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# INFLUENCE OF PROJECT RISK MANAGEMENT ON PERFORMANCE OF GOVERNMENT FUNDED HOUSING CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA

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## ABSTRACT

The aim of the study was to assess the influence of project risk management on performance of government funded housing construction projects in Nairobi City County, Kenya**.** The specific objectives were: To analyse the influence of project risk identification, and project risk analysis, on performance of government funded housing construction projects in Nairobi City County, Kenya. The study adopted modern portfolio theory, and prospect theory. A conceptual framework was developed in regard to the proposed relationship among the variables on the research problem. The target population was 350 (contractors, supervisors and project team leaders) of the government funded housing construction projects in Nairobi City County, Kenya as per the National Construction Authority (2021) report. The study sample size was 172. The researcher administered a questionnaire as the data collection instrument in order to obtain primary data. The descriptive statistics showed that all the independent variables contributed significantly towards the performance of government funded housing projects. The study determined that there is a strong positive correlation between all of the independent variables and the dependent variable. The multiple regression model reflected a strong relationship with the data pertaining to the variables indicating that it is a good predicting model. Additionally, the study found a statistically significant relationship between all the independent variables and the dependent variable. Lastly, the study found that Risk Handling was the strongest determinant of Performance of Government Funded Housing Projects followed by Risk Identification, respectively. The study concluded that Government funded housing projects need to provide a standardized document for risk identification processes by working with the regulator to develop enforceable standards that can be adhered to. Pilot sites should always be carried out to identify potential risks in time by formulating this as an essential risk identification procedure for all housing projects.

**Key Words:** Project Risk Management, Performance of Government Funded Housing Construction Projects, Project Risk Identification, Project Risk Analysis

## INTRODUCTION

A project risk is an uncertainty likely to have a devastating effect on the project (Smith, Merna & Jobling, 2014; Gitau, 2015). The Project Management Institute define a project risk as an event or uncertainty and a condition which could have a negative or positive effect on the performance of a project (Ndumia, 2015).The project managers strive to ensure that their projects are free from risks and find out the appropriate measures to eliminate the devastating effects (Osei-Kyei, & Chan, 2015; Rwemila, 2014). This calls for analysis of the risks in projects being carried out in attempt to reduce the unexpected consequences or uncertainties which will affect the success of the projects.

Risk mitigation among housing construction projects has gained increased prominence owing to what Ngundo (2014) observes as an increase in infrastructure development in the country. The rise of many housing construction projects, most notable in housings, has been faced with a lot of uncertainty, resulting in outcomes that fail to meet minimum standards benchmarked against best practice in the sector. This is attributed the low levels of project success to failure to develop proper procedures, lack of sufficient training and capacity building programs, incompetence among project staff, low levels of formal quality management support and low levels of management commitment. As a result, project risk management planning was characterised by poor risk identification, assessment, prioritization, mitigation and control. The overall outcomes were weak and inappropriate risk management measures that increased the vulnerability of the construction firms to risk (ibid).

According to Odeyinka, Lowe, and Kaka (2012), the uncertainty and ambiguity around anticipated construction project progress and completion was the main issue affecting the performance of housing projects. Hassan (2017) found that the effects of unanticipated changes on the development of complex construction projects made uncertainty and ambiguity, and their subsequent influence on firm performance, much more prominent. The numerous macro-economic aspects, primarily social, technological, economic, political, environmental, and legal challenges, are typically what define uncertainty and ambiguity.

Risk management among construction firms in Kenya has gained increased prominence owing to what Ngundo (2018) observes as an increase in infrastructure development in the country. The rise of many construction projects, most notable in real estate at the mass market level, has been faced with a lot of uncertainty, resulting in outcomes that fail to meet minimum standards benchmarked against best practice in the sector. Ngundo (2018) attributed the low levels of project success to failure to develop proper procedures, lack of sufficient training and capacity building programs, incompetence among project staff, low levels of formal quality management support and low levels of management commitment. As a result, project risk management planning was characterised by poor risk identification, assessment, prioritization, mitigation and control. The overall outcomes were weak and inappropriate risk management measures that increased the vulnerability of the construction firms to risk.

In addition, the Kenyan housing projects have witnessed time and cost overruns for a long period of time (Klug *et al.,* 2017). While lack of project risk mitigation practices some time is inevitable to be adopted in some projects, there exist some degree of poor cost and time management of the housing projects in the country. This could have been minimized through adoption of project management practices (Kambi, 2015; Osei-Kyei, & Chan, 2015). Wambui, Ombui and. Kagiri (2015) confirmed that most of the housing construction projects were failing to meet their objectives in terms of being completed in time and budget. The study reported that due to poor project risk management practices. Most of the housing construction projects failed to adopt and use enhanced modern equipment, hire appropriate technical expertise, project financiers and adoption of improved technology to enhance performance of the housing projects.

## Statement of the Problem

The Kenya National Bureau of Statistics (KNBS) has estimated the Kenyan growth population at 4.2% and is expected to reach 52 million by 2022. Based on these estimates there is an annual demand of 210,000 units of houses and the current supply is 49,000 units per year which creates a shortfall of 156,000 units every year (KNBS, 2021). The government of Kenya seeks to march the supply of houses to the existing demand by 2030 (RoK, 2015). Ministry of Housing, Land and Urban Development (2021) reported that 48% of construction projects in Nairobi County are still incomplete and 10% of these projects have completely stalled. In addition, Koskela (2017) mentioned that the cost incurred as a result of safety due to poor implementation of the housing construction projects is high. In a research carried out by Everett and Frank (2016) found that the total costs of construction accidents accounted for 7.9% to 15% of the total costs of projects. This has led to a slow uptake of housing construction projects. Failure of these construction projects will result in reduced supply of quality houses as well as a less vibrant economy which consequently contributes to a lower standard of living for Kenyans as well as increased unemployment (GOK, 2017).

Managing risks in these government funded housing construction projects has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability (Mwinzi & Moronge, 2018). Cases of building collapsing in Kenya and in Nairobi have become commonplace in the recent past. Public condemnation and outcry has followed mostly directed at owners of the building and the government in case of public building and the involved professionals (Buildafrique Consulting Limited, 2021). Ministry of Transport and Infrastructure Development (MTID) reports on collapsed structures apportions the blame to lack of project risk management in terms of lack of proper supervision and poor construction procedures (MTID, 2016). Other challenges cited ranging from loopholes in contractors registration, irregularities in contracts award, unprecedented project failures, lack of capital and corruption in the building sector among others (National Construction Authority, 2011). The unexplained pattern of massive failure of housing construction projects has resulted to a number of questions.

While various past studies have suggested that risk management improve implementation of housing construction projects (Mwinzi & Moronge, 2018; Omar, Namusonge, & Sakwa, 2018; Mbugua & Winja, 2021) no study has tried to link risk management with implementation of construction projects. The research problem identified, which has created a need to this study, is that most studies on risk management and project implementation are limited in the developing countries. Second, the risk mitigation measures in the building construction projects used in developed countries are not directly applicable in developing economies because of political, economic, technological and cultural differences (Hwang et al., 2017). Lastly, according to Gurcanli, Bilir and Sevim (2015) minimal research, if any, have been done on the risk management and performance of housing construction projects. Therefore, the dearth of information on risk management and performance of government funded housing construction projects is arising from the African context. It is on this premise which has necessitated the current study to examine the influence of project risk management on performance of government funded housing construction projects in Nairobi City County, Kenya.

## Objectives of the Study

The aim of the study was to assess the influence of project risk management on performance of government funded housing construction projects in Nairobi City County, Kenya. The specific objectives that this study was to:

1 To analyse the influence of project risk identification on performance of government funded housing construction projects in Nairobi City County, Kenya.

2. To assess the influence of project risk evaluation on performance of government funded housing construction projects in Nairobi City County, Kenya

## LITERATURE REVIEW

### Theoretical Review

### Modern Portfolio Theory

American economist Harry Markowitz published his modern portfolio theory in the *Journal of Finance* in 1952. Modern Portfolio Theory (MPT) is a concept of financial investment which tries to make ideal use return together with reduces danger by totally choosing numerous belongings (Aziz, Manab & Othman, 2015). MPT is a mathematically created idea of variety in investing, with the feature of choosing a collection of monetary investment possessions that has jointly minimized threat than any kind of type of particular home. This is useful, theoretically, because different type of structures often transform in worth in contrary methods. When the expenses in the safety and securities market loss, the costs in the bond market generally increase, and likewise vice versa. A collection of both type of homes can therefore have lower total danger than either individually (Wijelathike & Lama, 2019). This calls for the financier to recognize the feasible dangers associated with the financial investment.

In project management the primary concept upon which Modern Portfolio Theory is based (MPT) is the random stroll theory which mentions that the motion of project application complies with an unforeseeable path: the path as a pattern that is based on the long-run nominal task delivery around the fad is random (Giannakis & Papadopoulos, 2016). Risk management in the construction project management framework is an all-inclusive and systematic way of identifying, analyzing and responding to risks so that the objectives of the project are achieved. Modern Portfolio Theory (MPT) enhances risk management from the early stages of a project, where major decisions such as choice of alignment and selection of construction methods can be influenced, is essential (Hwang, Shan, Phua, & Chi, 2017). The benefits of the risk management process include identifying and analyzing risks, and improvement of construction project management processes and effective use of resources (Mwinzi & Moronge, 2018).

In the case of the modern portfolio theory, the past performance of the project under consideration is taken. The implementation of the past projects never provides a guarantee for the result that could arise in the future. Considering only the past performances sometimes leads to overpassing the newer circumstances, which might not be there when historical data were considered but could play an important role in making the decision about the risks identified (Mwinzi & Moronge, 2018). It is on this premise the current study will adopt Modern Portfolio Theory (MPT) to expound the relationship between risk identification and performance of housing construction projects in Nairobi City County, Kenya.

### Systems Theory

System theory originated in the 1940s in the work of the biologist Ludwig von Bertalanffy who initially sought to find a new approach to the study of life or living systems. More broadly, Von Bertalanffy envisioned general system theory as a way to address the increasing complexity of the world's problems. Systems theory looks at an organization as a system that survives by exchanging with its environment (Devaney, 2018). The theory anchors the interphase between performance contracting and performance of organizations. For an organization to survive it must strive to achieve the performance targets agreed upon between its management and the government agency. While the output from the organization is the targets agreed upon the inputs from the environment

is the support the project receives from the stakeholders. Projects operate in an environment whose interface in anchored in the open systems theory (Morley, Ablett, & Macfarlane, 2019). This is premised on the postulation of Giannakis and Papadopoulos (2016) that projects are environment serving and dependent. This precludes that projects must adapt or create a strategic fit to their environment if they are to remain viable. The external environment within which the project operates in provides a key resource that sustains it. The project uses resources from its environment, converts them into finished products through various processes utilizes some and exports the rest to its environment.

This means projects should continuously interact with their external environment to attract the resources that enhance their performance. Similarly the organizations export the finished products to the environment. These processes of import-conversion-export are what the organization does to survive (Aziz, Manab & Othman, 2015). Organizations differ from one another by the materials they import, by the processes they use for achieving conversion and by the end-products they export.

Aduma and Kimutai (2018) indicated that project must be treated as open system, which is consistently dependent upon and influenced by its environmental risks. The fundamental attributes of the business is open system theory is primarily interested in analysis of risk of the venture as open system is that it transforms inputs right into result within its atmosphere. Katz and Kahn (2012) system theory is primarily concerned with evaluation of risk on the relation between framework and additionally of interdependence. As a result there is significant influence on the principle of cross limits in between the system and its risks in the setting and in between the different parts of the system. Top monitoring must join working out the goals it organization must attain in stated duration and make certain the examination of risks related with the projects are controlled in time to accomplish the set and also negotiated targets. The present research study will adopt the systems concept to clarify the relationship between risk evaluation and efficiency of small scale housing construction tasks. It is on this premise that the current study will adopt Systems theory to expound the relationship between risk evaluation and performance of housing construction projects in Nairobi City County, Kenya.

**Conceptual Framework**

Portney (2020) specifies a conceptual framework as a visual or a diagrammatical design of presentation of the association between variables in the research study. It is a guidebook that the research plans to adhere to with the objective of trying to find answers to the issues increased by the research study concerns. Figure 1 highlights the relationship between variables

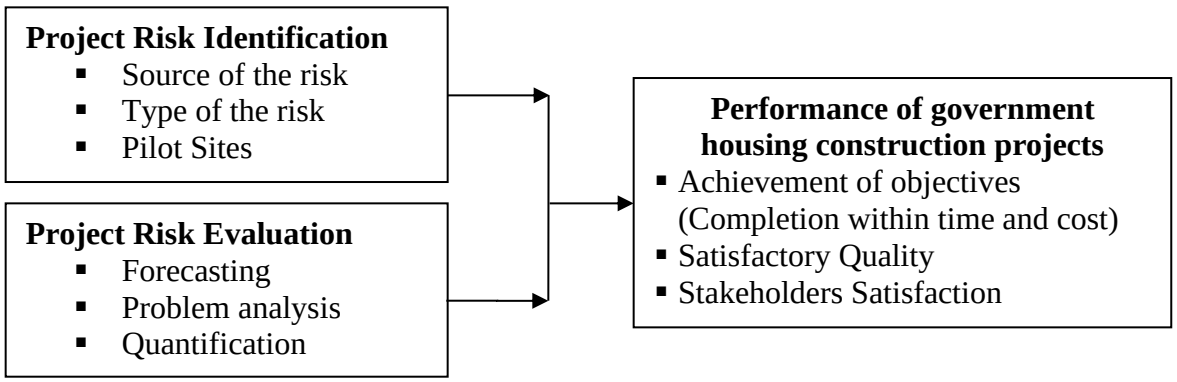


**Figure 1: Conceptual Framework**

## Empirical Literature

### Risk Identification

Perera, Dhanasinshe and Rameezdeen (2009) study identified the risk responsibilities for the contractual parties on how to enhance risk handling strategies in the Sri Lankan road projects. Primary data was collected by the use of semi-structured interviews and documentary evidence complemented the interviews. The study findings showed that road construction projects in Sri Lanka were facing numerous project risks associated parties assigned through the contract clauses. The study results also showed that the evidence of a standardised document for risk identification, the parties had no allocation of risks in consideration with their consequences. A study by Obillo (2020) on the influence of risk management strategies on delivery of urban housing projects in Kenya found that the projects benefitted from the full integration of risk identification processes into the risk management processes and procedures.

Gitau (2015) study sought to investigate a relationship between project risk management practices especially at the project planning phase and its effect on the schedule and cost performance. The risks that were focused on involved the risk identification during needs identification, profiling, site selection, architect or engineer selection and validation and schedule development. This was facilitated by frequent brainstorming meetings and interviewing of project team members to identify potential risks. The system of observation included the job managers, quantity land surveyors, service providers, architects, designers and regulatory authorities in the Rwandese construction sector. From the results of correlation analysis it was established that risk identification practice especially at the planning phase affected Rwandese Construction industry. In a study on factors affecting effectiveness of risk management in public housing construction projects in Kenya, Ngundo (2014) determined that these projects focused on the formulation of designs that facilitated improved risk identification which was part of the risk planning process. However, this was hampered by the lack of funding and poor awareness by the project team members of the need for proper risk management.

Kemboi, Otinga and Miroga (2021) conducted a study on the influence of project risk management on the completion of housing construction projects in Kisumu County, Kenya and posited that one of the mechanisms that the projects had instituted to enhance potential risk identification was the use of project sites. The study also found that the practical engagement of stakeholders in risk management played a critical role in ensuring completion of the projects. Muchelue, Gregory and Asinza (2019) research study focused on exactly how risk administration practices influenced performance of roadway construction projects in Kakamega County, Kenya. According to the study, the project team was trained on the risks identification to ensure that projects run within the allocated time schedule. The research findings also showed that threat identification and analysis had a favourable as well as considerable effect performance of road building jobs in Kakamega County, Kenya. A study by Githenya and Ngugi (2014) on the determinants of implementation of housing projects in Kenya found that in order to ensure eventual risk mitigation, the project teams needed to take pre-emptive actions to identify risk that are likely to affect project implementation such as the use of project plans, milestones and budgets as part of project control.

### Risk Evaluation

Bhandhari, Shahi and Shretsha (2014) study focused on the criteria which could be adopted to improve risk evaluation for sustainability and ranking rural road projects in Dang District of Nepal. It was found out that risk audits were being carried out at every stage of the project and that the criteria and sub criteria based on the risk evaluation could be used for ranking of rural road projects in consideration with their sustainability. From the study findings risk evaluation was identified as the factor affecting sustainability of the ranked rural road projects. Oyieyo, Rambo and Ndiritu (2018) examined the relationship between cost overruns related risks and completion of public

private partnership projects in Kenya and affirmed that in order to ensure proper risk management there were continuous risk assessments to reduce cost overruns. This acted as an early warning mechanism for the project teams to take preventive measures against the occurrence of risk and ensure timely completion of the projects.

Wibowo, Hatmoko and Nurdiana (2018) study analysed usage and application of risk evaluation in the toll road project. The study found that continuous risk trend analysis was conducted to reduce time overruns. Further, risk evaluation was found to have contributed to the performance of the road toll project. A study by Mwangi and Ngugi (2018) on the correlation between risk management practices and performance of construction projects in Nairobi City County Government, Kenya determined that one of the most critical risk management practices was project risk mapping which was done to ensure compliance with the time and cost requirements. This was focused on evaluating the exposure of the organisation to legal risk, contract risk, and construction risk so as to take the necessary remedial action by way of risk mitigation.

Okate and Kakade (2019) study focused on the process of risk management which focused on the evaluation and analysis form the contracting parties as owners, consultants, contractors among others. The study findings indicated a correlation between contracting parties risk evaluation and performance of roads. More specifically the risk management process was effectively integrated with other project/program management processes of all key stakeholders. In a study on reducing risks for low-income and disadvantaged communities in urban areas of the global South Miltin and Satterthwaite (2017) posited that through objective programming of work, potential risks in the such projects can be reduced since this will be informed by a thorough understanding of risk and vulnerability by those concerned. Elizabeth (2020) studied the influence of monitoring and evaluation practices on performance of police housing projects in Nairobi County, Kenya and found that in order for these projects to ensure effective risk management, qualified experts were recruited to help supervise the overall implementation of risk management processes.

**Performance of Government Funded Housing Projects**

According to Ghalem, Chafik, Chroqui and Elalami (2016), performance refers to the attainment of set objectives during the commission of a piece of work, task or activity against the established standards. Pintea and Achim (2010) defined performance as the extent to which an organisation is able to accomplish its stated objectives given limited resources and is typically measured by efficiency and effectiveness. As far as housing projects are concerned, Sedayu and Mangkoedihardjo (2019) remarked that it entails the determination of aesthetics, convenience, reliability, facilities, durability and conformity to design specifications.

A study by Kieti, Rukwaro and Olima (2020) on the status, opportunities and challenges of affordable housing in Kenya found that whilst the Government identified the provision of housing to all Kenyans as part of its big 4 agenda, owing to resource constraints, the timely delivery of projects such as the affordable housing programme that targeted construction of 500,000 units by 2022 has been wanting. Funding constraints experienced in the delivery of the project have been occasioned by low budgetary allocation by the Government and steep cost of borrowing from financial institutions. Ochieng (2019) studied a housing delivery model for planning needs of the low/middle level public sector employees in Kenya and established that owing to the huge demand for housing for this segment of the population the Government was overwhelmed and unable to meet the delivery of the intended housing units using the prescribed model within budget.

A study by Kimani and Karugu (2020) on strategic approaches and delivery of affordable housing in Nairobi City County determined that project work had been delivered within the scope owing to the use of innovative financing that increased the accessibility of pension benefits to individuals. Odhiambo (2015) studied the determinants of quality delivery of design-build projects by focusing on small-sized housing projects in Kasarani Constituency, Nairobi, Kenya and posited that the majority of the projects had been delivered with the quality standards required by integrating

object-oriented technology, collaborative participation, concurrent project processes, transparency and risk sharing.

## RESEARCH METHODOLOGY

This study adopted a descriptive research design to explain the cause and effect of the relationship among the variables. Descriptive research gathers quantifiable information that can be used for statistical inference on the target audience through data analysis. The advantage of the combination of the two research designs is that they are able to describe the situation and establish the association of the phenomena (Magutu & Muchelule, 2018). The study population was 305 contractors, project team leaders and supervisors as per the National Construction Authority (2021) report. The unit of analysis was the housing construction projects. The study focused on all the performance of government funded housing construction projects within Nairobi City County, Kenya. The unit of observation involved the managers of projects, project supervisors, and the contractors as the target population and study respondents. In this study the sample size will be determined by the use Slovins formula recommended by Saldana (2015) when the population is less than 1000. Therefore, from a population of 305, then our sample size was 173. The study adopted a stratified random sampling technique to collect data from the respondents.

The primary data was collected through the use of questionnaires. The data questionnaire was pilot tested by the use of 30 respondents, that is, 10% sample population. The pilot study was conducted at Starehe sub-county since it has a higher number of the government funded housing construction projects. The study adopted random sampling for pilot testing and the results were not included in the actual study.

Quantitative data was analysed by the use of descriptive statistics (mean and standard deviation) and inferential statistics (Pearson correlation and regression analysis). This was carried out by the use of SPSS version 29. The findings were presented using tables, charts and graphs to facilitate comparison and for easy inference. The relationship between the independent variables and dependent variable (performance of housing construction projects) was carried out by the use of Pearson correlation analysis. To establish the joint association among the variables, that is, independent variables project risk identification, analysis and dependent variable (performance of housing construction projects) were carried out by the use of Multiple regression analysis at .05 level of significance

## RESEARCH FINDINGS AND DISCUSSION

Morton, Bandara, Robinson and Carr (2012) defined a response rate as the proportion of completed interviews when measured against the total number of individuals contacted. The study administered questionnaires to 173 individuals are received 135 back, representing a response rate of 78% which tallied with the recommendations of Gordon (2002). This is illustrated in table 4.5 below.

### Descriptive Statistics

### Risk Identification and Performance of Government Housing Construction Projects

The results pertaining to the descriptive statistics of risk identification are captured in Table 1. According to the results, 42.2% of the respondents agreed to a very small extent, 20.7% agreed to a small extent while 36.3% agreed to a moderate extent that there is a standardized document for risk identification processes. Additionally, given that the mean for this statement was only 1.9556, it is apparent that there was a low level of agreement by the respondents to this statement and contradicted the findings of Perera *et al*. (2009). The results further showed that 9.6% of the respondents agreed to a very small extent, 23% to a small extent, 32.6% to a moderate extent, 10.4% to a great extent, and 24.4% to a very great extent that risk identification processes are fully integrated in the project processes and procedures. This indicates that there a relatively high level

of agreement by most of the respondents and confirmed the findings of Obillo (2020). This was reinforced by the relatively high mean score of 3.1704.

The results also showed that 25.9% of the respondents agreed to a very small extent, 20% to a small extent, 22.2% to a moderate extent, 11.9% to a great extent, and 20% to a very great extent that there is always brainstorming, meetings and interviewing of project team to identify potential risks. This indicated a moderately positive level of endorsement by the respondents to this statement, a fact that was confirmed by the mean score of 2.8000. It was consistent with the findings of Gitau (2015). Additionally, 33.3% of the respondents agreed to a very small extent, 22.2% to a moderate extent and 44.4% to a very great extent that the project design was made in such a way as to identify risks in time. This statement had a mean score of 3.2222 indicating that most of the respondents were in agreement with it and corroborating the findings of Ngundo (2014).

The results further showed that 53.3% agreed to a very small extent, 20.7% to a small extent, 11.1% to a moderate extent, 11.9% to a great extent, and 3% to a very great extent that pilot sites were always carried out to identify potential risks in time. This statement had a mean of 1.9037 indicating that most of the respondents were not in agreement with, which was inconsistent with the findings of Kemboi *et al.* (2021). The results also showed that 23.7% of the respondents agreed to a very small extent, 24.4% to a small extent, 31.9% to a moderate extent, and 20% to a great extent that the project team was trained on the risks identification to ensure that projects ran within the allocated time schedule. This statement had a mean of 2.4815 indicating that a moderate majority of respondents were not in agreement with it, which contradicted the findings of Muchelule *et al.* (2019). Lastly, the results showed that 21.5% of the respondents agreed to a very small extent, 1.5% to a small extent, 31.9% to a moderate extent, 11.1% to a great extent, and 34.1% to a very great extent that actions were taken to identify risks that affected implementation of the project. This statement had a mean score of 3.3481 indicating that the majority of the respondents were in agreement with it and affirming the findings of Githenya and Ngugi (2014).

Ultimately, all the aforementioned statements had low standard deviations, indicating that there was little variation between them and the average responses. Additionally, the high mean scores for four out of the seven statements indicate that risk identification plays a critical role in the performance of government funded housing projects.

**Table 1: Descriptive Statistics of Risk Identification**

| | Very Small Extent | Small Extent | Moderate Extent | Great Extent | Very Great Extent | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| There is a standardized document for risk identification processes | 42.2% | 20.7% | 36.3% | 0.7% | 0.0% | 1.9556 | 0.9049 |
| Risk identification processes are fully integrated in the project processes and procedures | 9.6% | 23.0% | 32.6% | 10.4% | 24.4% | 3.1704 | 1.2960 |
| There is always brainstorming meetings and interviewing of project team to identify potential risks | 25.9% | 20.0% | 22.2% | 11.9% | 20.0% | 2.8000 | 1.4599 |
| The project design is made such a way as to identify risks in time | 33.3% | 0.0% | 22.2% | 0.0% | 44.4% | 3.2222 | 1.7563 |
| Pilot sites are always carried out to identify potential risks in time | 53.3% | 20.7% | 11.1% | 11.9% | 3.0% | 1.9037 | 1.1774 |
| The project team is trained on the risks identification to ensure that projects run within the allocated time schedule | 23.7% | 24.4% | 31.9% | 20.0% | 0.0% | 2.4815 | 1.0640 |
| Actions are taken to identify risks that affect implementation of the project | 21.5% | 1.5% | 31.9% | 11.1% | 34.1% | 3.3481 | 1.4979 |

**Risk Evaluation and Performance of Government Housing Construction Projects**

The results relating to the descriptive statistics of risk evaluation are shown in Table 2. According to the results, 32.6% of the respondents agreed to a very small extent, 44.4% agreed to a small extent, 20.7% agreed to a moderate extent, and 2.3% agreed to a very great extent that there were risk audits being carried at every stage of the project. This statement had a mean score of 1.9481 indicating that most of the respondents were not in agreement with it. This contradicted the findings of Bhandhari *et al.* (2014). Additionally, 10.4% of the respondents agreed to a very small extent, 23.7% agreed to a small extent, 14.8% agreed to moderate extent, 30.4% agreed to a great extent, and 20.7% agreed to a very great extent that there were continuous risk assessments to reduce cost overruns. This statement had a mean score of 3.2741 indicating a high level of agreement among the majority of respondents and echoing the findings of Oyieyo *et al*. (2018).

The results also showed that 31.9% of the respondents agreed to a very small extent, 32.6% agreed to a small extent, 23% to a moderate extent, 1.5% agreed to a great extent, and 11% agreed to a very great extent that there is continuous risk trend analysis to reduce time overruns. This statement had a mean score of 2.2741 indicating that the majority of respondents were not in agreement with it, which contradicted the findings of Wibowo *et al*. (2018). Further, 33.3% of the respondents agreed to a very small extent, 32.6% agreed to a small extent, 23.7% agreed to a moderate extent, 9.6% agreed to a great extent, and 0.8% agreed to a very great extent that there is project risk mapping to ensure compliance with the time and cost requirements. This statement had a mean score of 2.1185 indicating that most of the respondents did not agree with it, which was inconsistent with the findings of Mwangi and Ngugi (2018).

Additionally, the results showed that 31.1% of the respondents agreed to a very small extent, 11.9% agreed to a small extent, 34% agreed to a moderate extent, and 23% agreed to a very great extent that the risk management process was effectively integrated with other project/program management processes. This statement had a mean score of 2.7185 indicating that a very moderate majority of respondents were in agreement with it and partially corroborating the findings of Okate and Kakade (2019). Further, according to the results, 10.4% of the respondents agreed to a very small extent, 23% agreed to a small extent, 14.8% agreed to a moderate extent, 31.1% agreed to a great extent, and 20.7% agreed to a very great extent that there was objective programming of work to reduce potential risks in the project. This statement had a mean score of 3.2889 indicating that most of the respondents were in agreement with it. This was consistent with the findings of Mitlin and Satterthwaite (2017). Lastly, the results showed that 23% of the respondents agreed to a very small extent, 11.9% agreed to a small extent, 31.8% agreed to a moderate extent, 0.7% agreed to a great extent, and 32.6% agreed to a very great extent that their risk management had available, qualified experts to help implement the processes. This statement had a mean score of 3.0815 indicating that most of the respondents were in agreement with it, which affirmed the findings of Elizabeth (2020).

The results showed that the standard deviations were between 0.8580 and 1.5359 indicating that all the responses for the questions relating to risk evaluation did not vary greatly from the average responses. Further, four of the statements had high means indicating that risk evaluation was critical towards the performance of government funded housing projects.

**Table 1: Descriptive Statistics of Risk Evaluation**

| | Very Small Extent | Small Extent | Moderate Extent | Great Extent | Very Great Extent | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| There are risk audits being carried at every stage of the project | 32.6% | 44.4% | 20.7% | 0.0% | 2.3% | 1.9481 | 0.8580 |
| There is continuous risk assessments to reduce cost overruns | 10.4% | 23.7% | 14.8% | 30.4% | 20.7% | 3.2741 | 1.3126 |
| There is continuous risk trend analysis to reduce time overruns | 31.9% | 32.6% | 23.0% | 1.5% | 11.0% | 2.2741 | 1.2425 |
| There is project risk mapping to ensure compliance with the time and cost requirements | 33.3% | 32.6% | 23.7% | 9.6% | 0.8% | 2.1185 | 1.0078 |
| The risk management process is effectively integrated with other project/program management processes. | 31.1% | 11.9% | 34.0% | 0.0% | 23.0% | 2.7185 | 1.4895 |
| There is objective programming of work to reduce potential risks in the project | 10.4% | 23.0% | 14.8% | 31.1% | 20.7% | 3.2889 | 1.3094 |
| Our risk management has available, qualified experts to help implement the processes. | 23.0% | 11.9% | 31.8% | 0.7% | 32.6% | 3.0815 | 1.5359 |

**Performance of Government Funded Housing Construction Projects**

The results associated with the descriptive statistics of performance of government funded housing projects are shown in Table 3. According to the results, 47.4% of the respondents agreed to a very small extent, 0.7% agreed to a small extent, 20.7% agreed to a moderate extent, 10.5% agreed to a great extent, and 20.7% agreed to a very great extent that the project had been delivered within time. This statement had a mean score of 2.5630 indicating that a very marginal majority of respondents agreed with this statement. This affirmed the findings of Kieti *et al*. (2020). Additionally, 43% of the respondents agreed to a very small extent, 12.5% agreed to a small extent, 11.9% agreed to a moderate extent, and 23.6% agreed to a very great extent that the project had been delivered within budget. This statement had a mean score of 2.4000 indicating that most of the respondents were not in agreement with it. This confirmed that findings of Ochieng (2019).

The results also showed that 20.7% of the respondents agreed to a very small extent, 23.7% agreed to a moderate extent, 11.1% agreed to a great extent, and 44.5% agreed to a very great extent that project work had been delivered within the scope. This statement had a mean score of 3.5852 indicating that most of the respondents were in agreement with it. It corroborated the findings of Kimani and Karugu (2020). Further, the results showed that 31.1% of the respondents agreed to a very small extent, 10.4% agreed to a small extent, 11.1% agreed to a moderate extent, 23% agreed to a great extent, and 24.4% agreed to a very great extent that the project had been delivered with the standards required (quality). This statement had a mean score of 2.9926 indicating that most of the respondents were in agreement with it, which was consistent with the findings of Odhiambo (2015).

The results showed that 20.7% of the respondents agreed to a very small extent, 10.4% agreed to a small extent, 23.7% agreed to a moderate extent, 12.6% agreed to a great extent, and 32.6% agreed to a very great extent that the client was satisfied with project implementation process. This statement had a mean score of 3.2593 indicating that the majority of the respondents were in agreement with it and affirming the findings of Alima (2021). Additionally, 34.8% of the respondents agreed to a very small extent, 10.4% agreed to a small extent, 20.7% agreed to a moderate extent, 0.8% agreed to a great extent, and 33.3% agreed to a very great extent that the project met its intended goals and objectives. This statement had a mean score of 2.8741 indicating that most of the respondents agreed with it. This was consistent with the findings of Muthoga (2020). Lastly, 31.9% of the respondents agreed to a very small extent, 43% agreed to a moderate

extent, 3% agreed to a great extent, and 22.1% agreed to a very great extent that there was proper utilization of project resources on its implementation. This statement had a mean score of 2.8370 indicating that a moderate majority of the respondents were in agreement with it. This contradicted the findings of Ngundo and James (2018).

The standard deviations of all of these statements ranged between 1.4772 and 1.6859 indicating that there was little variation in the responses from the average responses. Additionally, that fact that all but one of the statements had a mean above 2.5 indicates that performance had been prioritised by these projects.

**Table 3: Descriptive Statistics of Performance**

| | Very Small Extent | Small Extent | Moderate Extent | Great Extent | Very Great Extent | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| The project has been delivered within time | 47.4% | 0.7% | 20.7% | 10.5% | 20.7% | 2.5630 | 1.6327 |
| The project has been delivered within budget | 43.0% | 21.5% | 11.9% | 0.0% | 23.6% | 2.4000 | 1.5938 |
| Project work has been delivered within the scope | 20.7% | 0.0% | 23.7% | 11.1% | 44.5% | 3.5852 | 1.5472 |
| The project has been delivered with the standards required (quality) | 31.1% | 10.4% | 11.1% | 23.0% | 24.4% | 2.9926 | 1.6045 |
| The client is satisfied with project implementation process | 20.7% | 10.4% | 23.7% | 12.6% | 32.6% | 3.2593 | 1.5208 |
| The project meets its intended goals and objectives | 34.8% | 10.4% | 20.7% | 0.8% | 33.3% | 2.8741 | 1.6859 |
| There is proper utilization of project resources on its implementation. | 31.9% | 0.0% | 43.0% | 3.0% | 22.1% | 2.8370 | 1.4772 |

## Inferential Statistics

### Pearson Correlation Analysis

According to Hall (2015), the Pearson Correlation Coefficients (*r*) refer to the ratio of covariance between two variables signifying a collection of quantitative data, and raised to the square root of their variances. The results pertaining to the Pearson Correlation coefficients of the study are presented in Table 3. According to the results, all the independent variables, Risk Identification, Risk Evaluation, had positive correlations of r = 0.877; r = 0.783 respectively with the dependent variable, Performance of Government Funded Housing Projects. Accordingly, a change in Risk Identification by a value of 1 leads to a corresponding change of 0.877 in the Performance of Government Funded Housing Projects. Additionally, a change in Risk Evaluation by a value of 1 results in a corresponding change of 0.783 in the Performance of Government Funded Housing Projects.

The results also showed that the p-values of all of the independent variables, Risk Identification, Risk Evaluation, were well below 0.05 indicating a statistically significant relationship between each independent variables and the dependent variable. This corroborated Dahiru (2008) who established that whenever there are intervals of 95%, p-values of less than 0.05 indicate that observed differences between groups are not possibly to be due to chance and, as such, are statistically significant. This indicates the relevance of the p-value as an acceptable test of statistical significance.

**Table 4: Pearson Correlation Analysis**

| | | Risk Identification | Risk Evaluation | Performance |
|---|---|---|---|---|
| Risk Identification | Pearson Correlation | 1 | | |
| | Sig. (2-tailed) | | | |
| | N | 135 | | |
| Risk Evaluation | Pearson Correlation | .325** | 1 | |
| | Sig. (2-tailed) | .000 | | |
| | N | 135 | 135 | |
| Performance | Pearson Correlation | .877 | .783 | 1 |
| | Sig. (2-tailed) | .001 | .008 | |
| | N | 135 | 135 | 135 |

## Multiple Regression Analysis

The multiple regression statistics for the study are illustrated by table 5. According to the table, the R Square value for all the variables was 0.720 indicating that the results explained 72% of the variation in the Performance of Government Funded Housing Projects whenever there was a one percent change in the four independent variables. This was consistent with Hamilton, Ghert and Simpson (2015) who found that in order for R square values to be significant they should be higher than 0.7. In other words, whenever this model is used in future research it will be able to explain any variations in the dependent variable 72% of the time. This also shows that there is only a 28% difference between all the observed values and their fitted values in the examined data set indicating a strong Goodness-of-fit of the regression model.

**Table 6: Multiple Regression Model**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .849[a] | .720 | .712 | .17197 |

a. Predictors: (Constant), Risk Handling, Risk Identification,

## Analysis of Variance Statistics

Analysis of Variance (ANOVA) refers to a statistical technique used in enabling the detection of variations between the experimental group means when there is one dependent variable and one or more independent variables (Sawyer, 2009). Table 7 shows the findings pertaining to the ANOVA statistics for the study. The results indicate that the ANOVA F-test score, calculated value $F_{cal}$ at 5% level of significance is equivalent to 83.714, which is greater than the F critical value ($F_{crit}$) of 2.37 indicating that there is a significant relationship between all the independent variables and the dependent variable of Performance of Government Funded Housing Projects. Additionally, the p-value of 0.000 is less than 0.05 indicating that there is a statistically significant relationship between each of the independent variables and the Performance of Government Funded Housing Projects. This echoed the findings of Kao and Green (2008) and demonstrates the goodness of fit of the model.

**Table 7: ANOVA Statistics**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 9.903 | 4 | 2.476 | 83.714 | .000[b] |
| | Residual | 3.845 | 130 | .030 | | |
| | Total | 13.748 | 134 | | | |

a. Dependent Variable: Performance

b. Predictors: (Constant), Risk Identification, Risk Evaluation

## Beta Coefficient Analysis

Peterson and Brown (2005) referred to Beta Coefficients as unknown constants that are estimated on the basis of the data which are linked to given predictors or independent variables. The beta

coefficients of the study are illustrated in Table 8. The values of the constant and coefficients enabled the generation of the multiple regression model as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

$$= 6.633 + 0.172X_1 + 0.418X_2 + 0.231$$

A review of the findings also shows that a unit increase in Risk Identification will result in a 0.172 increase in Performance of Government Funded Housing Projects when all other independent variables are held constant. A unit increase in Risk Evaluation will result in a 0.418 increase in Performance of Government Funded Housing Projects when all other independent variables are held constant.

**Table 8: Beta Coefficients**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | t | Sig. |
| 1 | (Constant) | 6.633 | .231 | | 28.688 | .000 |
| | Risk Identification | .172 | .048 | .215 | 3.553 | .001 |
| | Risk Evaluation | .418 | .051 | .538 | 8.217 | .000 |

a. Dependent Variable: Performance

## Conclusions

The projects had taken actions to identify the risks that affect project implementation. The project design was made in such a way as to identify risks in time. Risk identification processes were fully integrated in the project processes and procedures. There were always brainstorming meetings and interviewing of project team to identify potential risks. However, there was neither a standardized document for risk identification processes, nor were pilot sites always carried out to identify potential risks in time. Additionally, the project team was not trained on the risks identification to ensure that projects run within the allocated time schedule.

There was objective programming of work to reduce potential risks in the projects. There were continuous risk assessments to reduce cost overruns. Risk management had available, qualified experts to help implement the processes. The risk management process was effectively integrated with other project/program management processes. However, risk audits were not being carried at every stage of the project, there was no project risk mapping to ensure compliance with the time and cost requirements, and there was no continuous risk trend analysis to reduce time overruns.

## Recommendations

Government funded housing projects need to provide a standardized document for risk identification processes by working with the regulator to develop enforceable standards that can be adhered to. Pilot sites should always be carried out to identify potential risks in time by formulating this as an essential risk identification procedure for all housing projects. Additionally, the project teams should be trained on the risks identification to ensure that projects run within the allocated time schedule.

Risk-based external audits or surveys should be conducted at every stage, each focusing on a specific topic to meet a specific requirement of a particular project stakeholder, whether regulator, partner, insurer or third-party inspector. The approach is based on a focus on the root causes of likely incidences instead of establishing the last line of defence. Project risk mapping should be conducted as a rule to ensure compliance with the time and cost requirements. The project risk mapping will utilise visual aids to multiplying the risk impact and probability of occurrence so as to establish a risk rating that can then be used to make comparisons and prioritise various types of risks.

## Areas of Further Research

A number of studies have been conducted on general determinants of completion of government funded projects in Kenya but not risk management, specifically. Thus, more research needs to be done on the correlation between risk management and performance of government funded housing projects. Additionally, many studies have tended to focus on constructed projects rather than housing projects thereby leading to findings that may not apply to this study. Again, more research should be situated on housing projects

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