



**RISK MANAGEMENT DETERMINANTS AND PERFORMANCE OF RESIDENTIAL BUILDINGS CONSTRUCTION
PROJECTS IN NAIROBI COUNTY, KENYA**

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ABSTRACT

Project performance is evaluated based on cost, time, and quality. Residential building construction projects encounter various risks that hamper those components of performance. Risk management enhances project performance and it is affected by various determinants. This study established the impact of risk management determinants on performance of residential buildings construction projects in Nairobi, Kenya. The identified determinants were risk mitigation strategy, risk management skills, project organization structure, and resource allocation. The study was anchored on decision theory, cost-benefit analysis model, and stakeholder theory. The target population was 1024 projects undertaken by contractors in the NCA 1, 2, 3 categories. The applied stratified random sampling method yielded 103 projects as the sample size (sampling factor being 0.1). Descriptive survey research design was used. The pilot study comprised sample of 5 projects. Data was collected using a questionnaire. The response rate from the targeted sample was 73.8% which was above the expected threshold. Data analysis was done on SPSS for both inferential and descriptive analysis. The respondents' education level was noted to be 42.11%, 36.16%, and 19.74% for post-graduate, undergraduate, and diploma respectively. 50% of the respondents had worked between 5-10 years, 36.84% had worked over 10 years, while 13.16% had worked for less than 5 years. A reliability analysis was conducted using Cronbach's Alpha test which yielded 0.762, an indication of higher level of internal consistency. The model summary indicated R to be 0.676 which showed high levels of correlation between project performance and the identified determinants. Regression analysis yielded coefficients that resulted in the equation, $Y = 1.779 + 0.258X_1 - 0.049X_2 + 0.303X_3 + 0.120X_4$. That illustrated that all determinants had positive correlation with project performance except project organization structure. The study concluded that risk management strategies and risk management skills had positive and significant impact on the project performance of residential buildings' construction in Nairobi, Kenya. Project stakeholders were recommended to adopt these strategies without fail. The study recommended undertaking the study in other areas to ascertain a comparative analysis on the significant determinants.

Key Words: Risk Mitigation Strategy, Risk Management, Project Organization Structure, Resource Allocation

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INTRODUCTION

Construction industries encompass capital-intensive investments that present unique and dynamic risks. Construction projects involve various stakeholders with different projects' expectations (Boadu *et al.*, 2020). One of the key expectations is project performance which in most cases is measured based on project management aspects of scope, time, and cost (Shehu & Wang, 2020). The project managers and the construction managers have to ensure that they adhere to proper practices to improve their construction projects' performance. The construction industry is a major contributor to countries' economic growth and social development. Just like any other industry that experiences incidences of risk which affect the progress of projects, the building and construction industry struggles with the same challenge. These risks that challenge the projects affect projects progress leading to negative impact on their performance (Taofeeq *et al.*, 2019).

Malaysia is one of the countries that have progressive and challenging construction industry (Bahamid *et al.*, 2020). The assessment of construction-related risks such as contractor risks is more significant in their construction projects than for other types of risk like financial risks (Salleh *et al.*, 2020). Therefore, project stakeholders would always consider risk management as an integral part in ensuring improved project performance. A 2015 study by Befrouei and Taghipour identified that project performance is always deterred by certain risks, which are unique for different companies in the Tehran, Iran. The study also reiterates the essential aspect that project performance is attributed to the balance between project timeline, outcome (scope), and assigned resources (in terms of cost incurred).

Developing countries, especially in Africa, face challenges when dealing with risk management. It can be noted that developed countries are better placed in risk management than the developing ones. Ghana is one of Africa's countries where the construction industry is considered a major

contributor to its economic growth, with a GDP of at least 13.7% (Boadu *et al.*, 2020). The Ghana construction industry employs about 7% of its working population. However, the construction activities equally pose serious risks that impair successful completion of projects, which is an important aspect of project performance (Boadu *et al.*, 2020). In Nigeria, the construction sector faces equal share of challenges such negative impact on project performance, given the project managers fail to apply risk management (Shehu & Wang, 2020).

Okweto (2012) discerns that government projects' completion rate from 2000-2010 was at 11%. Most of the project failures or delays were attributed to the non-commitment to certified payment, missing or late changes to project deliverables. According to Ndungu (2014), out of 100 projects, 73% of projects in tertiary institutions within Nairobi County do not meet the project duration while 37% experienced a cost overrun, resulting in poor performance. Failures to meet the project deadlines and experiencing cost overruns result in failed projects hence affecting their completion. Most of the projects carried out in Nairobi have major challenges, with most projects not being completed on time, others are substandard, while others stall and get abandoned or carried on years later. The delays are caused by risks associated to financial constraints, poor risk managerial skills and ignoring the project's scope (Banobi, 2019).

Befrouei and Taghipour (2015) reiterate the aspect of project performance being subject to the aspects of quality, time, and budget. The study identifies how various construction companies based in Tehran, Iran encounter various challenges that require efficient risk management to ensure that performance is not compromised. The study assesses performance based on time, quality, cost, and the environment-sustainability factors (Befrouei & Taghipour, 2015). The study identified that there are various risks associated to each of the factors and their existence are significant determinants to performance.

Resource allocation is effective in risk management as a way for project managers to identify ways that certain resources may be exposed to risks (Befrouei & Taghipour, 2015). Allocation for the resources to be used in risk management would easily enhance their efficiency and utilization. Risk-based resource allocation would be important to enhance adhering to budgetary plans in construction projects. It can be noted that project budgeting during the allocation phase is important for project performance. Gurcanli *et al.* (2015) established that failure to consider risks during resource assignment could lead to delays, project failures, and even negative financial implication. During resource allocation, the existence of risk would definitely affect the decision-making process. During the allocation phase, project stakeholders always come up with budgeting plans as well as allocation of other resources such as employees and equipment. In that case, it is important that the project stakeholders follow a risk-based resource allocation approach to avoid overlooking risks that would negatively impact the construction project development and performance.

Kenya economy remains a significant economy in Africa. The registered GDP being Kshs. 8904.9 billion after a 6.3% growth in 2018 (Transparency Market Research, 2020). According to a 2015 Economic Survey, 2014 witnessed the Kenya's construction industry progress by 13.1%, resulting in massive road constructions projects and influenced real estate development (Transparency Market Research, 2020). Nairobi, Kenya's capital city was listed as one of Africa's top four investment cities. The city has become a hub for success, with people flocking in it for opportunities while foreigners are highly interested in investment. In this regard, the Nairobi's construction sector is growing, with several projects expected to fuel the construction. There are high investments in city residential and business projects. The government prioritizes low-cost housing as one of its big four agendas to meet the rising demand and cover the current and anticipated housing shortfalls.

Statement of the Problem

Project performance comprises the comparison of the actual project cost and schedule outcome to the earlier stated baseline or benchmark. In this case it can be noted that cost and schedule (timeline) are important aspects which lead up to the completion of project deliverables. With accomplishment of deliverables, then the scope would be completed and leading to the other component which is quality. In construction projects, all these indicators of project management (scope, budget, and time) have to be achieved. However, the achievement may be negatively impacted by risks occurring during the construction projects (Shehu & Wang, 2020). Project performance can be used as an evaluation when project managers use the indicators to assess progress or achievement of project deliverables.

Risks in construction projects jeopardize the performance. For instance, Fakunle and Fashina (2020) identify delays in construction projects as a possible menace encountered in the industry. The delays would greatly affect one of the three indicators, which is the timeline. These risks can be managed depending on the risk mitigation strategy. Risk management requires technical knowledge, and that means for effectiveness of the strategy applied, there will be need for the project manager to possess risk management skills. Some risks such as team conflict due to lack of coordination are internal issues which would result from organisation structure. It can be noted that rigid structures would create some resistance to changes (Buertey *et al.*, 2016). Such effects would hinder progress towards changes to risk mitigation strategy which would affect project performance. Risk management requires resources allocation to enable its success and influence project performance. It would be easily affected by resource allocation strategies being applied in any construction company.

Various studies conducted suggest that the project performance in the construction sector highly depends on effective risk management. Risk management enables anticipation of negative impacts and would require top-level management

support (Mwangi & Ngugi, 2018). Mwangi & Ngugi (2018) conducted a research in Nairobi County. Studies have focused on risk management effect on financial performance, neglecting the aspects of quality and adherence to project schedule. This research study will attempt to determine the effect of risk mitigation strategy, project organization structure, resource allocation, and risk management skills on residential building construction projects in Nairobi County.

Objectives of the Study

The general objective was to be conducted in Nairobi, Kenya, seeking to determine the impact of risk management determinants on the performance of residential buildings construction projects. The specific objectives guiding the study include:

- To determine the impact of risk mitigation strategy on the performance of residential buildings construction projects in Nairobi, Kenya.
- To assess the impact of the project organisation structure on the performance of residential buildings construction projects in Nairobi, Kenya.
- To assess the impact of resource allocation on the performance of residential buildings construction projects in Nairobi, Kenya.
- To assess the impact of risk management skills on the performance of residential building construction projects in Nairobi, Kenya.

The study was guided by the following research questions

- Does risk mitigation strategy impact the performance of residential building construction projects in Nairobi, Kenya?
- What is the impact of project's organisation structure on the performance of residential building construction projects in Nairobi, Kenya?
- Does resource allocation impact the performance of residential building construction projects in Nairobi, Kenya?

- Do risk management skills impact the performance of residential building construction projects in Nairobi, Kenya?

LITERATURE REVIEW

Theoretical Review

Decision Theory

Leonard Savage's Decision Theory was presented in his book, "The Foundation of Statistics." Savage's theory integrates rationality with individual decision-making. The decision theory illustrates how an analysis of a business is arrived at during uncertain moments (Brown, 2012). The theory reiterates that for decision-making process aspects such as acts, payoffs, outcome, and event (risk). The theory utilizes the three types of decision class from which they may select from. The decision under the certainty class offers an abundance of information which leads to obvious decisions. It allows stakeholders decide based on analyzing different known and unknown variables, which leads to the most probabilistic decision (Brown, 2012). The third class allows for decision-making under conflicting situations. In the third class, a reactive approach is applied by anticipating potential consequences to the decision made before making the decision. Each of these decision theory classes has a place of application in construction projects.

Considering that construction projects are dynamic, a decision must be thought through to prevent project backlogs that result in financial losses. The analysis before deciding should have analyzed the payoff (cost or time overruns). Applying the decision theory offers the opportunity to select the best solutions or actions from the available alternatives based on various criteria (Ibadov, 2020). This will help establish an appropriate risk mitigation strategy, resource allocation strategy, or project's organisational structure that positively impacts the project's performance based on various aspects to be considered on a project. For construction projects, there are various external factors such as the supply chain of materials that would require collaboration between company's employees and

the suppliers (Shehu & Wang, 2020). In that case, the supply of construction materials is the event according to the decision theory and the choice of organisation structure would be the act. In that case, a flexible organisational structure to enable efficient collaboration would assist mitigate risks such as delays and costs increment.

Cost-Benefit Analysis Model

The CBA was developed by a French engineer and economist Jules Dupuit who pioneered the model by calculating a road bridge's construction project's social profitability. It was, however, formalized by Alfred Marshall (Livermore, 2014). The model was later made popular in the 1950s, with Otto Eckstein utilizing it in setting out a welfare economic foundation for the model application in water resource development. The CBA encompass the combined use of theories, models, and data to assess the existing tradeoff between alternative solutions to decide on an appropriate solution between them (Belay *et al.*, 2016). It is an ideal framework that can evaluate an investment benefits and drawbacks associated with construction projects as it allows project manager (or risk manager) to take into account all the costs and benefits of a project.

Stakeholder theory

This theory results from research by Freeman. Otherwise referred to as the stakeholder approach, the theory is concerned with firm's performance ensuring all stakeholders' interests are met. Normative theory of stakeholders comprises the ideas on stakeholder model and highlights the significance of stakeholders prioritizing existence of the organizational aim to enhance performance (Valentinov *et al.*, 2019). Instrumental approach reiterates that managers would act when organisation interest is top priority.

Every intervention in an organization is aimed at quality and performance facilitated by stakeholders. Each strategic and operational decision taken at all levels of the organisation would be supported by the stakeholders such as project owner, project manager, and the project team. Risk management requires that resources allocation is done effectively

and it would involve various stakeholders. Each stakeholder's input would be required to ensure that the aspects of resource allocation such as strategy applied or company policies on resources' allocation are effective to enhance project performance. The organisational structure simply manages the interconnected relationships between various project stakeholders and thus its choice should be supported by this theory given stakeholder engagement is a key indicator that influences project performance (Buertey *et al.*, 2016).

Empirical Review

Risk affect construction companies' performance if left unmanaged. Some of the effects include delays on schedule, poor quality constructions, and stalling. These aspects negatively impact project performance. When addressed adequately, risks are mitigated, contributing positively to construction projects' performance (Shehu & Wang, 2020). This section considers how risk mitigation strategy, project organisation structure, risk management skills, and resource allocation are some of the risk management determinants that facilitate construction projects' performance.

Choice of Risk Mitigation Strategy and Project Performance

A study by Mutunga and Ondara (2021) tries to identify how various risk management affects project performance, specifically at Kenya Airports Authority. Managing project risks is essential in preventing unwanted project consequences, which improves construction project performance. Instituting risk mitigation strategies pushes towards proper risk management in the construction sector, increasing the value-added along a construction chain. This does also minimize waste and any inefficiency, which contribute to better project performance mostly on costs and schedule. However, the study did not investigate the application of risk mitigation strategies during the project implementation, which is one of the identified research gaps to be considered.

Ondara (2017) asserts that adopting proper risk management techniques in construction can help

curtail potential adverse effects of uncertain events, influencing project objectives. He discerns that risk management techniques when well implemented can increase value. That is an aspect that would lead to adherence to the budget of construction projects. Ondara (2017) suggested some of the proposed risk management strategies, including ensuring good quality construction material supply, regular inspection of construction projects, reducing cost and time overruns, and managing quality defects. These techniques greatly influence project performance. The relevant variable in this study discusses how risk management techniques improve construction projects' performance. An identified gap would be the targeted population where in this case residential buildings will be considered.

Project Organisation Structure and Project Performance

It can be noted that the study by Radujkovic and Sjekavica studied project management, in which risk management is one of its essential components. The success factors affecting project management would also influence the risk management component. Organisational components of structure, culture, competence, alignment, and resources were identified as potential determinants to the project management performance. Project organisation structure designing is one of the most critical tasks that construction managers and senior staff do to ensure that their project meets the expectations and objectives, eliminating risks that could affect performance (Radujković & Sjekavica, 2017). The study was limited to projects in the EU which would have different characteristics from those in Nairobi, Kenya. Another noted gap was that investigation of the effect of choice of risk mitigation strategies were not prioritized, as much emphasis was on project stakeholders' competence and organisational competence.

Okweto (2012) conducted research that involved assessing how project performance is affected organisations' structure, focusing on Nairobi's public building projects. Okweto (2012) discerns that most of government projects' failures or delays were

attributed to the backdated payments and changes to project deliverables. Out of the reasons, late completion is the only reason for not failing within the organisation structure processes. For instance, centralisation may hinder effective decision-making as there will be delays through the hierarchy. An appropriate organisation structure should prevent delays and lengthy decision-making processes through decentralization. This results in project development and completion challenges, resulting in high administrative cost failed or stalled project and eventually losses that affect proper financial management and performance.

Resource Allocation and Project Performance

Mongina and Moronge (2021) conducted a research on how project management practices such as risk management and project allocation are essential in ensuring project performance within construction projects. Resource allocation in construction involves distributing human, material, equipment, or financial resources to facilitate construction operations. It also requires scheduling and allocating tasks to team members to meet the project deadline. Effective resource allocation means there is a better understanding of the project's scope and availability to manage the given project. Risk management is a project management process that can significantly improve performance, and would require proper resource allocation to ensure its successful. Project allocation that involves human, financial, and materials resource was noted to significantly improve the project performance when applied effectively (Mongina & Moronge, 2021).

Risk Management Skills and Project Performance

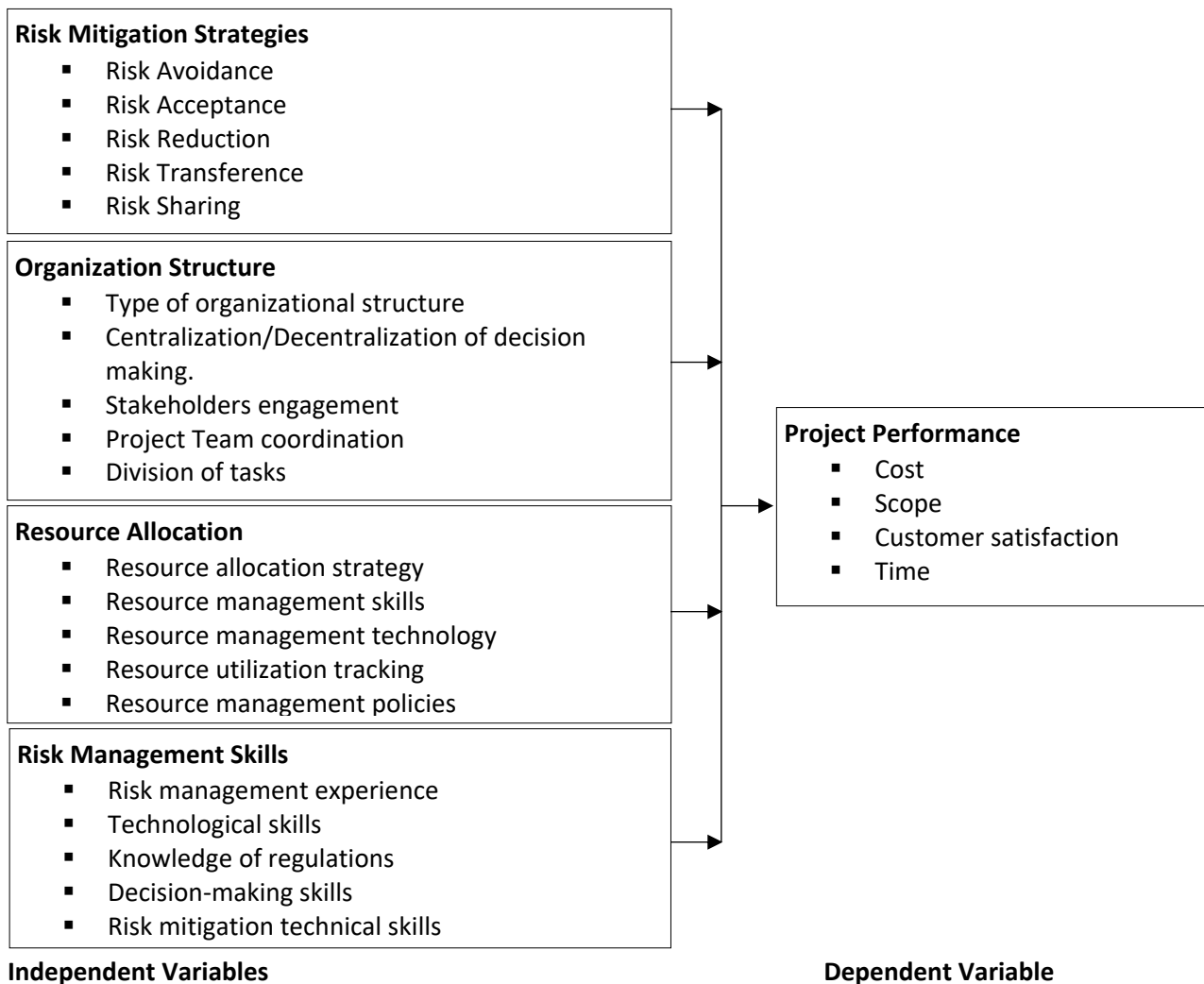
Risk management incorporates the use of special methodologies in a systematic manner, especially for projects in the construction sector. That means that any project stakeholder has to have the necessary risk management skills ensuring efficient risk management process (Serpella *et al.*, 2014). These special skills set is not only limited to the project manager but also the whole team has to be knowledgeable on their application. One way that may limit project performance is if the project

experiences delays. A 2019 study by Banobi and Jung identified lack of enough technical skills (inclusive of risk management skills) during power construction projects resulted to contractor-related delays. It was established that capacity training to enhance project team’s skills is an appropriate recommendation to avoid project delays.

There are very many facets of skills required for one to undertake risk management. In the current day and age, technology is a major boost to achieving efficiency in various business operations in organisations (Adeleke *et al.*, 2018). That would

mean the construction industry should consider how to adopt technology in its various operations, including risk management. Osazuwaa *et al.* (2019) undertook a study in which they analyzed the necessary risk management skills for construction professionals. It was ascertained that technological skills which they classified under organization skills are essential in facilitating the operations of risk management. Therefore, an organization should strive to ensure that the employees involved in various projects are well-equipped with necessary technological skills.

Conceptual Framework



Source: Researcher (2022)

Figure 1: Conceptual Framework

METHODOLOGY

The study adopted descriptive survey research design. The research design answered the questions, “when, what, how, and where.” The target population was residential building construction projects that were 100% completed by December 2021 and undertaken by 1024 construction firms which were in the categories NCA1-NCA3. One project from each of the categorized construction firms was considered for this project which yielded 1024 projects which was the population. Stratified random sampling technique was applied in the research study. Primary data was obtained through a questionnaire structured as per the operationalized variables. The questionnaire used the Likert scale. The commonly used rule of the thumb in determining sample size for pilot study was five participants, which was the sample size to be adopted for this pilot study. Validity was attained by ensuring that the pilot study’s participants do not take part in the main study. Construct validity was ascertained by comparing the tests used to make inferences and checking if they correlate. SPSS would

was used in the calculation of the Cronbach alpha. Taber (2018) note that an acceptable level of the Cronbach alpha is 0.7 or higher. This research study considered Cronbach alpha value of 0.7. The data collection for this research yielded quantitative and qualitative data which was analyzed. SPSS was used for data analysis and help yield results of descriptive statistics.

FINDINGS

Descriptive Findings

Risk Mitigation Strategies and Project Performance

Figures 2. below show the results of risk mitigation strategies used during residential construction projects. The researcher wanted to establish the most used risk mitigation strategy in construction projects. The most used risk mitigation strategy was risk reduction, with a total of 51.3%, followed by risk sharing with 28.95%, 10.53% used risk transfer, and 6.58% used the risk avoidance method of risk mitigation. The least used risk mitigation strategy is seen to be risk acceptance.

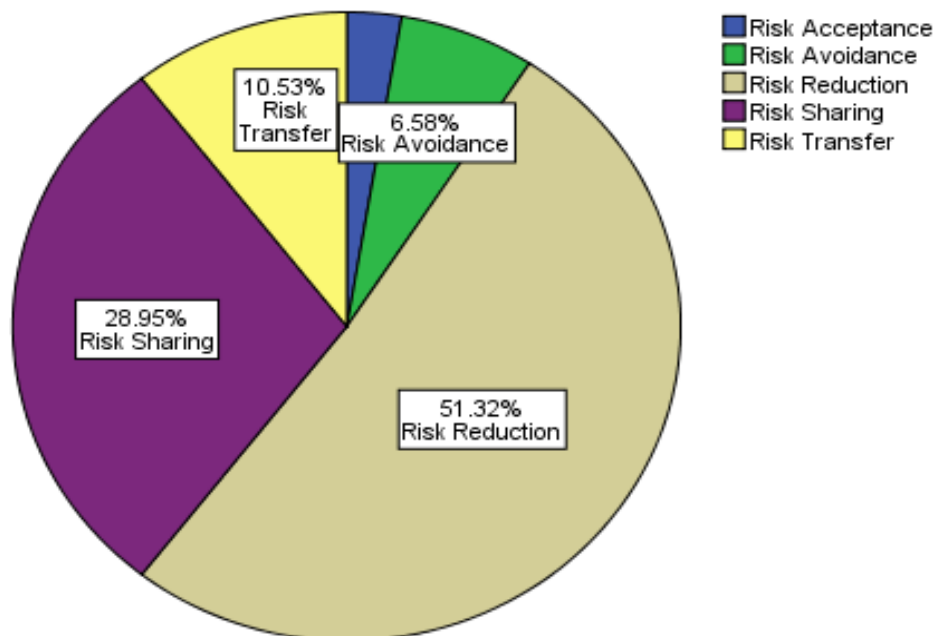


Figure 2: Risk mitigation strategies used during the projects

Table 1: Agreement levels on the impact of the risk mitigation strategies

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation
Reducing risk is an appropriate strategy that enhances project performance	65.8%	28.9%	5.3%	0%	0%	4.61	0.591
Sharing the risk through subcontracting is an appropriate strategy that enhances project performance	28.9%	25.0%	23.7%	11.8%	10.5%	3.50	1.311
Transferring the risk to an insurance company is an appropriate strategy that enhances project performance	6.6%	18.4%	43.4%	10.5%	21.1%	2.79	1.170
Avoiding risk enhances project performance	7.9%	7.9%	2.6%	13.2%	68.4%	1.74	1.300
Accepting and assuming risks enhances project performance	1.3%	5.3%	17.1%	27.6%	48.7%	1.83	0.985
	Average					2.89	1.0714

Source: Researcher (2022)

The researcher wanted to establish to what extent the responders agreed on the various risk mitigation strategies. Most respondents (65.8%) strongly agreed that reducing risk was an appropriate strategy to improve project performance, 28.9% agreed that reducing risk increases project performance, and 5.3% were neutral. 28.9% and 25.0% of the responders agreed that sharing risk through subcontracting is an appropriate strategy that enhances project performance, while 23.7% were neutral. 18.4% and 6.6% of the respondents agreed that transferring risk to an insurance company was an appropriate strategy to enhance project performance, and 7.9% strongly agreed that avoiding risks improves project performance. In comparison, 1.3% and 5.3% strongly agreed that accepting and assuming risks improve project performance. This data implies that risk reduction was the most used risk mitigation strategy to enhance project performance.

Project Organization Structure and Project Performance

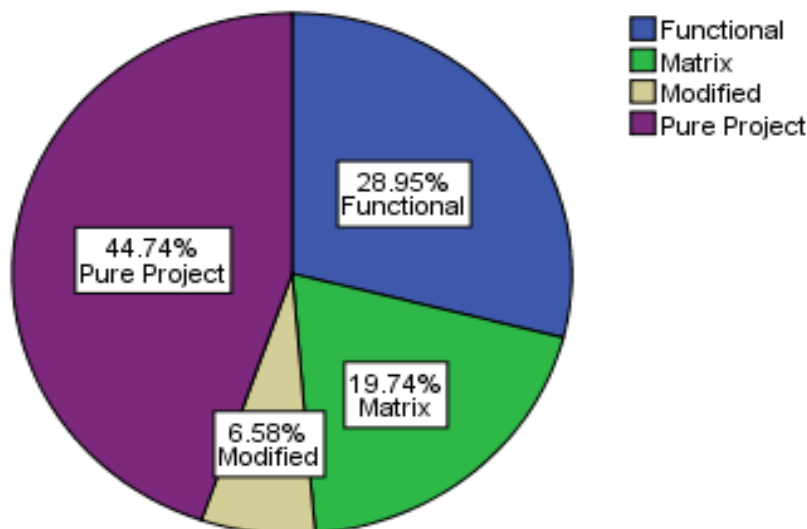


Figure 3: Project organization structure used during the projects

This section covers the different project organizational structures used during projects as adopted by different NCA categories. According to the findings, 44.7% of the respondents use pure project structure, 28.95% use functional structure, 19.74% use matrix structure, and 6.58% use modified design.

Agreement levels on the impact of project organizational structure

Table 2. below display agreement levels on the impact of project organization structure on project performance. Most study participants, with an average score of 4.16, agreed that the project organization structure enables efficiency in dividing tasks and assigning roles, promoting project performance. A mean score of 3.89 respondents

reported that organizational structure encourages stakeholder engagement in risk management. A mean score of 3.62 indicated that the existence of a project organization structure enhances team collaboration and coordination. A mean score of 3.64 indicated that the type of organization structure in their companies favored risk management processes, improving project management. A mean of 3.50 showed that decentralizing decision-making during risk management enhances project performance. The findings imply that most respondents agree that project organization structure enables efficiency in dividing tasks and assigning roles. According to research by Okweto (2012), this prevents project failures and delays attributed to backdated payments and changes to project deliverables.

Table 2: Agreement levels on the impact of project organizational structure

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation
The type of organizational structure in place favors risk management process, thus enhancing project performance	15.8%	56.6%	9.2%	13.2%	5.3%	3.64	1.067
The existent project organization structure enhances efficiency in team coordination and collaboration	14.5%	55.3%	11.8%	14.5%	3.9%	3.62	1.032
Decentralization of decision making during the risk management process enhances project performance	18.4%	36.8%	22.45	21.1%	1.3%	3.50	1.065
The organization structure encourages stakeholder engagement in risk management thus enhancing project performance	23.7%	57.9%	5.3%	10.5%	2.6%	3.89	0.974
The project organization structure enables efficiency in the division of task and roles	42.1%	42.1%	9.2%	2.6%	3.9%	4.16	0.981
					Average	3.762	1.024

Source: Researcher (2022)

Resource allocation and Project Performance

Table 3: Agreement levels on the effect of resource allocation

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Deviation
There are adequate company guidelines in place to support efficient resource allocation	10.5%	36.8%	13.2%	36.8%	2.6%	3.16	1.120
The utilized risk-based resource allocation strategy during the allocation phase	13.2%	48.7%	15.8%	18.4%	3.9%	3.49	1.064
The project team had adequate resource management skills	18.4%	59.2%	15.8%	5.3%	1.3%	3.88	0.816
There was the use of technology in resource management	22.4%	52.6%	13.2%	11.8%	2.6%	3.86	0.905
There was tracking of utilization to minimize cost due to wastage	36.8%	42.1%	9.2%	11.8%	0%	4.04	0.972
Average						3.686	0.975

Source: Researcher (2022)

A mean of 4.04 of the respondents indicated that tracking of resource utilization minimizes costs due to wastage. In contrast, a mean of 3.86 respondents said technology was used in resource management. A mean score of 3.88 for the respondents showed that the project team had adequate resource management. In contrast, a mean of 3.49 indicated

that they utilized a risk-based resource allocation strategy during the allocation phase. A mean of 3.16 showed that company guidelines support efficient resource allocation. The results imply that most responders concurred that there was tracking resource utilization to minimize costs due to wastage.

Risk Management Skills and Project Performance

Table 4: Agreement levels on the effect of risk management skills

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Std. Dev
Project team members undertaking project had adequate decision-making skills	28.9%	57.9%	9.2%	3.9%	0%	4.12	0.730
Project members undertaking project had knowledge of construction regulation	21.1%	50.0%	18.4%	10.5%	0%	3.82	0.890
The project team members undertaking the project had expertise in the application of risk mitigation strategies	13.2%	63.2%	9.2%	14.5%	0%	3.75	0.866
Project team undertaking the project had adequate risk management experience	18.4%	65.8%	6.6%	6.6%	2.6%	3.91	0.867
The project team members undertaking the project had adequate technological skills	44.7%	39.7%	5.3%	6.6%	3.9%	4.14	1.055
Average						3.95	0.882

Source: Researcher (2022)

As shown in Table 4. above, a mean of 4.12 of the respondents agreed that the project team members undertaking the project had adequate decision-making skills. A mean of 3.82 indicated that the project team members undertaking the project had sufficient knowledge of construction-related regulations. A mean of 3.75 told that the project team members undertaking the project had

adequate expertise on the application of risk mitigation strategies, a mean score of 3.91 indicated that the project team members undertaking the project had sufficient risk management experience. In contrast, the majority, with a mean score of 4.14, suggested that the project team members undertaking the project had adequate technological skills.

Project Performance of Residential Buildings Construction Projects

Table 5: Agreement levels on the project performance

Statements	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Maen	Std. Deviation
The customers are always satisfied with the completion of the project	39.5%	50.0%	5.3%	3.9%	1.3%	4.22	0.826
The projects are completed within the planned timeline (as per the project schedule)	22.45	50.0%	7.9%	11.8%	7.9%	3.67	1.182
The projects adhered to all deliverables within the project scope	23.7%	61.8%	6.6%	6.6%	1.3%	4.00	0.833
The project is completed within the indicated budget	19.7%	46.1%	3.9%	22.4%	7.9%	3.47	1.259
					Average	3.84	1.025

Source: Researcher (2022)

Table 5. above depicts respondents' agreement level on project performance key indicators. According to the results, the responders agree with a mean of 4.22 that the customers were satisfied with completing the projects. A mean of 3.67 indicated that the projects were completed within the stipulated time, a mean of 4.00 agreed that the projects adhered to all deliverables within the project scope, and a mean of 3.47 indicated that the projects were completed within the stated budget.

Inferential analysis

Reliability test

The Cronbach's Alpha test was applied to conduct a reliability analysis. This test has been shown to

accurately predict whether a given data set is internally consistent by identifying a scale. The scale measures a construct by determining whether the information gathered on each independent variable is significant relative to the dependent variable. This made it possible to assess whether the data obtained over time accurately represented the overall population under investigation. Illustrated in Table 6. below, Cronbach's Alpha was 0.762, indicating a great level of internal consistency. This implies that the data set was highly accurate and representative.

Table 6: Reliability Test

Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
.762	.763	24

Model Summary

Table 7. below presents the model of estimation showing the percentage of which the predictor variables account for the outcome variable.

Table 7: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of The Estimate
1	.676 ²	.457	.427	.625

a. Predictors: (Costant), Risk Management Skills, Project organization structure in use during projects, Resource Allocation, Risk Mitigation Strategy

Source: Researcher (2022)

As shown in Table 7 above, R was 0.676, indicating the correlation between the outcome variable (project performance) and predictors. The R square, 0.457, demonstrates the percentage of variance in the outcome variable that the predictor can predict. From the findings, the independent variables, risk management skills, project organization structure, resource allocation, and risk mitigation strategy

account for 45.7% of project performance. This means that changes in the independent variables affect 45.7% of the dependent variable's (project performance) difference.

Analysis of Variance (ANOVA)

Table 8. shows the significance of the R square value in the Model of Estimation.

Table 8: Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig
1	Regression	23.419	4	5.855	14.964	.000 ^b
	Residual	27.778	71	.391		
	Total	51.197	75			

a. Dependent Variable: Project Performance

b. Predictors: (Constant), Risk Management Skills, Project organization Structure in use during projects, Resource Allocation, Risk Mitigation Strategy

The dependent variable is significantly predicted by the regression model overall (R-Square value), with the p-value of 0.000 being less than 0.05. Therefore, the model is a good fit.

Regression Analysis

Table 9: Regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
	1 (Constant)	1.779	.477		
Project Organization Structure in use during projects	-.049	.084	-.052	-.584	.561
Risk Mitigation Strategy	.258	.071	.369	3.637	.001
Resource Allocation	.120	.066	.183	1.816	.074
Risk Management Skills	.303	.095	.305	3.182	.002

a. Dependent Variable: Project Performance

Table 9. presents the coefficients of regression. The findings showed how the predictors inform the

dependent variable. It can be noted that an increase of one unit in risk mitigation strategy used in building

projects increases project performance of the building projects by a factor of 0.258. An increase of one unit in project organization structure decreases project performance of building projects by 0.049. An increase of one unit in risk management skills increases project performance of building projects by 0.303. An increase of one unit in resource allocation increases project performance by 0.120. Risk mitigation strategy and risk management skills significantly impact on project performance of residential building projects positively with $p=0.001$ which is less than alpha value 0.05 and $p=0.002<0.05$, respectively. There was an insignificant negative impact of project organization structure and an insignificant positive effect of resource allocation on project performance of residential building projects with $p = 0.561$ and $p=0.074$, respectively. That is because they are greater than 0.05. From the results shown in table 9. above, $Y = 1.779 + 0.258X_1 - 0.049X_2 + 0.303X_3 + 0.120X_4$

Correlation Analysis

Table 10. below presents the correlation between the independent variables with the dependent variable and the significance levels. The association between risk management skills and project performance at $p=0.000<0.01$ is 0.504; this indicates a significantly strong positive connection between the two variables. The link between resource allocation and project performance at $p=0.000<0.01$ is 0.461, meaning a significantly moderate positive association between the two variables. The association between risk mitigation strategies and project performance at $p=0.000<0.01$ was 0.568 showing a significantly strong positive correlation between the two variables. Finally, there was an insignificant negative correlation between project organization structure and project performance, with a correlation of -0.193 at $p=0.095>0.0$

Table 10: Correlation analysis

		Risk Management skills	Resource Allocation	Risk Mitigation Strategy	Project organization structure in use during projects	Project Performance
Risk Management Skills	Pearson Correlation	1	.331**	.352**	-.164	.504**
	Sig. (tailed)	76	.004	.002	.157	.000
	N	76	76	76	76	76
Resource Allocation	Pearson Correlation	.331**	1	.455**	-.172	.461**
	Sig. (tailed)	.044		.000	.138	.000
	N	76	76	76	76	76
Risk Mitigation Strategy	Pearson Correlation	.352**	.455**	1	-.161	.568**
	Sig. (tailed)	.022	.000		.165	.000
	N	76	76	76	76	76
Project Organization Structure in use During project	Pearson Correlation	-.164	-.172	-.161	1	-.193
	Sig(tailed)	.157	.138	.165		.095
	N	76	76	76	76	76
Project Performance	Pearson Correlation	.504**	.461**	.568**	-.193	1
	Sig. (tailed)	.000	.000	.000	.095	
	N	76	76	76	76	76

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

CONCLUSIONS

The risk mitigation strategies moderately and positively impact the performance of residential building developments in Nairobi, Kenya. The study found that the predominant risk mitigation strategy used in residential construction projects in Nairobi, Kenya is risk reduction, followed by risk sharing through subcontracting, risk transfer to insurance companies, accepting and assuming, and finally, avoiding risks. Therefore, the study identified essential risk mitigation strategies that should be instituted to minimize inefficiencies, thus bettering project performance mostly on cost and schedule, which was an objective in the literature review.

The study concluded that risk management skills also moderately and positively impact the performance of residential building developments in Nairobi, Kenya. The moderate and positive impact is attributed to the fact that project managers and team members undertaking the projects had adequate decision-making skills, knowledge of construction-related regulations, expertise in the application of risk mitigation strategies, adequate risk management experience, and technological skills. And thus, the projects adhered to all deliverables within the project scope. The results support the literature of the study that project managers and the whole project team should have unique and necessary skills while performing construction projects to avoid contractor-related delays.

The study concluded that project organization structure had a weak and negative influence on the performance of residential building projects in Nairobi, Kenya. This means that the positive impact of project organization structure on the performance of residential building projects is determined by something other than the factors type and existence of project organization structure nor decentralization of decision-making during projects. The study revealed that resource allocation had a weak and positive impact on the project

performance of residential building developments in Nairobi, Kenya. The results concluded that the effects of resource allocation on the performance of residential building developments are not highly based on adequate company guidelines/policies, resource allocation strategy used during projects, resource management skills, use of technology in resource management, or tracking of resources.

RECOMMENDATIONS

The study recommends that project managers in Nairobi, Kenya, continue adopting and implementing risk mitigation strategies. It has been established that adopting risk mitigation strategies, including risk reduction, risk sharing through subcontracting, and risk transfer through insurance companies, improves project performance.

The study encourages project managers to embrace risk management techniques and capacity training of team members while managing projects in Kenya. It has been established that working with team members who possess good decision-making skills, adequate knowledge of construction-related regulations, sufficient expertise in the application of risk mitigation strategies, adequate risk management experience, and adequate technological skills can help curtail potential adverse effects of uncertain events and thus increase adherence of all deliverables within the project scope.

Recommendations for further study

Further studies are required to assess project organization structure factors that impact project performance of construction projects in Nairobi, Kenya, and resource allocation factors that highly influence project performance in Nairobi.

Similar research should be conducted in other counties besides Nairobi to establish whether risk mitigation strategies and risk management skills are utilized in construction projects and determine the effect of resource allocation and project organizational structure in other counties.

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