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RISK MANAGEMENT PRACTICES AND PERFORMANCE OF CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

The construction industry takes the key responsibility for the construction of constructions that are occupied by millions of Kenyans. According to the ministry of housing 79.2% of all the projects implemented exhibited some degree of failure. The purpose of the study was to examine the influence of project risk management practices on the performance of construction projects in Nairobi City County, Kenya by focusing on two specific objectives; project risk identification and project risk assessment. The study was guided by prospect theory and contingency theory. The research was conducted using a descriptive research design. The target population of the study was 368 construction projects in Nairobi City, County. Simple random sampling technique was applied whereby a sample size of 192 construction projects was derived. Primary data was collected through the use of semi-structured questionnaires. Quantitative and qualitative data were generated from the closed-ended and open-ended questions, respectively. Qualitative data was analyzed on a thematic basis and the findings provided in a narrative form. Inferential and descriptive statistics were employed for the analysis of quantitative data with the assistance of the Statistical Package for Social Sciences (SPSS version 25). The study results were presented through the use of tables and figures. The study concludes that risk identification has a positive and significant effect on the performance of construction projects in Nairobi City County, Kenya. In addition, the study concludes that risk assessment has a positive and significant effect on the performance of construction projects in Nairobi City County, Kenya. The study further recommended that Project Managers should give priority to risk management practices since they influence project success.

Key Words: Project Risk Management Practices, Performance, Construction Projects, Project Risk Identification, Project Risk Assessment

INTRODUCTION

The construction industry is confirmed to be the cornerstone and bedrock of the fast economic increase of any state (Sugimoto, 2014). Construction is a competitive high risk – business (Verzuh, 2015). Globally, it's a 1.7 trillion industry amounting to 5 to 7 % of gross domestic product in most countries and accounts for a significant part of global gross capital formation- a little under one-third. The sector's role in economic development is undeniable – housing, utility network, schools, and clinics are all built assets. Because of the role of construction projects in the development of a country, the poor performance of these projects can significantly reduce the economic return to investments and carry high human costs in terms of injury and death (World Bank, 2017).

According to Kihunga, 2018 the rate at which construction projects fail or are abandoned and collapse of constructions, some even under construction is retrogressive in developing countries. The answer to project success, failures, abandonment, and collapse of construction projects lies in efficient project risk management practices. According to Mamai and Yinghua (2017), risk management is the process through which project managers assess the inherent risks present in their activities while mitigating those risks and hence achieving sustainable and optimum benefits from their activities. Construction projects experience unanticipated events and uncertainty which results in damaging consequences for the projects hence project managers need to effectively deal with the risks and uncertainty to fully achieve the vision of the project (Gitau, 2016). According to Kumar (2014), risk management tools and techniques enables the project team to successfully deliver the project on time, within budget, and to meet client desired quality. Construction projects are always prone to uncertainties and risk and failure to successfully manage the associated risks appropriately results in failure of the projects in terms of delay in completion (Jean, 2015). Hence studying risk management practices is essential in unlocking project success.

Muiruri and Mulinge (2014), opined that the construction industry in Kenya has been increasingly under siege to establish proper risk management practices given the heightened rate of accidents including the collapsing of constructions and ill-health problems on construction sites. This situation is exacerbated by the fact that construction projects in Kenya employ a wide range of cadres of employees including people from very diverse educational backgrounds, cultural backgrounds, wide cultural differences, and even different levels of health and safety awareness (Muiruri & Mulinge, 2014). Thus, the increased incidence of accidents and ill-health at construction sites in Kenya reflects the lack of adequate risk mitigation measures (Muiruri & Mulinge, 2014).

Statement of the Problem

Performance of projects fails due to inadequate risk management practices. There are several well-established methods and tools to manage project risks in big projects (White and Fortune, 2002); however, little research has been published on the techniques and tools for managing project risks in small projects and their performance (Bryde, 2003).The public and other government-funded projects users have observed and lamented the fact that they consistently run behind schedule, which in turn affects cost due to a number of factors. Among such, as indicated by (Mwangi et al., 2018; Waihenya (2011) are variations in the cost of building materials, changes in the design of the building, changes in finishes by the client, the contractor running out of money to run projects for some time, hiring extra tools during construction that were not anticipated, the project Quantity Surveyor underestimating the cost of construction, the application of the incorrect time estimation model, and the increase in weather patterns.

The increasing demand for housing and space for commercial activities, construction firms are taking shortcuts to encroach on public space, roads, and sewerage ignoring the construction process leading to un functioning and unsafe construction (Kihunga, 2018). According to a National Constructions Inspectorate (NBI)audit report, just 2,170 houses, or about 44%, were deemed safe for accommodation out of 4,879 assessed over 30 months. Approximately, 650 were graded as very hazardous, 826 as hazardous, 1,185 as fair, and only 44%, were established to be conducive for accommodation (National Construction Inspectorate, 2017). Structural failure has been documented in 87 cases of constructions collapsing, with a death record of one hundred and seventy people (Kabala, 2019). According to Bahamid & Doh (2017), a deficiency of acceptable visibility into key risk factors, their criticality, and a failure to handle property risks in an organized manner have all been related to poor performance in construction projects.

Based on the study by Ngugi and Mwangi (2018) on Risk Management Practices ,the study found out that poor design risk management leads to poor implementation of a project which as a result leads to cost overruns, prolonged execution period and compromise on quality of the projects. Nairobi City County Government (2017), most construction projects in the city by delegated contractors are always facing challenges of delays, budget overruns, change of designs due to disputes over invasion of human settlements to the road reserves and illegal construction of buildings on public land, public utilities and along power lines.

Therefore, the study addresses gaps in existing research, emphasizing the need to link poor project performance to risk management practices. The focus is on understanding the complexity of risks throughout project implementation, going beyond attributing delays solely to contractors. The research aims to bridge these gaps by examining the influence of risk management practices on the performance of construction projects in Nairobi City County, Kenya.

Objectives of the Study

i) To establish the influence of risk identification practices on the performance of construction projects in Nairobi City County, Kenya.

ii) To examine the influence of risk assessment practices on the performance of construction projects in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Review

Prospect Theory

The prospect theory was developed by Kahneman and Tversky in 1979. It had to envision the project environment, especially in risky conditions (Tversky and Kahneman, 1979). The idea of prospect theory is that people make assessments based on what they may gain or lose as the result of making a choice. It is designed to aid organizations and individuals to understand, explain and predict choices in a world of uncertainty. It clarifies how decisions are outlined and assessed in the dynamic cycle. It centres around two pieces of independent direction, the outlining stage and the assessment stage (Tversky, 1967).

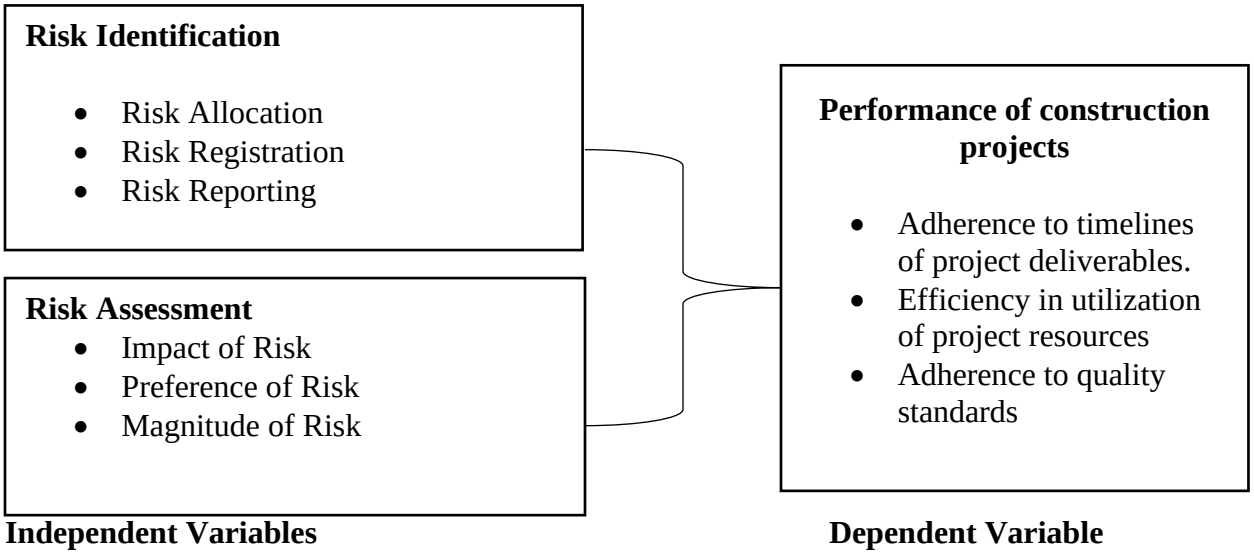
According to prospect theory, the possibility of losing an existing position will generate a level of resistance that will outweigh the energy and resources a person might expend to gain a new position (Kahneman, 2011). It states that when people are faced with a risk in which they have limited information, and do not apply rigorous analytical processes, their choices will often be driven by how the information about the situation is framed either by themselves or others (Wolfe, 2008). This theory helps explain the influence of risk identification on project performance.

Decision Theory

Decision theory was developed by Sven Ove Hansson in 1994. The theory states that the management team of an organization makes the decisions based on future uncertainties in the business. It explains how the management team assesses the risks involved in certain risks and then takes decisions based on the level and magnitude of the risks. According to the decision theory, the decision made in response to the assessed risk depends on risk appetite, expected value, risk attitude, and loss aversion (Kinyua et *al.*, 2015).

The attitude project managers also have towards risk may inform of the decision they make in running a project. Those who have a negative attitude towards risk will make decisions that are unlikely to result in risk while those who have a positive attitude towards risk will take risky decisions. The theory further states that project managers who prefer profit on loss will make decisions that may lead the project in profit-making (Kaliti, 2015). For either decision to be taken by the management team, risk has to be first evaluated and the consequences of making decisions in the organization measured against such risks. Therefore, decision theory was relevant in guiding the current study regarding the influence of project risk assessment practices on the performance of construction projects in Kenya.

Conceptual Framework



Risk Identification

According to Antwi-Agyei *et al.*, (2015), risk identification involves risk screening, risk register, weakness, and threats identification. The Project manager must communicate with stakeholders early and as often as necessary and explain the nature of the risks, (Alderton, 2014). Inefficiencies in the risk identification process in complex projects contribute greatly to the failure of projects (Reeves et al., 2013). According to Carvalho (2015), inefficiencies in the process of identifying risks in the development of complex systems are the cause of project failures. According to Baker et *al.*, (2012), risk identification is the most influential process in project management through communications of risk, reporting, risk registration, risk allocation, risk analysis, and risk control at influencing project's performance.

Risk Assessment

Risk assessment refers to the overall process or method of analyzing and evaluating the level of risk associated with that hazard (Wanyonyi, 2015). According to Nkirimpai (2017) the importance of risk assessments on project performance lay in threats identification, identification of potential dangers or losses, management evaluation of risks, and estimation of the likelihood of the project risks materializing. It entails assessing risks, considering possibility and impact as a basis for identifying how the risks will be handled (Ochieng, 2017). Nair et *al.,* (2014) notes that risk assessment may include qualitative enterprise risk assessment practices that involved the use of management to evaluate the risks that organizations faced.

Performance of construction projects

Project performance is a subject of utmost concern to most stakeholders in any project. The main expectation of many stakeholders from projects is their performance in terms of the achievement of objectives. Satisfactory achievement of set objectives is what makes a project successful (Muchelule, 2018). According to Nguyen and Watanabe(2017), the measures of project performance should include the project completion time, the completion of the project within the approved budget, efficiency, effectiveness, meeting the stakeholder's expectation, with minimum conflicts and disputes. However, according to Zuofa & Ochieng (2014), projects may be completed within their targeted time, cost, and scope criteria but still be classified as failures. Therefore, it becomes necessary to consider failure beyond these criteria and include targets such as the aspiration of stakeholders, the benefits accruing to society or project organization among criteria for determining project failure. According to Kerzner (2017), project performance is defined as a project that meets its objectives under budget and schedule.

Empirical Review

Risk Identification and Project Performance

A study conducted by Hopkinson (2017) on the construction industry indicated that more structural techniques were used to evaluate the impact and probability of those risks on risk identification while identifying and analysing risks within the projects. The professionals involved in these projects used checklists and manuals to document the various forms of risk identification on the organizational level. They used historical data regarding previous projects, not well-executed being which the respondents treated as a source of potential risks. The study also indicated that considering the future consequences already in the early stages of the project since all projects are unique and the project team might have varying opinions. Due to the nature of projects being different depending on the scope, the use of checklists and other manuals was considered essential the team of experts dealing with risk management implementation used discussions as the most common technique to identify risks and problems. The project team also used group discussions which were more appropriate since they encourage more ideas that assist to identify and manage risks.

Tworek (2015) examined the methods of risk identification in companies' investment projects. The study exclusively dealt with the methodological aspects of risk identification in investment projects carried out by companies carried out in 25, out of 100, leading construction and assembly companies in Poland. The research was conducted in the third quarter of 2009. The study found that effective identification of the effects of the risk is especially vital as it guarantees increasingly compelling assurance against risks.

Mutua and Kirui (2020), conducted a study on the effects of project risk identification on the performance of core banking systems in commercial Banks of Kenya. The study adopted a descriptive research design. The study conducted a census of 80 respondents. The collected data were quantitatively analyzed using descriptive statistics and multiple regression analysis. The study found that risk identification on project performance. The study concluded that identifying risk enables full risk analysis to be done and risk to be addressed and the project managers qualify risk based on likelihood and impact.

Risk Assessment and Project Performance

According to a study done by Darnall & Preston (2010), it indicated that while most risks may seem predictable, it is very important for the project team to ensure that they still implement proper risk management practices. This is because the impact that these risks have on projects can lead to cost overruns or project termination. Banaitiene & Banaitis (2012), also discussed risk management in Lithuanian projects and stated that the correct risk management practices enable the construction companies in identifying and quantifying risks, and that risk reduction and control policies should be considered.

A study done by (Enshassi *et al.*, 2015), within the Gaza strip identified four main causes of time delays as strikes and border closures, material-related factors, lack of materials in markets, and delays in material delivery to the site. Three main causes of cost overruns were price fluctuations in construction materials, contractor delays in materials and equipment delivery, and inflation. They suggested that the project managers should ensure that the risk management process is implemented in construction projects to minimize delays and cost overruns.

Roque and de Carvalho (2017), conducted a study on risk assessment on the performance of IT projects in Brazil. The study conducted a survey of 415 Information and technology projects in Brazil. The study found that risk assessment had a significant positive impact on project performance. The study established that assessing uncertainties when undertaking projects is essential in improving project performance.

RESEARCH METHODOLOGY

The research was conducted using a descriptive research design. The descriptive research method is chosen because it provides answers to questions such as what, who, where, when, and how they are related to the problems. Kasomo (2018). The study targeted construction projects with the unit of analysis being 368 constructions projects in Nairobi City County while the unit of observation are the project managers working in these projects. The study used primary data that was gathered by use of structured questionnaires and captured through a 5-point Likert scale type and interview schedule. The Likert scale with closed and open question guide was distributed to the respondents after approval to collect data. The purpose of the study was explained and consent to participate in the study was sought. Dates and venues for administering the questionnaires in consultation with the potential subjects were set. Drop-and-pick-later method of questionnaire administering was implored with explanations of how to fill them. Cronbach's alpha coefficient of 0.7 and above was used to determine internal reliability and internal consistency of the instrument and see how well a test measures the achievement which is proportion of variance in observed result attributed to the actual result (Jennifer, 2022). SPSS version 28 program was also used to analyze quantitative data and results presented in form of charts, graphs and frequency tables for easier interpretation.

RESEARCH FINDINGS AND DISCUSSIONS

Response rate

The researcher sampled 192 project managers who were each administered with the questionnaires. From the 192 questionnaires 181 were completely filled and returned hence a response rate of 94.3%. The response rate was considered as suitable for making inferences from the data collected. Smith (2018) indicates that a response rate that is above fifty per-cent is considered adequate for data analysis and reporting while a response rate that is above 70% is classified as excellent. Hence, the response rate of this study was within the acceptable limits for drawing conclusions and making recommendations.

Descriptive Analysis of the Variables of the Study

Risk Identification Practices and the Performance of Construction Projects

The statements regarding performance of construction projects in Nairobi City County were established and summarized into mean and standard deviation as shown in Table 1. From the results, the respondents agreed that different risks are identified before the commencement of a project. This is supported by a mean of 3.943 (std. dv = 0.981). In addition, as shown by a mean of 3.926 (std. dv = 0.850), the respondents agreed that the risks identified are communicated to all the project stakeholders. Further, the respondents agreed that increase in project risk reporting influences project performance. This is shown by a mean of 3.911 (std. dv = 0.914). The respondents agreed that the use of a risk register enhances risk identification in construction projects. This is shown by a mean of 3.896 (std. dv = 0.947). With a mean of 3.889 (std. dv = 0.856), the respondents agreed that risk registration influence the identification and management of project risk. The respondents agreed that the risk register is maintained for monitoring and mitigating project risk. This is supported by a mean of 3.876 (std. dv = 0.694). In addition, as shown by a mean of 3.764 (std. dv = 0.892), the respondents agreed that risk allocation is undertaken to mitigate the occurrence of project loss. The respondents agreed that screening of project risks and taking measures influence project performance. This is shown by a mean of 3.732 (std. dv = 0.876). With a mean of 3.654 (std. dv = 0.762), the respondents agreed that effective risk identification process enables project managers to take corrective measures that influence projects performance.

Table 1: Risk Identification Practices and the Performance of Construction Projects

	Mean	Std. Dev.
Different risks are identified before the commencement of a project	3.943	0.981
The risks identified are communicated to all the project stakeholders.	3.926	0.850
Increase in project risk reporting influences project performance	3.911	0.914
The use of a risk register enhances risk identification in construction projects	3.896	0.947
Risk registration influence the identification and management of project risk	3.889	0.856
The risk register is maintained for monitoring and mitigating project risk	3.876	0.694
Risk allocation is undertaken to mitigate the occurrence of project loss	3.764	0.892
Screening of project risks and taking measures influence project performance	3.732	0.876
Effective risk identification process enables project managers to take corrective measures that influence projects performance	3.654	0.762
Aggregate	**3.879**	**0.871**

Risk Assessment Practices and the Performance of Construction Projects

From the results in Table 2, the respondents agreed that the risk assessment is carried out by project managers. This is supported by a mean of 3.996 (std. dv = 0.865). In addition, as shown by a mean of 3.919 (std. dv = 0.945), the respondents agreed that risks are ranked from low impact to high impact risks. Further, the respondents agreed that risk is categorized project performance is dependent on efficient risk assessment. This is shown by a mean of 3.898 (std. dv = 0.611). The respondents also agreed that the occurrence of the risk and their effects on projects evaluated and determine. This is shown by a mean of 3.831 (std. dv = 0.908). With a mean of 3.761 (std. dv = 0.776), the respondents agreed that there are continuous risk assessments to reduce cost overruns. The respondents also agreed that assessing the risk that affects construction projects reduce project risks. This is shown by a mean of 3.712 (std. dv = 0.921).

Table 2: Risk Assessment Practices and the Performance of Construction Projects

	Mean	Std. Dev.
The risk assessment is carried out by project managers	3.996	0.865
Risks are ranked from low impact to high impact risks	3.919	0.945
Risk is categorized project performance is dependent on efficient risk assessment	3.898	0.611
The occurrence of the risk and their effects on projects evaluated and determine	3.831	0.908
There are continuous risk assessments to reduce cost overruns	3.761	0.776
Assessing the risk that affects construction projects reduce project risks	3.712	0.921
Aggregate	**3.872**	**0.841**

Performance of Construction Projects

Various statements relating to performance of construction projects in Nairobi City County, Kenya are presented in Table 3. From the results, the respondents agreed that the project phases have been completed within the planned timeframes. This is supported by a mean of 3.984 (std. dv = 0.997). In addition, as shown by a mean of 3.907 (std. dv = 0.831), the respondents agreed that the work done in the project is significant to the timelines used. Further, the respondents agreed that the percentage of the already done work of the project has used an equivalent percentage of the budget. This is shown by a mean of 3.828 (std. dv = 0.563). The respondents agreed that the remaining funds in the budget are adequate to run the remaining part of the project into a success. This is shown by a mean of 3.821 (std. dv = 0.851). The respondents also agreed that the stakeholders have shown their satisfaction with the progress of the project. This is supported by a mean of 3.813 (std. dv = 0.821). In addition, as shown by a mean of 3.907 (std. dv = 0.831), the respondents agreed that the completed phase of the project is aligned to the intended quality standards.

Table 3: Performance of Construction Projects

	Mean	Std. Dev
The project phases have been completed within the planned timeframes	3.984	0.997
The work done in the project is significant to the timelines used	3.907	0.831
The percentage of the already done work of the project has used an equivalent percentage of the budget	3.828	0.563
The remaining funds in the budget are adequate to run the remaining part of the project into a success	3.821	0.851
The stakeholders have shown their satisfaction with the progress of the project	3.813	0.821
The completed phase of the project is aligned to the intended quality standards	3.786	0.786
Aggregate	**3.829**	**0.818**

Correlation Analysis

The results in Table 4 shows that there was a very strong relationship between risk identification practices and performance of construction projects in Nairobi City County, County, Kenya (r = 0.836, p value =0.002). The relationship was significant since the p value 0.002 was less than 0.05 (significant level). The findings are in line with the findings of Hopkinson (2017) who indicated that there is a very strong relationship between risk identification practices and project performance. Moreover, the results revealed that there is a very strong relationship between risk assessment practices and performance of construction projects in Nairobi City County, County, Kenya (r = 0.845, p value =0.001). The relationship was significant since the p value 0.001 was less than 0.05 (significant level). The findings conform to the findings of Enshassi *et al*., (2015) that there is a very strong relationship between risk assessment practices and project performance.

Table 4: Correlation Analysis

		Performance of Construction Projects	Risk Identification Practices	Risk Assessment Practices
Performance of Construction Projects	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	181		
Risk Identification Practices	Pearson Correlation	.836**	1	
	Sig. (2-tailed)	.002		
	N	181	181	
Risk Assessment Practices	Pearson Correlation	.845**	.289	1
	Sig. (2-tailed)	.001	.061	
	N	181	181	181

Regression Analysis

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.940	.884	.885	.582

Table 6: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.027	4	3.007	80.61	.000[b]
	Residual	6.568	176	.0373		
	Total	18.595	180			

Table 7: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.311	0.082		3.793	0.003
	Risk Identification Practices	0.387	0.091	0.388	3.593	0.003
	Risk Assessment Practices	0.386	0.099	0.387	3.890	0.000

a Dependent Variable: Performance of construction projects

The model summary was used to explain the variation in the dependent variable that could be explained by the independent variables. The r-squared for the relationship between the independent variables and the dependent variable was 0.884. This implied that 88.4% of the variation in the dependent variable (performance of construction projects in Nairobi City County, Kenya) could be explained by independent variables (risk identification practices and risk assessment practices).

The ANOVA was used to determine whether the model was a good fit for the data. F calculated was 80.61 while the F critical was 2.423. The p value was 0.000. Since the F-calculated was greater than the F-critical and the p value 0.000 was less than 0.05, the model was considered as a good fit for the data. Therefore, the model can be used to predict the influence of risk identification practices, risk assessment practices, risk mitigation practices and risk monitoring practices on performance of construction projects in Nairobi City County, County, Kenya.

According to the results, risk identification practices have a significant effect on performance of construction projects in Nairobi City County, County, Kenya β_1=0.387, p value= 0.003). The relationship was considered significant since the p value 0.003 was less than the significant level of 0.05. The findings are in line with the findings of Hopkinson (2017) who indicated that there is a very strong relationship between risk identification practices and project performance.

The results also revealed that risk assessment practices have significant effect on performance of construction projects in Nairobi City County, County, Kenya, β1=0.386, p value= 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings conform to the findings of Enshassi *et al.*, (2015) that there is a very strong relationship between risk assessment practices and project performance.

Conclusion

The study concludes that risk identification has a positive and significant effect on the performance of construction projects in Nairobi City County, Kenya. Findings revealed that risk allocation, risk register and risk reporting influence performance of construction projects in Nairobi City County, Kenya. In addition, the study concludes that risk assessment has a positive and significant effect

on the performance of construction projects in Nairobi City County, Kenya. Findings revealed that impact of risk, preference of risk and magnitude of risk influence performance of construction projects in Nairobi City County, Kenya.

Recommendations of the Study

To improve the performance of construction projects in Nairobi City County, it is crucial to strengthen risk identification processes. Project stakeholders should invest in comprehensive risk assessment methodologies and tools to identify potential risks more accurately and proactively. This may involve conducting thorough site assessments, environmental impact assessments, and engaging with experienced professionals to ensure all potential risks are identified early in the project planning phase. To improve construction project performance in Nairobi City County, it is essential to strengthen and formalize the process of risk assessment. This includes conducting thorough risk assessments at various stages of the project, from planning to execution. Employ experienced professionals and employ modern risk assessment techniques, such as quantitative risk analysis, to better understand and quantify potential risks. Regularly update risk assessments to adapt to changing project conditions.

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