positive impact should be exploited (Rafele, 2015).

According to Kendrick (2019), risk management in a project or organization is dependent on the ability of the team to understand the sources and variations in projects, and then working to minimize threats while maximizing opportunities wherever it is feasible. The objective of project risk management is to increase the likelihood and impact of positive events and decrease the likelihood and impact of negative events on the project. Project risk has its origins in the uncertainty present in all risks.

Not all project risks threaten to delay a project entirely, but they should still be taken seriously. Some of the most common project risks include scope creep, IT, and construction risks. *Scope creep* is a common risk to projects of all sizes and types. Scope creep involves growing expectations for a project's requirements and results after the project begins. Managers can combat scope creep with proper project planning. Scope creep results from poor communication and planning and can cause low morale, low executive confidence, and increased budget and scheduling needs (Dandage, Mantha, & Rane, 2018). IT risks center around gathering, storing, and protecting sensitive data, as well as maintenance of both hardware and software used by a company. One of the best ways to mitigate IT risks is to back up data regularly and ensure that all computers and applications are up to date (Jiwani & Gupta, 2019). Construction of any kind is an expensive and time-consuming process that comes with many inherent risks. A construction project plan that doesn't include risk mitigation strategies can cost builders and their clients' significant time and money. Construction projects require excellent planning and communication. Construction projects also require special permits, so it is important to know what the project entails from the beginning. This way, managers can ensure that all legal needs are met (Rane, Potdar, & Rane, 2021).

Nowadays a sound management of risk is a crucial determinant of the success of a project due to an increased attention to the variability of actual quality, time, and cost performance compared to the expected one as a consequence of a growing pressure on reducing time and costs. It has been demonstrated that failure to deal with risk is a main cause of budget overrun, schedule delay, and missing performance targets (Carbone & Tippet 2017). Construction owners, project teams and contractors often define and apply risk management activities differently on a project. Effective risk management is typically achieved when an organization undertakes an active commitment to

integrating risk management into their project protocols and controls. Primary considerations for an organization to establish an effective plan include: allotting appropriate resources to perform risk management activities, creating an environment that embraces and promotes risk management and actively encourages and pursues risk management at all levels of the organization; and clearly defining and training personnel on risk management controls (Firmenich, 2017).

Statement of the Problem

The construction sector provides an economy with the necessary framework to facilitate mobility of factors of production and distribution of goods and services from their respective areas of production to their areas of consumption or utility. In the year 2021, transport sector contributed to 7.3% of Kenya's GDP, electricity supply 1.7%, water and waste management 0.7%, and construction 5.5%. Agriculture, manufacturing, and trade, all depend highly on access to infrastructure, accounted for 34.6%, 7.9%, and 7.6% of GDP respectively meaning that infrastructure directly or indirectly affects approximately 65.3% of the country's GDP (KBS, 2021). However, 35-60% of infrastructural projects in Kenya face cost overruns while time overrun is most severe with 35-73% projects overrunning their schedule (Deloitte, 2017). Mongina (2021) estimated that on average 48% of road projects in the initiation phase had cost overruns and 54% projects had delays. Deviation in cost and time is a common characteristic in road projects regardless of region or complexity of the project and the trend has worsened in the past decade. Nakuru county is among the counties that have had a rough experience with audit queries from the office of the auditor general regarding funding of infrastructural projects. According to the 2017-2018 auditor's report, the executive spent 44% of the county revenue which is way above the 35% recommended.

Scholars have shown that risk management practices enhance project implementation. Kinyua (2015) on effects of risk management strategies on the project performance of small and medium information communication technology (ICT) enterprises in Nairobi, Kenya revealed that ICT enterprises that manage risk effectively enjoy improved success rates of new projects and better decision making. Aduma and Kimutai (2018) study on effect of project risk management techniques on project performance at National Hospital Insurance Fund (NHIF) in Kenya found risk preventions have the greatest effect on NHIF project performance followed by risk control then risk acceptance while risk transfer having the least effect on NHIF project performance. Ndambiri and Kimutai (2016) on effect of project risk management on performance of health systems Digitalization projects in public hospitals in Nyeri County of Kenya concluded that project risk management was key to influencing the level of project performance. From these studies, it is evident that there is study limitation on effect of risk management practices on performance of infrastructural projects in Nakuru County, Kenya. This study hence sought to fill this research gap.

Objectives of the Study

The general objective of the study was to examine effect of risk management practices on performance of infrastructural projects in Nakuru County, Kenya. The study was guided by the following specific objectives;

- i. To explore the effect of risk mitigation on performance of infrastructural projects in Nakuru County, Kenya.
- ii. To establish the effect of risk control on performance of infrastructural projects in Nakuru County, Kenya.

LITERATURE REVIEW

Theoretical Review

Prospect Theory

The prospect theory was developed by Tversky and Kahneman (1979). The theory helps in prospect theory helps in decision-making under conditions of risk. Decisions often involve internal conflicts over value trade-offs. This theory is designed to help organizations and individuals to better understand, explain and predict choices in a world of uncertainty. The theory explains how these choices are framed and evaluated in the decision making process. Prospect theory is descriptive and empirical in nature. It focusses on two parts of decision making: the framing phase and the evaluation phase (Tversky, 1967). The framing phase describes how a choice can be affected by the manner in which it is presented to a decision maker. The evaluation phase consists of two parts, the value function and the weighing function, where the value function is defined in terms of gains and losses relative to the reference point.

Prospect theory is used in decision-making where the decision maker multiplies the value of each outcome by its decision weight. Decision weights not only serve as measures of perceived likelihood of an outcome, but also as a representation of an empirically derived assessment of how people arrive at their sense of likelihood (Tversky & Kahneman, 1979). Risk is an exposure to the possibility of economic or financial loss or gain, or delay as a result of the uncertainty associated with pursuing a certain course of action. When assessing risks in a project, relevant data must be available to enable statistical analysis, otherwise, the experience and knowledge of the decision makers is used to assess the probability of an adverse event. Risks impact projects in a great way by affecting the planned expenses, quality of work and expected project performance. Therefore, risk management is important in managing projects that are exposed to risks in order to ensure that the objectives of the projects are achieved within the constraints of the project. In case the risks happen, the project managers will have to made solid decisions on how to handle the risks.

Enterprise Risk Management Theory

The theory of risk management was developed by Daniel Bernoulli in 1738. Tabish and Jha (2012) defines enterprise risk management (ERM) as a discipline that supports achievement of projects objectives by addressing the full chain of risks and managing the combined impact of those risks as an interrelated portfolio (Sudhakar, 2012). The major aim of this theory is therefore to ensure that the project can keep on creating significant value under any uncertain environment. Managers stand high chances of saving a lot of money if they deal with uncertain project events in a proactive manner that will minimize the impact of threats and seize the opportunities that could occur (Shahu et al., 2012). The ERM theory has become popular in project management techniques despite the fact that it was developed for management of company risks Drumll (2001) explains that adopting ERM philosophy in project management is a wise decision as it applies to industries that have very high rates of failure like construction industry. These failures are as a result of failure to identify, mitigate and control risk across the entire business making this theory relevant to this research. Proper management of the risks will determine how the managers will prevent the risks from occurring.

Conceptual Framework

According to Kothari and Garg (2014), a conceptual framework represents a hypothetical model which identifies the relationship between dependent and independent variables. The conceptual framework is presented in Figure 1.

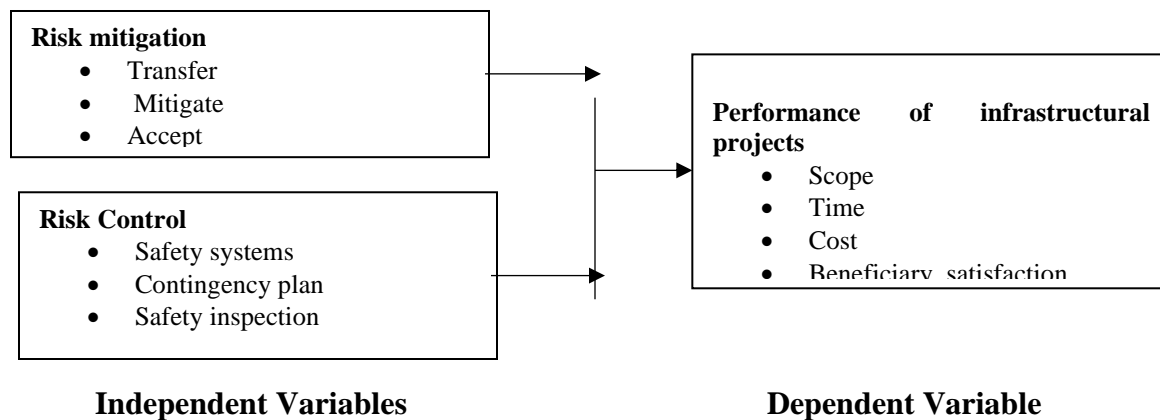


Figure 1: Conceptual Framework

Risk Mitigation

Risk mitigation is the action be taken towards the identified risks and threats. The response strategy and approach chosen depend on the kind of risks concerned. Other requirements are that the risk needs to have a supervisor to monitor the development of the response, which was agreed by the actors involved in this risk management practices. Risk response is the process of developing options and determining actions to enhance opportunities and reduce threats to the project’s objectives (Galli, 2019). According to Smith, (2013) having prioritized and assessed risks, it is essential that something should be done in response. Risk mitigation phase is the most important in the risk process, since this is where the project team get a chance to make a difference to the risk exposure facing the project. It is usually the responsibility of each risk owner to decide what type of response is most appropriate, though they will often seek help and advice on this. When developing risk responses, it is important to adopt a strategic approach in order to focus attention on what is being attempted.

Risk transfer is a risk reduction method that shifts the risk from the project to another party. The purchase of insurance on certain items is a risk-transfer method. The risk is transferred from the project to the insurance company. Risk reduction is a risk management technique that involves reducing the financial consequences of a loss. This encompasses a whole range of things including reducing the severity of a loss, reducing its frequency, or making it less likely to occur overall. Shifting risks and the negative impacts they bring is also an option when the risks are outside the project management’s control, for example political issues or labor strikes (Darnall & Preston, 2010).

Accepting risk, or risk acceptance, occurs when a business or individual acknowledges that the potential loss from a risk is not great enough to warrant spending money to avoid it. Also known as "risk retention," it is an aspect of risk management commonly found in the business or investment fields. Some risks may be accepted: in some cases, it is cheaper to leave an asset unprotected due to a specific risk, rather than make the effort (and spend the money) required to protect it. This cannot be an ignorant decision: the risk must be considered, and all options must be considered before accepting the risk (Conrad, et al, 2014). Risk mitigation design should be based on a comprehensive understanding of how risks arise. This includes understanding not only the immediate causes of an event but also the underlying factors that influence whether the proposed response will be effective (Zhang, 2016).

Risk Control

Risk control involves implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project. The key benefit of this process is that it improves efficiency of the risk approach

throughout the project life cycle to continuously optimize risk responses. The inputs for risk control are project management plan, risk register, work performance data & work performance reports. The tools and techniques for control risks are risk reassessment, risk audits, variance and trend analysis, technical performance measurement, reserve analysis and meetings (Hillson, 2015).

Risk control involves developing an alternative strategy that has a higher probability of success but usually at a higher cost associated with accomplishing a project task. A common risk avoidance technique is to use proven and existing technologies rather than adopt new techniques, even though the new techniques may show promise of better performance or lower costs. Risk avoidance is the elimination or avoidance of some risk, or class of risks, by changing the parameters of the project (Srinivas, 2019). It seeks to reconfigure the project such that the risk in question disappears or is reduced to an acceptable value. The nature of the solution may be engineering, technical, financial, political, or whatever else addresses the cause of the risk. However, care should be taken so that avoiding one known risk does not lead to taking on unknown risks of even greater consequence (Darnall & Preston, 2010).

Empirical Studies

Risk Mitigation and Project Performance

Yan and Liu (2021) sought to identify appropriate risk response strategies for international construction project managers in Australia. The study adopted an optimal model approach. Findings revealed that the contractors had adopted a Credibility-Based Fuzzy Chance Constrained Programming (CFCCP) which simultaneously minimized the expected losses of risk events and total costs of risk response. Project managers with a greater risk aversion can lead to a higher mitigation ratio of expected losses of risk events and a higher total cost of risk response.

Naji, Hafeth, and Ali (2018) sought to determine strategies adopted to deal with unexpected events and control uncertain situations. Findings show that the best strategies for responding to risks saves about 30% of costs. The risk response is an important part that results to effective project performance in terms of saving project costs. Kolo (2015) investigated the influence of project risk management practices in construction projects in Abuja Nigeria. The study adopted a descriptive research design. The study population was 12 construction firms. Questionnaires were used to collect data. Findings revealed that the construction firm adopted risk transfer strategies such as insurance policy and risk premiums. The strategies influenced performance of the projects in terms of cost time and quality.

Aimabale (2015) did a study on effects of risk management methods on project performance in Kenyan construction industry. Findings revealed that risks are very common in construction sector. 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 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.

Risk Control and Project Performance

Rehman (2017) investigated the risk management strategies adopted by construction firms in Pakistan. The study adopted a descriptive approach. Questionnaires were used to collect data. Findings established that management of risks reduce the chances of failure in construction projects. The study recommended that contractors should invest more in getting accurate and reliable information for better cost estimation and future forecasting. Weingarten, Humphreys, Gimenez, and McIvor (2016) investigated the influence of risk prevention on firm performance.

The study adopted a descriptive research design. The sample was 12 firms dealing with supply of stationery were the study' target population. Questionnaires were then successfully administered to the study respondents who consisted of managers, finance offices and procurement officers. Findings of the study revealed that the supply chain firms adopted risk prevention strategies such as detailed planning, alternative approaches and contingency as a way of risk prevention. Study findings further implicated that risk prevention practice positively influences the performance of supply chain firms.

Ubani, Amade, Benedict, Aku, Agwu, and Okogbuo (2015) investigated the influence of risk management practices on construction industry. The study adopted a case study research design. The study target was contractors, clients and consultants in the construction industry. Findings of the study revealed that the construction firms adopted risk control strategies through identification of the risk, quantifying and responding to the risk in accordance to risk management policy of each firm. The findings further showed that all the construction firms adjusted plans and scope of work in order to counter risk effects, monitoring risk making timely decisions and keeping project managers informed about possible risk. The study concluded that by adopting risk control measures the construction company's performance of projects is enhanced through working within the time limit and budget of projects.

Kinyua (2015) conducted a study to establish the effects of risk management strategies on the project performance of small and medium information communication technology (ICT) enterprises in Nairobi, Kenya. A descriptive research design was adopted. Target population was 48 ICT SMEs in Nairobi, Kenya. Primary data was collected using a questionnaire. Findings revealed that an effective risk management practice encourages the ICT enterprises to identify and quantify risks and to consider risk containment and risk reduction policies. The study also established that there existed a positive relationship between risk management strategies affecting project performance and ICT project performance for SMEs in Kenya.

Aduma and Kimutai (2018) conducted a study to establish the effect of project risk management techniques on project performance at National Hospital Insurance Fund (NHIF) in Kenya. The study adopted a descriptive research design. The study targeted was 651 management staff and sampled 241 staff. Primary data was collected using questionnaires. Findings showed that risk preventions have the greatest effect on NHIF project performance followed by risk control then risk acceptance while risk transfer having the least effect on NHIF project performance.

Wabomba (2015) investigated the influence of risk management strategies on performance of projects among International Development Organizations. The study adopted a correlational research design. Data was collected using review analysis, literature and questions. Data collected was then analyzed using Excel 2013 and findings of the study revealed that the organization adopted changing of work plans to avoid risks, contingency, regular inspections, operational reviews training and skill enhancements in order to prevent risks.

RESEARCH METHODOLOGY

The study adopted a cross-sectional survey design. A cross-sectional survey design is a one shot descriptive survey that investigates one or many attributes across different population categories. The target population for this study was infrastructural projects in Nakuru County. The projects are classified into 8 categories. The unit of observation was the 201 project managers of the projects. The sampling frame was 201 infrastructural projects in Nakuru County. Sample size was determined using Yamane Sampling formula. The study adopted a stratified random sampling technique. The projects were stratified according to their category and the researcher randomly picked the project managers.

The sample size was 134 project managers. The study used primary data collected using questionnaires. A pilot study was conducted before the actual study. This was with an aim of ensuring that the questionnaires would help the researcher to achieve the study objectives and answer the research questions. A pilot was conducted with 10% of the sample size therefore 13 project managers. The pilot respondents did not take part in the actual study. Data was analyzed using Statistical Package for Social Science (SPSS version 28). Descriptive Statistics such as mean, frequency, and percentages were used. Inferential statistics were Pearson correlation and linear regressions. Linear regression was preferred since it shows how a change in the dependent variables would predict changes in dependent variable. It also helps to identify the independent variable that have the greatest effect on dependent variable as well as the variable with the lowest effect on dependent variable. Findings were presented using tables.

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

Questionnaires were distributed to 134 project managers. The response rate was 71.6% which is a good representation of the sample size. In order to have sufficient data for analysis, Fincham (2018) stated that a response rate of 60% should be the target of every social science researcher. The researcher put in extra time and effort to build rapport with respondent through thorough data collecting, which led to a higher response rate.

Risk Mitigation

The third objective was to explore the effect of risk mitigation on performance of infrastructural projects in Nakuru County, Kenya. Respondents were asked to mark how much they agreed or disagreed with the following statements about risk mitigation. Findings are presented in Table 1

Table 1: Risk Mitigation (N=96)

Statements	SD		D		NS		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Increase in project risk reporting influence project quality	5	5.2	3	3.1	4	4.2	44	45.8	40	41.7	4.16
The organization has put in place mechanisms that ensure there is regular monitoring of project progress	1	1.0	2	2.1	4	4.2	46	47.9	43	44.8	4.33
Increase in project risk reporting enhance benefit realization	0	0	5	5.2	2	2.1	57	59.4	32	33.3	4.21
Inspection of ongoing projects ensure projects are not delayed	0	0	10	10.4	2	2.1	48	50.0	36	37.5	4.15
Factors such as budget, schedule and resources are considered	4	4.2	1	1.0	1	1.0	43	44.8	47	49.0	4.33
There is a well-developed strategy within the project to respond to risks.	30	31.2	44	45.8	5	5.2	7	7.3	10	10.4	2.47
The organization usually outsources some functions.	1	1.0	10	10.4	3	2.1	48	50.0	34	35.4	4.42

Findings show that the project managers strongly agreed that the organization usually outsources some functions especially on those that may impact on the duration of the project (m= 4.42), the organization has put in place mechanisms that ensure there is regular monitoring of project progress (m= 4.33), factors such as budget, schedule and resources are considered while responding to risk (m= 4.33), and increase in project risk reporting enhance benefit realization of health projects (m= 4.21). Respondents also agreed that increase in project risk reporting influence project quality (m= 4.16), and inspection of ongoing projects ensure projects are not delayed (m= 4.15). Nonetheless, there is lack of a well-developed strategy within the project to respond to risks (m= 2.47).

Findings imply that the project managers take various actions to address possible risks. Through constant project monitoring, the project managers are able to record the project progress and determine the possible timelines for project delivery. Inspection also ensures project quality is achieved hence reducing risks of the projects delivered. The project managers also outsource some project functions to speed up the project activities which also mean diversifying any possible risks. Findings concur with Naji, Hafeth, and Ali (2018) that risk mitigation is an important part that results to effective project performance in terms of saving project costs.

Risk Control

The fourth objective was to establish the effect of risk control on performance of infrastructural projects in Nakuru County, Kenya. Respondents were asked to mark how much they agreed or disagreed with the following statements about risk control. Findings are presented in Table 2.

Table 2: Risk Control (N=96)

Statements	SD		D		NS		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Management of risks reduce the chances of project failure	2	2.1	4	4.2	3	3.1	46	47.9	41	42.7	4.25
Screening of project risks and taking measure influence project completion within time	0	0	4	4.2	3	3.1	54	56.3	35	36.5	4.15
Risk prevention enables project managers to forecast risks that could occur in a project in future	0	0	0	0	15	15.6	47	49.0	34	35.4	4.35
The firm encourages use of contingency plans	0	0	7	7.3	12	12.5	37	38.5	40	41.7	4.40
The organization encourages use of detailed work	0	0	2	2.1	7	7.3	57	59.4	30	31.2	4.34
The firm uses regular inspections	0	0	11	11.5	2	2.1	23	24.0	60	62.5	3.36
Our firm ensures installation of safety systems	3	3.1	8	8.3	8	8.3	46	47.9	31	32.3	2.47

Findings who that the project managers strongly agreed that; the organization encourages use of contingency plans or in order to avoid any situation that may cause delays in project implementation (m= 4.40), risk prevention enables project managers to forecast risks that could occur in a project in future (m= 4.35), the organization encourages use of detailed work plans so as to limit occurrence of anything that may delay the implementation of the project (m= 4.34), and management of risks reduce the chances of project failure (m= 4.25). Findings also show that the project managers agreed that screening of project risks and taking measure influence project completion within time (m= 4.15), and the firm uses regular inspections to ensure no issue arises that may delay project implementation (m= 3.36). Findings also reveal that majority of project managers do not check on safety systems which would help to alert the project team on any event that may lead to project delay (m= 2.47).

This indicates that the project managers have put in place work schedules for the project team to show the role delegated to every project team member. Risks may occur due role duplication and work plans guides the project team on various roles which prevents role duplication and possible project delays. Majority of project managers Measures to ensure safety of the project team are however not strictly adhered which may put the workers at risk causing project delays. Findings are in consistent with, Humphreys, Gimenez, and McIvor (2016) that risk control strategies such as detailed planning, alternative approaches and contingency help to control risks. Ubani, Amade, Benedict, Aku, Agwu, and Okogbuo (2015) also revealed that key project control strategies adopted by construction firms include adjusting plans and scope of work to counter risk effects, and keeping project managers informed about possible risk.

Project Performance

A variety of metrics were used to assess performance of infrastructural projects in the County. Projects managers were asked to indicate their level of agreement on statements related to project performance. Findings are presented in Table 3.

Table 3: Project Performance (N=96)

Statements	SD		D		NS		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
The projects meet time objective	36	37.5	35	36.5	18	18.8	4	4.2	3	3.1	1.99
Projects are delivered within set budget	19	19.8	65	67.7	3	3.1	9	9.4	0	0	2.17
Project clients are satisfied	3	3.1	5	5.2	16	5.2	53	55.2	19	19.8	3.82
Project realizes its benefits	10	10.4	9	9.4	10	10.4	21	21.9	46	47.9	3.74
Project beneficiaries are satisfied	9	9.4	3	3.1	10	10.1	25	26.0	49	51.0	3.29

Findings show that majority of the respondents agreed that; project clients are satisfied (m= 3.82), project realizes its benefits (m= 3.74), and project beneficiaries are satisfied (m= 3.29). Results also show that, projects are not delivered within set budget (m= 2.17), and they also fail to meet time objective (m= 1.99). Findings imply that the projects experience time and budget overruns. The projects surpass the planned time and more costs than planned are used to complete the projects. The projects however realize its benefits since both the clients and the beneficiaries are satisfied. Findings are in agreement with Nyabaro (2015) that most infrastructure projects are completed 2 to 5 years after the scheduled time. Nyarangi, and Ngali (2021), also found that almost half of road projects had cost overruns and had delays.

Correlation

Pearson correlation was used in this study to assess the relationship between the risk management strategies and project performance. The significant value was as 0.05. Correlation results are shown in Table 4.

Table 4: Correlation Coefficient

Variables		Project performance	Mitigation	Control
Project performance	Pearson Correlation	1		
	Sig. (2-tailed)			
Mitigation	Pearson Correlation	.457**	1	
	Sig. (2-tailed)	.005		
Control	Pearson Correlation	.525**	.429	1
	Sig. (2-tailed)	.000	.082	

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

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

Findings show that the Pearson correlation coefficient for risk mitigation and project performance was (r = 0.457, p-value=0.005), and for risk control and project performance was (r = 0.525, p-value=0.000). Findings imply that there is a strong significant relationship between risk mitigation and control and project performance. Findings are in agreement with Kolo (2015) that risk mitigation strategies influenced performance of the projects in terms of cost time and quality, and Kinyua (2015) that there existed a positive relationship between risk management strategies affecting project.

Regression

A regression analysis was also conducted to assess how a unit change in an independent variable would cause a change in the independent variable. The coefficient of determination indicates how well a statistical model is expected to predict future outcomes. The Model Summary is shown in Table 5.

Table 5: Model Summary

Model	R	r ²	Adjusted r ²	Std. Error of the Estimate
1	0.622	0.546	0.441	1.123

Predictors: (constant) mitigation, control

The R-square value in Table 5 is 0.546. This means that strategic risks prioritization, assessment, mitigation, and control can explain 54.6% of changes in project performance. This means that other risk management strategies that were not part of the project scope contribute to 45.4% of project performance.

An analysis of variance was also conducted on the relationship between independent variables and dependent variables. Table 6 shows the ANOVA results.

Table 6: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	38.337	4	9.584	8.538	.000 ^b
Residual	102.152	91	1.123		
Total	140.490	95			

Predictors: (constant) mitigation, control

Dependent variable: Project Performance

Findings showed that the regression model was significant (p-value = 0.000) at 0.05 hence there was a linear relationship between project management hard skills and project performance. The F is 8.538 which show that the model is suitable in testing the relationship between risk management strategies and performance of infrastructural projects.

Multiple regression demonstrates how a change in the independent variable would predict changes in the dependent variable by one unit. The regression coefficients are shown in Table 4.13.

Table 7: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant/Y Intercept	1.757	.812		2.163	.033
Mitigation	.352	.122	.259	2.887	.005
Control	.294	.097	.281	3.037	.003

As per the SPSS generated in Table 7, The following regression equation was established from the regression analysis:

$$(\text{Project performance}) = 1.757 + 0.352 \text{ Mitigation} + 0.294 \text{ Control}$$

This means that if all factors are held constant at zero, performance of infrastructural projects in Nakuru County, Kenya would be 1.757. The equation also shows that a unit increase in risk mitigation would cause an increase in project performance by a unit of 0.352, and a unit increase in risk control would cause an increase in project performance by a unit of 0.294. According to the t statistics, risk control had the greatest effect on project performance (3.037), followed by risk mitigation (2.887). This imply that risk mitigation and control are the key risk management strategies affecting performance of infrastructural projects. Findings are in agreement with Aduma and Kimutai (2018) who found that risk preventions have the greatest effect on project

performance. Mhirat and Irtemeh (2017) also found that risk assessment, and mitigation enables project managers in to achieve project success.

Conclusion

Project managers mitigate project risks through various ways. This is achieved through outsourcing some projects' process so that in case of any risk, the financial burden will not be entirely covered by the project manager. To mitigate the risks, project managers have put in place regular monitoring of progress to ensure that the project is progressing as planned. The project risks are also reported on time so that they are dealt with before they escalate. Project managers can put in place measures that reduce the severity of a loss after it has happened. Therefore, good loss prevention and control practices enhance project performance. Risk control is a strategy that implies that the chance of loss is reduced to zero because the loss exposure is never acquired. If projects fail to control some of the risks, project resources may be used to counter the risks leading to cost overruns and project delays.

Recommendations

Projects managers should mitigate risks through diversification. Using a reinsurance technique, projects can allocate risks to those parties who are most appropriate to bear them. This can reduce losses of the original project and therefore improve performance. Projects can put in place measures that reduce the severity of a risk after it has occurred. Therefore, good loss prevention and control practices are thought to enhance project performance. Project managers should therefore apply a system of policies and strategies in order to control the risks of running out of project funds provided their resources are applied effectively.

Suggestions for Further Studies

The study was conducted in Nakuru county hence the need to carry out a similar study in other counties in Kenya. Findings have shown that the risk management strategies studied contributes to 54.6% of changes in project performance. Therefore there is need to study other project risk management strategies that contribute to 45.4% of project performance. This study focused on risk management in contractors' perspective (project managers). A research could hence be conducted targeting other infrastructure project stakeholders who include the client and the consultants.

REFERENCES

- Aduma, L. & Kimutai, G. (2018). Project Risk Management Strategies and Project Performance at the National Hospital Insurance Fund in Kenya. *International Academic Journal of Information Sciences and Project Management*, 3(2), 80-110
- Amandin, M. M., & Kule, J. W. (2016). Project delays on cost overrun risks: a study of Gasabo district construction projects Kigali, Rwanda. *ABC Journal of Advanced Research*, 5(1), 21-34.
- Apostolopoulos, C., Halikias, G., Maroukian, K., & Tsaramirsis, G. (2016). Facilitating organisational decision making: A change risk assessment model case study. *Journal of Modelling in Management; Bradford*, 11(2), 694–721.
- Boateng, A., Ameyaw, C. & Mensah, S. (2020) Assessment of systematic risk management practices on building construction projects in Ghana. *International Journal of Construction Management*, 10(1)38-45
- Carbone, T. & Tippett, D. (2017). Project risk management using the project risk FMEA. *Engineering Management Journal*, 16(4) 28-35
- Damali, M., & Shukla, J. (2016). Project Implementation factors influence on the success of community-based projects in Rwanda: A case study of church and community mobilization

- project – Bugesera District. *European Journal of Business and Social Sciences*, 5 (7) 79 – 102
- Dandage, R.V., Mantha, S. & Rane, S.B. (2018). Analysis of interactions among barriers in project risk management. *Journal of Industrial Engineering International*, 14 (3) 153–169
- Firmenich, J. (2017). Customisable framework for project risk management. *Construction Innovation*, 17(1) 68-89
- Galli, B. (2019). An engineering manager’s guide for commonly used change management approaches—From one practitioner’s experience. *IEEE Engineering Management Review*, 47(3), 118–126.
- Gunnar, A. & Josefina, E. (2020). Communication inside Risk Assessment and Risk Management (COMRISK): Final report. EFSA Supporting Publications. 17(7) 1891.
- Hijazi, I., Isikdag, U., Abunemeh, M., Li, X., Hashash, M., El Meouche, R., & Cansiz, S. (2018). Mapping the Processes of Donor-Funded Construction Projects. *Sustainability*, 10(7), 2355
- Humphreys, P., Gimenez, C. & McIvor, R. (2016). Risk, risk management practices, and the success of supply chain integration. *International Journal of Production Economics*, 10(10)
- Jiwani, N., & Gupta, K. (2019). Comparison of Various Tools and Techniques used for Project Risk Management. *International Journal of Machine Learning for Sustainable Development*, 1(1), 51-58
- Kendrick, T. (2019). Identifying and Managing Project Risk. Prepared for sweeney@lsst.org, donald sweene.
- Kinyua, E. (2015). Effect of Risk Management Strategies on Project Performance of Small and Medium Information Communication Technology Enterprises in Nairobi, Kenya. *International Journal of Economics, Commerce and Management*, 3(2) 1- 30
- Kolo, D. N. (2015). Safety Issues involving workers on building construction sites in Nigeria: An Abuja Study (Doctoral dissertation, Eastern Mediterranean University (EMU)- Doğu Akdeniz Üniversitesi (DAÜ)).
- Lee, P., Lam, P. T. I., & Lee, W. L. (2015). Risks in energy performance contracting (EPC) projects. *Energy and Buildings*, 92, 116-127.
- Macharia, E. W., Mbassana, M., & Oduor, J. (2015). Assessing sustainability of rural water projects in Naivasha, Kenya, case study: Maraigushu water project. *European Journal of Business and Social Sciences*, 4(7), 52-83.
- Management Issues in the Nigerian Construction Industry. *International Journal of Engineering and Technical Research*, 3(1) 217-232
- Mba, B. & Agumba, J. (2017). Factors for Selecting Joint Venture Partner for Construction Project in South Africa. Retrieved from <http://hdl.handle.net/10210/21>
- Mhirat, M. & Irtemeh, H. (2017). Impact of Risk Management on Project Success: An Empirical Investigation in Jordanian Ministry of Environment. *European Journal of Business and Management*, 9(19) 55-61
- Mishra, A. & Kamalendra, M. (2017). Factors and Impact of Risk Management Practice on Success of Construction Projects of Housing Developers, Kathmandu, Nepal. *International Journal of Sciences: Basic and Applied Research, Published by Research Gate*, 36(7) 206-232I
- Mitikie, ., Jaeho Lee, & Tai Sik Lee. (2017). The Impact of risk in Ethiopian Construction project performance. *Open Access Library Journal*, 4 4: e4233
- Naji, I., Hafeth, R. & Ali, R. (2018). Risk Response Selection in Construction Projects. *Civil Engineering Journal*, 3(12)1208
- Nawaz, A.; Waqar, A. (2019). An Innovative Framework for Risk Management in Construction Projects in Developing Countries: Evidence from Pakistan. *Risks* 2019, 7, 24.

- Nerija, B. & Banaitis, A. (2012). *Risk Management in construction Projects. Department of Construction Economics and Property management*. Unpublished Masters' Thesis, Vilnius Gediminas Technical University
- Nguyen, T. P & Chileshe, N. (2015). Revisiting the construction project failure factors in Vietnam. Built environment project and assessment, 5, 398
- Nyarangi, J. & Ngali, R. (2021). Risk management practices and financial performance of insurance companies listed in Nairobi Securities Exchange, Kenya. *International Academic Journal of Economics and Finance*, 3(7), 176-197
- Ochieng, E. G. (2017). Working separately but together: appraising virtual project team challenges. *Team Performance Management: An International Journal*.
- Otaalo, G., Muchelule, Y. & Asinza, K. (2019). Effect of Risk Identification and Risk Analysis on Performance of Road Construction Projects in Kenya: A Case Study of Kakamega County. *International Journal of Social Science and Humanities Research*, 7 (2) (407-411)
- Pimchangthong, D., & Boonjing, V. (2017). Effects of risk management practice on the success of IT project. *Procedia Engineering*, 182, 579-586.
- Rafele, C. (2015). Choosing project risk management techniques. A theoretical framework. In: *Journal of Risk Research*, 18(2) 232-248
- Rane, S., Potdar, R., & Rane, S. (2021). Development of Project Risk Management framework based on Industry 4.0 technologies", *Benchmarking: An International Journal*, 28(5) 1451-1481
- Rehman, M. (2017). Identification of Risk Factors associated with Pakistan's Construction Industry Project Manager Perspective. *International Journal of Business and Social Science*. 8(3) 150-157.
- Roque, R. & Carvalho, M. (2013). Understanding the Impact of Project Risk Management on Project Performance: an Empirical Study. *Journal of Technology Management & Innovation*, 8(4) 64-78.
- Schwalbe, K. (2016). *Project Management Techniques*. Computer Press. ISBN 978-80-251-2882-4.
- Tipili, G. & Yakubu, I. (2016). Identification and assessment of Key Risk Factors Affecting Public Construction Projects in Nigeria: Stakeholders Perspectives , *International Journal of Engineering and Advanced Technology Studies, Published by European Centre for Research Training and Development*, 4(2) 20 -32
- Wabomba, K. W. (2015). *Influence of Risk Management Strategies on Project Performance: A Survey of Selected International Development Organizations Based In Nairobi City, Kenya*. Unpublished Masters' Thesis, Kenyatta University.
- Wachira, E.G., James, R. (2018). Critical Success Factors in the implementation of community based projects in Kiambu County, Kenya. *International Journal of Economics, Business and Management Research*, 2(04)
- Yan, P., & Liu, J. (2021). Risk response incorporating risk preferences in international construction projects. *Engineering, Construction and Architectural Management*, 4(1)
- Zangirolami-Raimundo, J, Echeimberg, J. & Leone C. (2018). Research methodology topics: Cross-sectional studies. *Journal of Human Growth and Development*. 28(3)356-360
- Zhang, Y. (2016). Selecting risk response strategies considering project risk interdependence. *International Journal of Project Management*, 34(5), 819–830.