

**INFLUENCE OF RISK MANAGEMENT PRACTICES ON PERFORMANCE OF
ROAD CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA.**

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DECLARATION

This research report is an original work that was not submitted at any other university for a degree or for any other academic award.

Signature 

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I verify that the research work contained in this report by the undersigned student was under my oversight.

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DEDICATION

I sincerely thank the Lord God for blessing me with the energy and resources to pursue this purpose. Secondly, to my dear wife, Joyce and kids, Jennelle and Jeff, who continuously gave me the much-needed encouragement and moral support, then to my dear parents, Mr. and Mrs. Githere, who always gave my brothers and I the inspiration that education is the key.

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ABBREVIATIONS AND ACRONYMS

NACOSTI	National Commission for Science and Technology
NCC	Nairobi City County
NCCG	Nairobi City County Government, Kenya
RM	Risk Management
SPSS	Statistical Product and Service Solutions

OPERATIONAL DEFINITION OF TERMS

- Project risk Assessment:** This refers to the combined effort of analyzing potential project risks and quantifying of risks that are likely to negatively affect construction project activities and making judgments on the tolerability of the project risk on the basis analysis of a risk.
- Project Risk Control:** This refers to risk management practice involving implementation of risk response plans.
- Risk Identification:** It is the process of whereby potentially risks in the road construction project are identified and highlighted before consideration of prevention or mitigation actions.
- Project Performance:** This refers to project indicators which constitute the basic components project success including cost, time and quality (Nichols, 2000).
- Project Risks Management:** Refers identification, assessing, planning, monitoring and controlling risks in road construction projects.
- Project Risk Planning:** Involves identifying how to carry out the activities of project risk management for the role of determining actions to properly respond to the identified risks.

ABSTRACT

The performance of road construction projects has been a subject of concern in Kenya and more specifically in Nairobi City County (NCC). The evidence shows that most road construction projects in Kenya are usually not completed in time thus significant cost overruns. Managing construction project risks is considered as compulsory for any project to be successful. This study seeks to determine the effect of risk management practices on performance of road construction projects' performance in the Kenyan context. The research specifically sought to determine the effect of project risk assessment on performance of road construction projects in Nairobi City County; to establish the effect of project risk identification on performance of road construction projects in Nairobi City County; examine the effect of risk planning on performance of road construction projects in Nairobi City County; and to determine effect of risk control management on performance of road construction projects in Nairobi City County. The concepts that guided the research were the theory of agencies, the theory of uncertainty, and the theory of stakeholders. A descriptive design for studies was used. The target population was 614 sampled participants using stratified sampling technique and the sample size consisted of 184 participants chosen using simple random sampling technique. Questionnaires were used to obtain quantitative data which was analyzed using descriptive statistics and regression analysis. The research established that project performance had a beneficial and substantial impact on design danger, legal risk, construction risk, and contract management risk. It was found out that project risk assessment, project risk identification, project risk planning, and risk control management had a significant and positive correlation with road project performance in Nairobi City County. The research concludes that design impacts the execution of NCC road building projects as design limitations restrict the variety of prospective design alternatives. Poor design is a danger engaged in project plan planning and implementation. It is vital to build legal risk management into project management when designing, developing and implementing building projects across the county to guarantee governance and compliance with legislation, regulations and norms. Building risk is highest at the earliest phases of the project beginning with the selection of procurement route. Another efficient yet inexpensive technique of mitigating risk is to implement a consistent contract management process. As far as risk mitigation and distribution is concerned, this involves provisions pertaining to compensation, liability constraints and appropriate disclaimers. The research proposes that the building department and builders need adequate project layout, legal approval and adherence to policy demands to mitigate the hazards involved in the project execution phase, adequate planning to guarantee that all funds are accessible to carry out the building. County should consider concentrating on the legal secondary hazards. If wrongly managed, this can result in costly economic losses for the county as well as elevated leadership and personnel time expenses. Contractors need to closely evaluate the hazards and recognize their project's potential consequences for these hazards. Stakeholders need to monitor risk reactions, evaluate the magnitude of the danger, provide risk control policies and handle any remaining hazards.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Performance of road construction projects has been a subject of concern in majority of countries (both developed and developing) for quite some time (Rivera, Baguec & Yeom, 2020; Otim & Alinaitwe, 2014). The problem of underperformance is not only affecting the road construction projects but also the construction industry (Otim & Alinaitwe, 2014). The problem of projects performance of road construction globally, regionally and locally is evidenced in a number of studies. Globally, Bordat et al. (2014) analyzed 2668 road projects in the United States, and found there was the inability to complete projects on time and within budget. In Australia, Creedy, Skitmore and Wong (2010) studied 231 road projects and found out that there were risk factors leading to cost overrun in delivery of road construction projects. Lee (2018) studied 138 road projects in South Korea, finding cost increases, time schedule delays, and benefit shortfalls were common problems that affected the road and rail construction projects.

In the African region, a study Akal, El-Maaty and El-Hamrawy (2018) confirmed the prevalence of schedule delay, cost escalation, and quality shortfall in public highway projects in Egypt. Rwakarehe and Mfinanga (2014) studied seven road projects in Tanzania and found there were project performance problems. Cost and time overruns for the reviewed projects averaged 44% and 26% respectively, a problem predominantly related to problems that occurred during the design process. In Uganda, Otim and Alinaitwe (2014) revealed that poor project planning and poor (risk) management have remained the major factors affecting paved

road project performance. Mudau and Pretorius (2009) posited that construction projects ability to manage and control risks in South Africa significantly influence the performance of projects and consequently determines the success of the implementation of such projects. This evidence shows that performance of road projects is a challenge in both developed and developing countries.

In Kenya, building and construction is critical to the economic development of the country, and its function should not be disregarded. The industry has produced an important contribution to nation's the Gross Domestic Product (GDP) over the past 5 years, according to statistics from the Kenya Statistics Bureau. This is certain that the development business output is a significant and indispensable part of the domestic output, talking to a significant extent. In 2010, 2011, 2012 and 2013, the industry created employment of around 100,100, 106,000, 116,100 and 130,300 people, respectively, according to the Republic of Kenya report (2014).

Despite the economic significance of the building and construction, Kisavi and Ngugi (2019) revealed that whereas the Kenyan government has continued to invest heavily towards road construction, the challenge of delays in completion of road construction projects and cost overruns continue to hamper accelerated road improvement in the country. They indicated that more than 50 percent of all road construction projects in Kenya are completed late with significant cost overruns. This indicates there is poor performance of road construction projects. A research conducted by Mbeche and Mwandali (2006) found that project timetable and budget had a major impact on projects. Projects that expanded completion time and cost respectively accounted for 70% and 50%. This was due to project hazards and how they are managed.

According to Petrovic (2017) the risk management process is of great importance for obtaining project objectives/performance. Managing construction project risks is considered as compulsory for any project to be successful. Frank *et al.* (2014) have emphasized the importance of noting that risk management practices are not entirely designed with expectations of eliminating risks altogether but are targeted at controlling the events and issue from which risks emanate from thus hinder achieving project performance outcomes. Project risk management is essential in optimizing project performance (Basel, 2010).

Risk management in project implementation take an important and necessary stage as per project management models. Given the importance of managing risks in construction projects, the efficiency in project risk administration is looked forward to determining success of project performance. According to Bannerman (2008) achieving success in construction projects depend on the extent risks sources are identified, planning on risk management deployed and better management of risks to achieve project performance objectives.

According to objective three of the study, the review of the literature links risk identification through factor analysis and major component analysis based on the event resulted in ten aspects of risk sources. The study revealed that risk planning and finance aspects, equipment aspects, location and environmental aspects, natural aspects, government policy aspects, material aspects, human and energy aspects work, control aspects, aspects of health and safety, aspects of human error. Further review of the studies indicated level of risk from the most influential is the high risk consisting of aspects of health and safety, aspects of human.

Nieto-Morote and Ruz-Vila (2010) note that building risk management procedures have been frequently seen in demonstrating vibrant and sensible impact. Jomaah, Bafail and Abdulaal (2010) described the board practice as a danger for problems and problems related to the accomplishment of an effort and the accomplishment of a job goal.

1.1.1 Project Performance

Project performance was a key concern of the study as it was the dependent variable. There are several definitions of project performance with the definitions being in terms of deliverables, time and budgets. According to Ibbs and Kwak (2000), project performance denotes the overall quality of projects as indicated by their value to beneficiaries, effectiveness and efficiency during implementation as well as sustainability in the long run. Flanagan and Norman (200) have noted that project performance is quite significant and is attained by ensuring that the project is successful within cost estimates, delivery within stipulated approvals timelines, occupancy, design and meeting the agreed technical quality standards, functionality, ensuring fitness for purpose, safety as well as environmental protection. Further, project performance seeks to ensure that client and the implementing organisation maximize their profitability while working towards minimizing outcomes of risky and uncertain events which might interfere with the achievement of the project's objectives and seizing any opportunity that may arise to the benefit of the project (Kululanga & Kuotcha, 2010).

In the construction industry the significance of project risk management is underscored by the time and budget indicators. This has led to the critical attention paid by many models of project risk management to time and cost as the basic risk management strategies. Wenchao and Baochao (2010), noted that Chinese construction projects in

shows a range of performance measure as completion of project within expected time, expected budget and improve customer satisfaction.

From the foregoing definition and discussions, it is clear that quality cost and time are key components of any endeavor to measure project performance and consequently they are indicators of how successful a project is. These indicators thus formed the project performance measure for the study. As noted by Owolabi *et al.* (2014), it is also important to be clear on the quality expectations in any project as this guarantees effectiveness and conformity of quality performance. Road building projects are considered successful if passed on with arranged term, capital allocation, and project quality. Impediment of basic inquiry in the climax construction industry through a general estimate, usually resulting in prolonged expenses due to time development or stimulation and also loss of earnings, worsening of job, loss of wages due to instances between legally limiting social affairs and project submissions. Activity delay in meeting the requirements of large projects has major cost implications, which ultimately have comprehensive outcomes on owners' expectations, particularly in Kenya (Aziz, 2013).

Construction project performance is characterized by aspects such as timeliness, spending plan and expectations. It is the general nature of a project as far as its effect, worth to recipients, usage adequacy, effectiveness and maintainability (Ibbs & Kwak, 2000). A definitive significance of undertaking execution is accomplished through staying away from the task's inability to keep inside cost spending plan, inability to complete within time for endorsements, structure, inhabitation and inability to fulfill the necessary specialized guidelines for

quality, usefulness, qualification for reason, security and condition insurance (Flanagan & Norman 2003). Task execution guarantees that ventures amplify on gainfulness, limit the outcomes of unsafe and unsure occasions as far as accomplishing the undertaking's goals and holds onto the odds of the dangerous occasions from emerging (Kululanga & Kuotcha, 2010).

The advantages of risk administration for development industry lie at the purpose of time and spending venture focal points. This has been the justification for having most implementing teams including project risks models in their execution strategies. Wenchao and Baochao (2010), noticed that Chinese construction undertakings shows a scope of project performance measure as fulfillment of venture inside anticipated time, anticipated spending plan and improve consumer loyalty.

Studies such as Villazón et al. (2020) and Westland (2015) have outlined the measures of project performance. For instance, Villazón et al. (2020) indicated that project performance can be measured by cycle time, cost, quality, overall satisfaction of stakeholders, project team's ability to manage project risks, ability to resolve project problems and efficiency of execution. Westland (2015) on the other hand indicates that it can be measured by schedule (whether or not the original timeline was adhered to), quality, cost and stakeholder satisfaction.

The criteria of project execution for the venture will be cost, time and quality which are essential components of task achievement. To guarantee the viability and similarity of value execution, the particular of value necessities ought to be unmistakably and unequivocally expressed in structure and agreement records.

Project execution measure for this investigation will be characterized as cost, time, quality and productivity.

1.1.2 Project Risk Management Practices

Risk factors are involved at every stage from designing and planning stages to completion of a project (Bahamid, Doh & Al-Sharaf, 2019). Management of risk in construction projects involves deployment of qualitative risk analysis tools and methods. This includes risk identification and preliminary risk assessment, where the objective is to establish the main sources of risk and to illustrate the level of common impacts on estimated cost and time. Based on the activity, construction project risks genesis can be traced to the human, financial, political, environmental, planning, marketing, economic, natural, technical, criminal and safety issues. Risk management practices is a combination of coordinated tasks and activities for controlling and directing risks confronted by project managers through the incorporation of key risk management tactics and processes to achieve set project goals (Nikolaidou & Vogiazas, 2014).

Risk identification is the first step in the risk management process whereby potential problems specific to the project must be identified before quantification of the magnitude of the risk, or consideration of prevention or mitigation actions (Vasishta, Chandra & Asadi, 2018). Risk identification can be done in many ways. But generally, the risks are broadly based on two types. One is internal risk (technical factors, site factors and commercial factors -delay in payment, poorly tailored contract forms, third party liabilities etc). Two is external risks which generally comprise of political factors, environmental factors, and socio-economic

factors. There are also project scope risks, utility conflict, and construction management related risks (Vasishta, Chandra & Asadi, 2018). By identifying risks in an early stage of planning and assessing their relative importance, project managers can identify methods used to reduce risks and allocate the best people to mitigate them (Tadayon, Jaafar & Nasri, 2012). Four techniques are commonly used to identify risks in construction projects. They include; industrial checklists which are typically prepared by a documentation specialist; through interviews with key project participants; examining historic data from previous similar projects and brainstorming with the project (Kendrick, 2009; Tadayon et al., 2012). In this study, risk identification is measured by information sharing, project environmental impact assessment, screening of project risks, technical specifications and supervision of project teams.

Risk assessment is also necessary prior to planning and management of risks to minimize the adverse impacts of risks involved in road construction (Vishwakarma et al. 2016). An effective risk assessment is determination of quantitative estimate of risks as risks are involved at every stage of road construction project. Risk assessment is an effective tool for supporting decision-making and corrective actions in construction. Assessment of risk factors will help in risk planning and risk management of any road construction project. This helps in improving the performance of highway construction projects, i.e., to maintain cost and quality of the project and for scheduled completion of the project (Odimabo, 2016). In this study, risk assessment is measured by project fund allocation, material management, transparency and accountability, project fund disbursement and project team competency.

As risks are present from start to end of the project i.e. from development phase to operational phase so it becomes very important to analyze risks and mitigate them by proper means of planning and management (Vishambar et al., 2016). Planning how to manage or cope with risk is an extremely difficult task, which needs to be undertaken already at the stage of project planning. The level of involvement at the initial phase in most cases translates into the overall risk coping process (Szymański, 2017). Project risk planning is therefore an important aspect in risk management process of construction projects. In this study, Project risk planning will be measured by risk knowledge sharing, information analysis, scheduling of project operations, budget allocation, responsibility sharing and stakeholder involvement.

After risks have been identified, assessed, and appropriate responses have been developed, those findings must be put into action. Risk control includes implementing the risk plan, which should be an integral part of the project plan (Renault & Agumba, 2016). Two key challenges are usually encountered during monitoring and controlling; the first is putting the risk plans into action and ensuring that they are still effective. The second is producing significant documentation to support the process (Renault & Agumba, 2016). Risk management in construction allows project managers not only to identify, analyze, but also respond and control the risks of the project. The managers should provide measures to control the risk and manage any residual risks (Al-Ajmi & Makinde, 2018).

To enhance successful performance on road construction projects, risk factors of the projects have to be identified, assessed and minimized for scheduled, safe and cost-effective completion of the projects (El-Karim et al., 2017).

1.1.3 Road Construction in Nairobi's County Government

The construction industry is growing and is a crucial sector for the growth of the economy in Kenya. For example, according to the reports of Kenya National Bureau of statistics (KNBS, 2018) and the Kenya Economic Outlook (2018) the construction sector grew by 8.6% in 2017. In the same period, the Gross Fixed Capital Formation increased by 15.9% for dwellings and 13.6% for other buildings other than dwellings respectively compared to 2016. In Nairobi County, there are several ongoing road construction projects in Nairobi County which include bypass roads, link roads and link road extension.

Some of the notable ongoing road projects includes: construction of Nairobi Eastern missing link roads and Non-Motorised Transport (NMT) facilities in Nairobi, rehabilitation of Kasarani - Mwiki Road, Nairobi Outering road improvement project, construction to Bitumen Standard of Waiyaki Way –Redhill Link Road, upgrading to Bitumen Standards of Mlolongo – Kware – Katani Link Road (Phase I), improvement of Nairobi Roads Lot 2 (Part of Likoni Road, Enterprise Road and Shreeji Road), Construction of Lenana – Muchugia road, among others.

According to Kisavi and Ngugi (2019), more than fifty percent of all road construction projects in Kenya are never completed in time thus the significant cost overruns recorded. This is not different for Nairobi County; and this point at poor performance of road construction projects.

Some projects are not operational owing to the use of road construction by the NCCG due to risk management. In 2009 there were various activities that ended with bad performance in the light of distinct evidence of bad risk connection, non-receptivity of equipment, change of course of action and drawing that are locked in with efforts of setting up shots, additional works, holding up the decisions, handing over, assortment mastermind, rectifications and postponement of illusion.

1.2 Statement of the Problem

County and local roads are of great importance as a part of the road network in the distribution of traffic at a lower level. Modernization in all aspects of life requires modernization and development of transport infrastructure, which leads to faster and better flow of transport services (Boskovic, 2015). The continued growth of construction of infrastructural networks such as roads seeks to enhance connectivity and mobility in Nairobi County. However, the problem of performance of projects in the road sector has raised numerous concerns. Auditor-General report for the year to June 2018 indicated that up to Ksh. 9.6bn had been sunk into stalled or incomplete road projects which translates to ineffective use of public resources as the projects were not achieving their intended purpose. A study by Kisavi and Ngugi (2019) also identified that more than 50% of all road construction projects in Kenya were completed late with significant cost overruns. This is a situation replicated in all Counties, including Nairobi County.

Completion of construction projects within budget, within time and required standards have been the concern of the government and require risk management compliance to achieve project performance expectation. Bundi (2013) noted that road construction by

Kenya Rural Roads Authority face political interferences and financial risks affecting completion of KeRRA projects. Risk management practices are important in management of projects. According to authors such as Banaitiene and Banaitis (2012), Petrovic (2017) mitigation of project risks are crucial steps in managing successful projects, and that managing construction project risks is considered as compulsory for any project to be successful. In Kenya, management of projects have deployed project risk management practices, risk identification, risk analysis, risk planning in an effort to achieve construction project performance (Barare, 2012). Although top management deploy risk management practices, the degree to which it contribute to road success or failure of construction projects in Kenya remain less researched.

Local studies such as Kinyua, Ogollah and Mburu (2015) research examined how risk management methods impact the effectiveness of projects in SMEs in Nairobi, Kenya and discovered ICT businesses can save their finances and contribute to improved productivity owing to effective and efficient risk management. This study was conducted on SMEs and did not investigate the aspect of project performance. This study does not fill the intended research gap. Study by Silva, Warnakulasooriya and Arachchige (2015) examined a review of literature on how critical success factors affect building project efficiency. This study does not provide evidence on how risk management practices affect performance of road construction projects, which is the gap that this study sought to fill. Research done by Wanyonyi (2015) looked at how risk management policies affect project efficiency. This study was conducted on selected International Development Organizations Based in Nairobi, whose operations and implementation of projects is different from that of Nairobi City County. The research also concentrated on how risk management practices affect project efficiency which is different from this

study which sought to investigate how risk management practices affect performance of road construction projects in Nairobi City County. None of the reviewed study has addressed the gap that this study wanted to fill. In addition, despite the increase in use of risk management strategies in construction project management; there have been scanty empirical studies that focus on determining the effects of risk management practices on road construction project performance. This study attempted to find out the effects of risk management practices on road development project outcome in Kenya.

1.3 Objectives of the Study

1.3.1 General Objective of the Study

To investigate the influence of risk management practices on performance of road construction projects in Nairobi City County, Kenya.

1.3.2 Specific Objectives

To determine the influence of project risk assessment on performance of road construction projects in Nairobi City County.

- i. To establish the influence of project risk identification on performance of road construction projects in Nairobi City County.
- ii. To examine the influence of risk planning on performance of road construction projects in Nairobi City County.
- iii. To determine influence of risk control management on performance of road construction projects in Nairobi City County.

1.4 Research Questions

This study sought to achieve the following specific research questions :

- i. What is the influence of project risk assessment on performance of road construction projects in Nairobi City County?
- ii. How does project risk identification influence performance of road construction projects in Nairobi City County?
- iii. What is the influence of risk planning on performance of road construction projects in Nairobi City County?
- iv. How does risk control management influence performance of road construction projects in Nairobi City County?

1.5 Significance of the Study

This study is going to give more insight on the potential activities or actions that can contribute to risks in road construction projects, how risk management practices can be employed and their effects on performance of road construction projects. The findings of this study therefore will profit the management of NCCG as they will know how to identify and mitigate hazards in road construction projects to enhance project efficiency.

The study will be valuable to both the national and county governments as policy makers, as the study may highlight gaps in the construction sector. The study might therefore trigger the national and county governments to formulate policies aimed at reducing risks in road construction projects and improving the performance of the projects.

The study may also be beneficial to researchers and academicians as it will add knowledge in the field of management practices on performance of road construction projects; which has limited empirical evidence. It will also be source of reference to the future scholars and researchers.

1.6 Scope of the Study

The study was limited to Nairobi City County and the study population comprised of staff (contractors, consultants/specialists and project technicians) engaged in NCC road construction projects. The research evaluated the design, legal, construction, and contract risks associated with road construction, how they were managed, and their effect on project performance in NCC. The research evaluated the project efficiency on the basis of scope, budget, timelines and acceptability of beneficiaries. The study was based on the Network Theory, the Theory of Constraint, Agency Theory and Institutional Theory. The study was undertaken over a six months period.

1.7 Limitations of the Study

Because of the sensitivity of some data, participants could be afraid to provide adequate data about road construction project results. The participants however, were ensured that the data would be handled as confidentially as possible. The research population was wide and large, therefore reaching all participants was hard. However, there was an appropriate sampling method for a representative sample size.

1.8 Structure of the Study

This research project comprises of five chapters. Chapter one covers the background of the study which discusses the concept and the context of the study, statement of the problem, objectives of the study, and research questions. This chapter

also outlines the significance of the study, scope and limitation, and lastly organization of the study. Chapter two reviews literature which includes theoretical review and empirical review from where the study draws the research gaps. The chapter ends with a presentation of the conceptual framework which outlines the interaction of variables. Chapter three deals with research methodology, chapter four presents the data analysis and interpretation of findings in order to address/answer the study objectives/questions while chapter five a summary of the findings of the study, conclusions, policy recommendations made, as guided by the study objectives. At the end of this chapter, the researcher also suggests areas for further study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews past studies in regards to effects of risk management practices on performance of construction projects. The study also presents empirical review, research gaps and conceptual framework. Only the issues in the objectives of this study are featured, critically reviewed and discussed.

2.2 Theoretical Review

The research was done based on the network theory, the Theory of Constraint, Agency Theory and Institutional Theory. These theories were deemed appropriate in explaining the relationship between risk management and project performance.

2.2.1 Network Theory

Network Theory was developed from the works of Leonhard Euler. Euler's solution of the *Seven Bridges of Königsberg problem* is considered to be the first true proof in the theory of networks. Network theory was later applied in many disciplines. A network is a dynamic structure catching just the nuts and bolts of association examples and little else. Since it is a summed up design, devices produced for breaking down, displaying and understanding systems can hypothetically be actualized across disciplines. System hypothesis inventiveness lays in the use of some system hypothesis markers to the venture chance administration field (Olsson, 2008).

Instruments utilized in evaluating risks are regularly adequate, however model multifaceted nature and restrictions of computational force can tie chance assessors to include increasingly causal associations and record for progressively Black Swan

occasion results. The use of network theory devices on risk evaluation, computational impediments might be survived and bring about more extensive inclusion of occasions with a smaller scope of vulnerabilities. Dynamic procedures are not fused into routine hazard evaluations; notwithstanding, they assume a basic job in such procedures.

It is accordingly significant for hazard assessors to limit affirmation predisposition via doing their examination and distributing their outcomes with negligible inclusion of outer factors, for example, governmental issues, media, and donors. Risk assessment is a significant instrument to gain a present and future hazard status of the system data framework venture. Many hazard appraisal approaches consider the current framework security status, while the future security status, which additionally affects surveying the framework chance, isn't mulled over (Meeampol & Ogunlana, 2006).

The investigation depends on arrange hypothesis to manage chance evaluation and associations in development ventures. Undoubtedly, such ventures are presented to various and reliant dangers of different nature, which makes their administration progressively troublesome. Right now hypothesis is given targeting recognizing key components in the task structure of interrelated dangers conceivably influencing a venture (Hamimah & Adnan, 2008). This investigation fills in as a ground-breaking supplement to old style venture hazard examination. The development of the hazard organize requires the inclusion of the venture supervisor and other colleagues allotted to the hazard the executives procedure.

2.2.2 Theory of Constraints

Theory of Constraints (TOC) was conceived by Dr. Eliyahu Goldratt and introduced it to a wide audience through his bestselling 1984 novel, “The Goal”. The primary theoretical anchorage of this study is the Theory of Constraints (TOC), a management paradigm that postulates that any manageable system faces a number of constraints that limit the achievement of its organizational goals (Goldratt, 1990). The TOC was the main theory for this study, as it interrogated the entire construction value chain, from start to finish.

The TOC largely takes a process based view of firm performance and identifies the rate determining steps, that is, those that are most critical in affecting project performance, and by extension, firm performance. When these are resolved, they have a net effect of enhancing the flow of work and effective allocation and distribution of firm resources. At the minimum, TOC holds that there is at least one constraint and proposes the use of a focusing process to identify the constraint and organize the rest of the processes around it. Identifying the constraint or constraints, TOC proposes measurement and control using three key parameters, namely, the throughput, operational expense and inventory. Inventory represents the financial costs of all items necessary in production; operational expense, on the other hand, is the cost of production (converting inventory into throughput); while throughput refers to the rate at which the system generates sales revenues.

According to TOC, if there were no constraints inhibiting an organization from achieving its throughput, its sales revenues would be infinite. This is however, impossible in a real life system, and only by optimizing flow through the constraints, can overall throughput

be maximized. Constraints can be internal, where the system fails to generate sufficient supply to match demand, conversely, external, where supply exceeds demand. In order to focus processes through the constraints, TOC proposes five key steps, namely, identification of the systems constraints, formulating strategies on exploiting the identified constraints, prioritizing these strategies, increasing the constraints throughout capacity and monitoring and elevating with the necessary feedback loops. The five focusing steps are known as the Process of Ongoing Improvement (POOGI) and the centroid of their implementation is the identified system constraints (Goldratt, 1990).

In applying TOC to risk management of construction projects, there is recognition of the fact that existing and future constraints are liable to become project risks. In practice, in the initial definition of construction project risks, project management focuses on the identification of the most critical risks involved (Steyn, 2002). Risk events are thus prioritized according to their potential impact at any given stage in a project. This implies that, along the project life cycle, different risks tend to assume different levels of criticality as the project progresses. Using the feedback loop implied in the last focusing step of TOC approach ensures that risk events are effectively managed by continually reducing the most critical current risk, thereby ensuring that the overall risk is reduced gradually, continually and systematically. This ensures those scarce resources are directed at managing the risks that may affect adversely on the project at any given point, and that emergent risks obtain the required attention, in terms of resource allocation, at the right stage. Ultimately, this speeds up project performance and has a multiplier effect on firm performance.

2.2.3 Agency Theory

Organization hypothesis as upheld by Smith and Stulz (1985) which clears up a potential overwhelm of essentialness between financial specialists, membership and duty holders by prudence of asymmetries in having dispersal, which makes the organisation put everything hanging in the balance or not sharing in positive net respect undertakings (Mayers and Smith, 2012). According to these lines, the theory of membership recognizes that support approaches portrayed can have an important effect on strong regard (Fite & Pfliederer, 1995). Zou, Zhang and Wang (2013) argue that devoid of the standard esteem owner, responsible for tolerating the rest of the dangers and confirmation of commitment repayment, adventure financing approaches are normally joined by point by point.

To oversee various types of hazards, the company's backup or cash-related manual may establish an agreement of assignment persons and risk regions associated to the daring to see a piece of opportunity and the unique legally restrictive assertions that distribute the possibility (Minato (2012) office hazard may be decreased or discarded by the opposition between attempted administrators in authoritative As assignment measure manufactures, the two capabilities are mostly credited to the task chief; organization and hazard bearing can be regarded as distinct sections of development on a regular basis within a course of action known as the effort directed by the organization meeting.

Project managerial motivation factors in implementation of corporate risk management have been empirically investigated in a few studies with a negative effect (Faff & Nguyen, 2002). Overall, the bulk of empirical evidence seems to be against agency theory hypotheses however Agency theory provides

strong support for hedging as a response to mismatch between managerial incentives and shareholder interests.

2.2.4 Institutional theory

Donaldson and Preston (1995) believed that this theory revolves around vital legislative power and that the interests of all accomplices are inalienable and that no interest match plans are recognized as governing the others (Wheeler, et. al, 2003). Development sector includes managing the money of people and is a severe capital. This requires accountability and constant asset management. The partner hypothesis follows these lines as addressing the partner requirement is the main methodology for carrying out the development initiatives. Therefore, the application of stakeholder theory provided fresh insights into plausible rationale for risk management and risk planning in construction project management.

The moderating influence of government was explained through the institutional theory. Scott (2008) notes that the institutional theory refers to the role of regulatory policy in exercising control over industries, execute through the formal and legal aspects of government infrastructure. The theory examines the processes through which government infrastructure and authority forms an authoritative guideline for institutional and social behaviour. In order to survive, and earn legitimacy, construction firms must conform to the rules and belief systems prevailing in the environment. The role of government, both as a facilitator and regulator, exerts a lot of influence on the performance of firms in the construction industry. This normative influence of government, extended through support and sanction of players in the industry, ensures fair-play, and promotes constructive competition. Social, technological, economic, political, environmental and legal factors,

as manipulated through the legislative mechanism, create industry-centric factors conducive for business (Porter, 1990). This in turn creates competitive advantage for firms that choose to exploit opportunities in these market segments.

In this study, this theory helped to examine how the compliance levels among the construction firms, with the policy and regulatory standards regarded as best practice in the sector, moderates the influence of risk management strategies on firm's performance. Through enforcement of the building code, government initiates risk management strategies that seek to attain compliance with acceptable standards which affects the interlinkage among the dependent variable and the independent variables. The institutional theory assisted in explaining how construction firms seek legitimacy through ensuring compliance. Ju and Rowlinson (2014) conducted a case study on the institutional components of construction safety management strategies amongst Hong Kong contractors. Ju and Rowlinson (2014) studied how contractors responded to institutional expectations such as complying with construction health and safety standards, involvement of involuntary safety drives and campaigns, as well as commitment towards eliminating accidents. The findings indicate that contractors preferred to compromise and avoid risks in the face of stringent safety requirements. The other response identified in the study was conformity to compliance requirements, as a means of ensuring compliance.

2.3 Empirical Review

Under the following segment the study presented a review of the literature related to the problem under study. The discussions herein were categorized according to the specific objectives in order to ensure relevance to the overall research study.

2.3.1 Project risk Assessment and Project performance

An empirical study Chen, Hao, Poon and Ng (2004) investigated the issue of cost risk management in the West Rail Project of Hong Kong. This was a case study where the researchers proposed fifteen risks that were thought to affect project costs and which were divided into three clusters namely; resource factors, managerial issues and inherent project factors. The findings indicated that the most significant factors that led to cost escalation in this project included resource factors such as price escalation of materials, management factors such as inaccurate cost budget and supplier or subcontractors' default. Inherent factors included too much interference in the management of the project.

Panigrahi et al. (2014) categorize financial risks as including cash flows, working capital, credit ratings and interest rates. In order to mitigate resource risks, it is necessary to maintain a continual and timely availability of resources. Material risks relate to poor quality of materials or an inconsistent availability of material that meets standard specifications. Land resource risk relates to the ground and site conditions, while capital equipment risk reflects the appropriateness of available construction technology and associated costs, which is normally a problem for many contractors, especially those in the SME sector.

Research done by Paweł and Szymański (2017) clearly shows risk management in construction project. The study adopted case study analysis where source of construction project risks from preliminary design, tender, detailed design, construction work and in financing the project. The study deployed risk assessment tool which included stakeholder analysis, Qualitative and quantitative risk analysis and risk planning. The study revealed that there different approached that can be employed in management of

risks identified through Brown and Chong the management process can be carried out in four different ways. The results identified risk avoidance, risk mitigation, dispersion of risk, absorption of risks as risk management process in construction projects. The findings however failed to demonstrate the best selection of appropriate risk response approaches to respond to risk is the result of much research and conditions.

The first study which was relevant to this objective was by Frans, Sutanto and Subandiyah (2018) who analysed implementation of risk management in hospital's construction projects. The study assessed the impact of construction project risks and risk management when undertaking construction projects in hospital. The findings of this study were done using the method of principal component analysis based on the method of likelihood. Emphasize that implementation of this construction work must meet the provisions on engineering, Occupational Safety and Health, labor protection, and local environmental order to ensure the realization of orderly construction of construction work. The case is based on construction projects in Indonesia where more than 300 thousand work accidents, 5000 deaths, 500 permanent disability and compensation of more than 550 billion rupiah in the implementation of construction projects. It also indicated that occurrence of project risks causes losses of life, financial losses to a tune of more than 2 trillion rupiah, which is largely a loss to the business world. This emphasize on the need to examine the relationship between risk management and implementation of hospital construction projects. The study clearly determines risk influence assessment on the implementation of hospital construction project.

The outcomes indicate that risk assessment effective during implementation of hospital project included communication and coordination, equipment, material prices, equipment being feasible and the culture and customs. While the research results using measurement scale AS/NZS according the likelihood of events resulted in three aspects of risk is very high, 5 aspects of high risk and 4 aspects of intermediate risk, and based on the impact occurs produces one aspect of risk is very high, four aspects of high risk 5 aspects medium risk and one low risk aspect (Frans et al., 2018).

Empirical studies have also been conducted with regard to resource risk management strategies and firm performance. For example, Odeyinka, Lowe and Kaka (2008) carried out a descriptive cross-sectional survey whose objective was to identify and assess the impact of risk factors attributed for causing critical variations between forecasted and actual cash flows among construction firms in the UK. The research tool was a structured questionnaire while respondents were drawn from firms categorized into small, medium and large, based on annual turnover. Statistical analysis entailed mean value Analysis and Univariate Analysis of Variance (ANOVA) techniques. This permitted determination of significant risk factors as well as an investigation of differences in opinions among the three categories. The findings identified eight significant risk factors isolated from a total of twenty six risk parameters.

2.3.2 Risk Identification

Risk identification process is aimed at isolating and mapping the genesis and type of project risks. Goh and Abdul-Rahman (2013) conducted an investigation into the identification and management of major risks in the Malaysian construction

industry. The primary goals of this study was to find out the key risks in the industry and evaluate what measures the stakeholders had implemented to respond to these risks. The research methodology was based on questionnaire surveys and in-depth interviews with key players. The findings of the study revealed that financial and time risks were the key risks faced both in terms of frequency of occurrence and impact on the projects. This was largely occasioned by a lack of risk management expertise and also, the prohibitive costs of implementing sustainable risk management strategies. Risk management strategies identified included a need for training of project personnel on sustainable risk management strategies with a bigger emphasis on the time and other benefits of effective risk management. Such training was geared towards demonstrating the implementation of risk management strategies as an investment that would result in positive outcomes, thus changing the negative perception of overall risk management as an unnecessary and costly undertaking (Goh & Abdul-Rahman, 2013).

Well organized project managers process involves tend to use register of possible risks and evaluate probability that such occurrence might occur during the project implementation. The risks checklists are varied as some firms and overall industries used experience from past projects in developing their risk checklists. Further, the designed checklists assist the project managers and implementing team in detecting both the particular risks on the register and enhancing the approach of the workers towards risky events. The nature of previous engagements by the project team on risks, the organizations risk profile and availability of experts in the involved industry are important in the identification of potential project risks (Minato, 2003).

According to Harvard Business Review (2011), organizations which have a Chief Risk Officer tend to undertake more extensive risk planning activities than the other

organization which do not have this role in their management and operations. The report cautioned that this manifests clearly in a pool of comparatively large corporates while in micro and small business the practice of risk management is bundled together with other managerial and administrative work by the owner or managers.

Goh and Abdul-Rahman (2013) conducted an investigation into the identification and management of major risks in the Malaysian construction industry. The primary goals of this study was to find out the key risks in the industry and evaluate what measures the stakeholders had implemented to respond to these risks. The research methodology was based on questionnaire surveys and in-depth interviews with key players. The findings of the study revealed that financial and time risks were the key risks faced both in terms of frequency of occurrence and impact on the projects. This was largely occasioned by a lack of risk management expertise and also, the prohibitive costs of implementing sustainable risk management strategies. Risk management strategies identified included a need for training of project personnel on sustainable risk management strategies with a bigger emphasis on the time and other benefits of effective risk management. Such training was geared towards demonstrating the implementation of risk management strategies as an investment that would result in positive outcomes, thus changing the negative perception of overall risk management as an unnecessary and costly undertaking (Goh & Abdul-Rahman, 2013).

2.3.3 Project risk Planning

All projects undertakings contain tasks and activities which can be broken down to specific issues. These project tasks usually include perils which when inadequately anticipated for will lead to the project derailing and even affecting the team members as well as the financiers (Cadle and Yeate, 2001). Such perils and consequent issues or

dangers that are not satisfactorily controlled are probably going to cause expanded negative hazard positive dangers that are not fittingly acknowledged speak to lost chances. Utilize the Risk Management worksheet to decide and get ready for venture's dangers. Distinguished dangers should be firmly checked and hazard oversaw (Schwalbe, 2002). The decrease in peril levels may not generally be plausible in most cases. The ability to acknowledge or understand perils that an organization needs to take as a feature of the business procedure is thus a crucial undertaking especially with huge projects as it ensures success of such undertakings.

The primary stage in managing risks among development projects entails the act of anticipating the perilous issues. Anticipation and ability to look ahead on perils and what they can do to projects, includes arranging how to approach and handle the perilous issues to guarantee that the level, type and perceivability of perils the executives are aware of in terms of magnitude in relation to the project tasks at hand and its consequent importance. The undertaking targets are set up and the duties are appointed to the applicable gatherings in the hazard arranging stage (PMI, 2004).

Hazard the board arranging builds up a point by point procedure for chance reactions relying upon the idea of likely dangers. Another round of meeting to generate new ideas was led to decide cost – advantages of activities against each hazard occasion. In like manner, dangers reactions were executed (Wang, 2001). Another round of conceptualizing was done to decide if the lingering hazard is middle of the road before usage. To control hazard in the venture under investigation, a little gathering was framed with agents from both proprietor (TCPO) and designer.

The gathering worked intimately with the undertaking observing and control gathering. They kept up a hazard register to screen each hazard occasion alongside the execution progress of each work bundle. This register helped in settling on different choices over the task stages. Hazard examination lead to inferring a couple of compelling danger reactions in accordance with the standards like evasion, moving, decrease, and engrossing (Wang, 2001).

Hoffman (2001) states the accompanying moderation methodologies to deal with the most conspicuous programming dangers model utilitarian necessities, have each undertaking colleague versed with all parts of the development venture, use programming displaying apparatuses to aid the structure stage, use web innovations to remain in contact for email, venture site actualize a degree the board plan, examine all constraints of advancement condition and contrast and programming prerequisites and have a product review process and guarantee autonomous testing is finished utilizing solid experiments.

Development undertakings extends on usage give data to help tasks, the board investigation and dynamic inside hazard wanting to improve development venture execution (Yang, 2001). In spite of the fact that supervisors guarantee that they deal with the development venture hazards productively, confirmations of absence of the executives of development extends even by driving specialists have demonstrated disappointment in risk planning.

Insufficiencies in venture risk planning and group building are notable development chance components (Kasser, 2010). A full and complete task plan may not really be

introduced before the agreement however a far reaching and appropriate venture the executives technique should be started at the earliest opportunity (Cadle and Yeate, 2001). Moreover, an even group including both well and less experienced examiners and SW engineers should be constructed. Effective correspondence channels connecting venture directors, venture group, client chiefs and end-clients the fundamental to guarantee streams of data and input. These correspondence channels are seen as the key of conclusive achievement in development venture inception and execution (Cadle & Yeate, 2001).

At long last, the development risk planning ought to incorporate officially characterized and concurred achievements and expectations (Holland & Light, 1999). These achievements and courses of events empower suitable undertaking observing and control, just as auspicious relief choices at whatever point hazard occasions rise. The executives of these cutoff times should be met all together for the task to remain inside concurred calendars and spending plans and to keep up venture group validity.

Jun, Qiuzhen and Qingguo (2010) researched the impacts of anticipating peril in development ventures such as projects execution concentrating on the context of Chinese development organizations in the national and gloabal arena. Jun et al. (2010) approach tested the rationale that proper project risk anticipation and hazard control makes a more noteworthy huge positive commitment to extend execution at low degrees of intrinsic vulnerability than at elevated levels. In spite of the research configuration being a basic part in social research, the investigation by Jun et al. (2010) neglected to indentify

the exploration plan for the examination. The examination configuration would help the specialist in deciding the connection between factors under the investigation.

The investigation by Jun et al. (2010) utilized survey to gather information from a 181 example of development venture chiefs and other key sources from development organizations in Hangzhou City, China, via mail and email. The respondents were mentioned to furnish data as for at least one as of late finished redistributed development advancement ventures. From the discoveries, the examination found that there existed a noteworthy positive connection between venture chance arranging and controlling and venture execution. The study brought out evidence which demonstrated that undertaking risk assessment and control improve projects' execution making their total time plan, at the planned and merchant firm enhanced benefit level. The investigation neglected to connect risk control to usage of building development ventures.

Risk management among construction firms in Kenya has gained increased prominence owing to what Ngundo (2014) observes as an increase in infrastructure development in the country was achieved due to increase in risk planning. The rise of the numerous construction projects, most notably 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 (2014) attributed the low levels of project success to failure to poor risk planning, inadequate 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 characterized 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.

Based on the views of executives among firms undertaking development projects, risk in Kenya has increased exponentially with unmistakable influence on quality of projects. Inferences by Ngundo (2014) show an expansion in framework advancement in the nation was accomplished because of increment in risks anticipation. The ascent of numerous development ventures, generally remarkable in land at the mass market level, has been confronted with a great deal of vulnerability, bringing about results that neglect to satisfy least guidelines benchmarked against best practice in the part. Ngundo (2014) ascribed the low degrees of task accomplishment to inability to poor risk planning, deficient create legitimate systems, absence of adequate preparing and limit building programs, inadequacy among venture staff, low degrees of formal quality administration backing and low degrees of the board duty. Thus, venture chance administration arranging was portrayed by poor hazard distinguishing proof, appraisal, prioritization, relief and control. The general results were powerless and unseemly hazard the executives gauges that expanded the weakness of the development firms to chance.

2.3.4 Project Risk Controlling and Project Performance

Gido and Clements (2003) observed the need for proper cost estimation at project inception and continuous cost assessment and control throughout the project life cycle to ensure conformity to budget, as an effective cost risk management strategy in construction projects. Effective project cost management also factors in the needs of all project stakeholder's as these will also be affected. Zou, Zhang and Wang (2007) carried out a study where they used a holistic and systematic approach to identify construction

project risks, their likelihood of occurrence, impact of the risks and mitigating factors. Their study, rather than focusing on the traditional elements of cost, time and quality took a stakeholder and project life cycle approach and focused on a broader set of quantitative and qualitative variables, among these, those that affected project cost performance. The research methodology used for this risk management project comprised of a comprehensive literature review, a postal questionnaire to the construction industry practitioners and a statistical analysis of the survey data. Twenty major risk factors were identified based on their probability of occurrence and impact on the project goals.

2.4 Summary of Literature Reviewed and Research gaps

Author/Year	Research Theme	Variables	Methodology	Results	Research Gaps	Research Focus
Frans, Sutanto and Subandiyah (2018).	The study sought to assess the impact of construction project risks and risk management on implementation of hospital construction project.	Risk assessment	The study used the method of principal component analysis based on the method of likelihood.	The results and indicated that risk assessment effective during implementation of hospital project included communication and coordination, equipment, material prices, equipment being feasible and the culture and customs	Need for link between risk management strategies and project performance	The current study focuses on risk management strategies in road construction project
Han and Huang (2007)	To determine the extent to which risk assessment improve software project performance.	Risk assessment	Used descriptive research design, target population, Sample size and sampling technique and Statistical methods for data analysis identified.	Monitoring and controlling, planning risks so that the project performance can be improved	The study focused on risk resource management on performance of IT projects.	The study focused on risk management strategies on performance of road construction projects in Kenya.
Lowe and Kaka (2008)	To identify and assess the impact of risk factors attributed for causing critical variations between forecasted and actual cash flows among	Risk management strategies	A mixture of research designs were adopted and questionnaires used for data collection.	The results revealed that risk management strategies improve performance of project	The study failed to risk management practices to road construction projects	The current study focused on risk management practices and road construction projects

	construction firms in the UK.					
Roque and deCarvalho (2013)	To assess impact of project risk management, assessment of risks on implementation of Construction Project in Brazillian Vendor companies.	Risk assessment	Adopt survey research design, Data was analyzed using descriptive statistical analysis.	The results indicated that risk avoidance and planning has a significant positive impact on implementation of Construction Projects	The study focused on risk assessment on implementation of construction project	The current study focuses on risk management on road construction project performance
Goh and Abdul-Rahman(2013)	To assess influence of project risk identification on performance of Malaysian construction project in the industry.	Project risk identification	Research methodology was based on questionnaires surveys and in-depth interviews with key players	The findings revealed that financial and time risks identification led to cost efficiency in projects	The study failed to link project identification to performance of road project performance	The current study link project identification to performance of road project performance in Kenyatta County Level.
Jun, Qiuzhen and Qingguo (2010)	To determine effects of project risk planning on construction project performance focusing on a case of China construction firms.	Project risk planning	The study adopted descriptive survey research design. Analysis of data was done using descriptive statistic and inferential analysis.	The study found that there existed a significant positive relationship between project risk planning and controlling and project performance.	The study found failed to link project risk planning and project performance	The study found link between project risk planning and road construction project performance
Ling and Ang(2013)	To determine identifying influence of project	Project control risk management	The study adopted descriptive survey research	Effective control systems help to concretize the monitoring and	The study failed to link project risk control to performance	The current study focused on project risk control to

	control risk management strategies on project performance among Singapore based construction firms		design. Analysis of data was done using descriptive statistic and inferential analysis	evaluation component in a project and contributed to project quality.	of construction projects	performance of construction projects
Ali and Kamaruzza man(2010	To determine influence of project control mitigation measures on schedule performance of project	Project risk control mitigation	The methodology relied on questionnaires which were administered to 30 respondents in the KlangValley	The result revealed effective risk strategies measures suggested controlling construction costs included proper project costing and financing, analyzing, and forecasting cost contribute to project schedule performance.	The findings failed to demonstrate d link between project risk controlling on performance of construction projects	The current study focused on project risk control to road construction performance

Source: Author (2020).

2.5 Conceptual framework

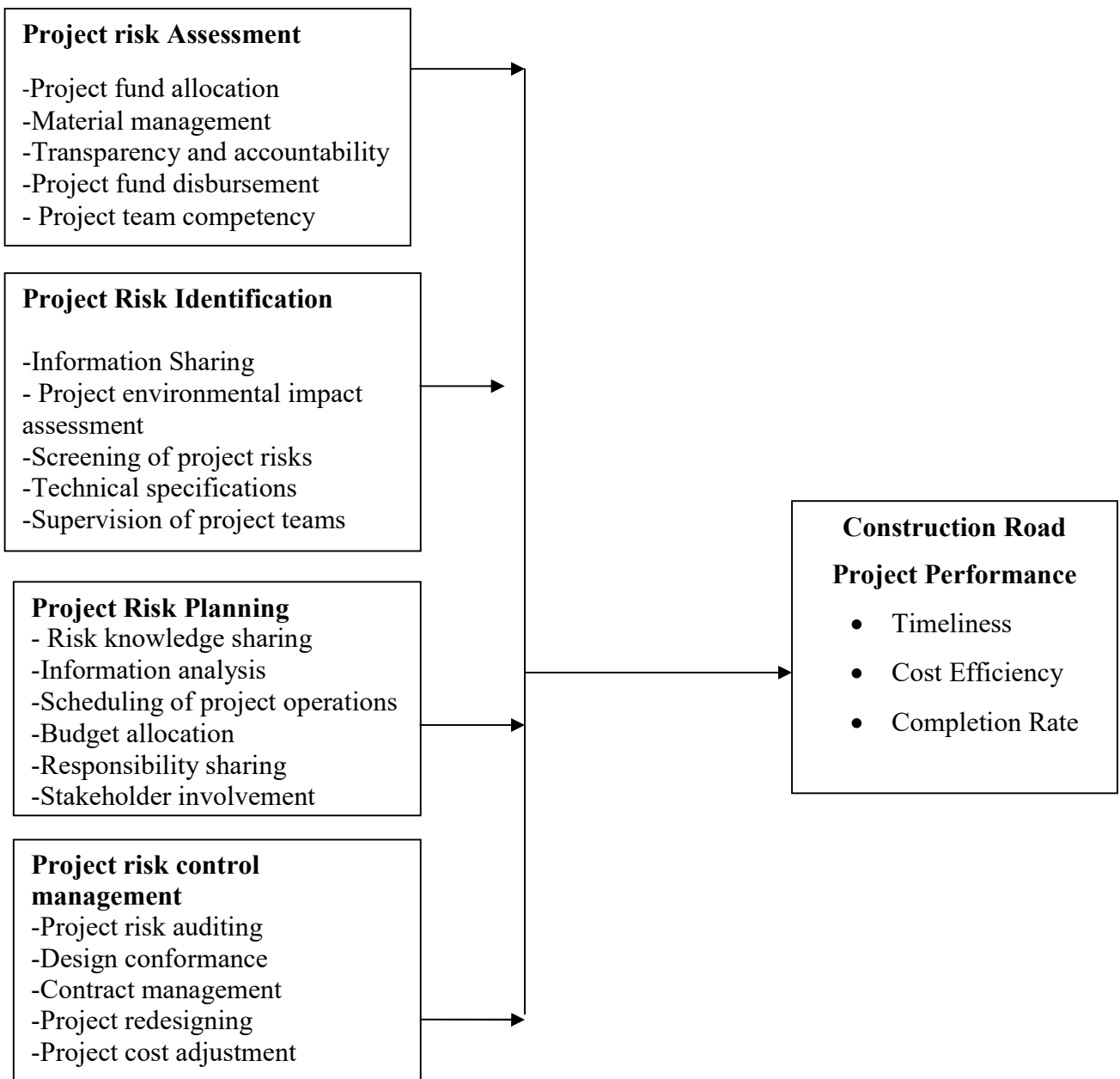


Figure 2.1: Conceptual framework for Risk Management and Project Performance

Source: Author (2020).

CHAPTER THREE

RESEARCH METHODOGY

3.1 Introduction

The chapter outlines the research methodology that was employed in order to address the objectives of the study. This chapter covers the research design adopted, study population, sample size and sampling technique, data collection procedure, data analysis techniques employed and ethical issues considered in the research.

3.2 Research Design

This study used descriptive survey research design as it was of helped in identification of study variable. The design was the cross-sectional descriptive design. The research design helps the study in determining the relationship between variables under the study (Cooper & Schindler, 2011). The research design assist in further indentifying study variables that may warrant further studies. The study used descriptive survey research design because it facilitates collection of data that was quantitative and qualitative in natures (Mugenda, 2008). Descriptive research design also allows use of multifaceted approach to collection of data and use of differential data analysis techniques.

Descriptive survey design is most appropriate design for this study as it gives real time information through data collection for testing hypothesis or answering questions to conclude the study. It is also perfect fit for this study since it will facilitate collection of both qualitative and quantitative data through questionnaires to answer the research questions. Further descriptive survey design was chosen because it results in rich data collected in large amounts that depicts existing phenomena by asking questions relating to individual perceptions and attitudes. A descriptive research design

incorporating the use of exploratory studies has been used to allow researchers to collect field information, summarize information, current information and interpret information for the purpose of clarifying the information (Orodho, 2003). This layout fits the survey as it permitted questionnaires to be used and information from a bigger population to be collected at a lower price.

3.3 Target Population

The target population comprised of 614 participants staff Nairobi City County. The study population includes 345 contractors, 108 consultants / specialists and 161 project technicians engaged in NCC road building projects (NCC, 2017), targeting a complete population of 614.

Table 3.1: Target Population

Type	Number
Contractors	345
Specialists	108
Project Engineers	161
Total	614

Source: Nairobi City County (2019)

3.4 Sampling Design and Sample Size

According to Kothari (2010), at least thirty percent of the sample size is representative of the population available. Thus, the sample that was 184 created a decision of 30% of the 614. According to Mugenda (2008) when the population is below 1000 subjects a sample of 30% should be taken while when the population is 1000 and over, a 10% sample should be taken. In this case, a 30% sample was taken. The research applied Stratified Sampling and Simple Random Sampling Techniques to be used in the selection of respondents. The Project Officers being at different levels of

management formed the basis for stratification. This is because the population structured into various non-homogenous sub-groups.

Table 3.2: Sample Size

Category	Accessible Population	Factor	Sample
Contractors	345	0.3	104
Consultants	108	0.3	32
Project Engineers	161	0.3	48
Total	614		184

Source: Author, 2019

3.5. Data Collection Instrument

The research used questionnaires to acquire primary data for all participants. The instrument provided the scientist with a more extensive structured reaction to the study's achievement. The questionnaire had both closed and open-ended questions (see appendix II). As noted by Kothari (2014), the closed-ended questions are good at providing organized responses which enable clear interpretations and well targeted recommendations. The closed and open-ended questions facilitated the collection of both qualitative and quantitative data. The choice of questionnaire as data collection instrument was due to various benefit attached to it. It is an easy instrument to use and administer. It helps in collection of large volume of data; it also helps in collecting both quantitative and qualitative data. Further, data collected using questionnaire is easy to analyse.

3.6. Pilot Test

For a questionnaire to be regarded as acceptable, it must possess two very important qualities which are reliability and validity. The pilot study was carried out to ascertain the validity and reliability of the questionnaire. Mugenda (2008)

assert that a pilot study sample size of 1% to 10% is a reasonable number to consider in a pilot study. This is an adequate sample for the pilot study. The pilot test helped the researcher identify the most likely source of errors and hence modify the questionnaire before the actual study and improve on quality of data collection instrument.

3.6.1 Validity of the Instrument

During the current study questionnaire development, various assessments were conducted to show that each instrument measures what it is required to measure and perform as designed to perform. Validity tests that were conducted include content validity and construct validity. The questionnaire was drafted and prepared and based on the identified study variables to ensure that the items of interests were aptly captured ensuring that they served to meet the purpose and objectives of the study. Furthermore, content validity was enhanced by seeking expert comments and feedback from workers, supervisors and practitioners.

Validity was guaranteed through focusing the questions to the conceptualized variables and making sure that the questionnaire items were each variable fell with the same construct. The purpose of this rule was to ensure that each measure adequately assessed the issues it was designed to capture from the respondents. Furthermore, Mugenda (2008) indicates that accuracy during the data collection activities determines to a large extent the quality of a research study and thus training of research assistants involved in collecting the data. This ensured that the research instrument used collected only data which appropriately answered the research questions.

3.6.2 Reliability

In a questionnaire, reliability is the measurement of the internal consistency of information (Orodho, 2005). The researcher shall ensure that the questionnaire is designed to enable reliability by providing consistent, stable and repeatable tests. The stud ensured reliability by piloting the questionnaire draft among 18 staff working in Nairobi City County. Cronbach alpha (a) test was used to measure of internal consistency reliability, whereby a reliability coefficient (alpha) of 0.7 or higher considered as acceptable reliability (Cronbach, 1951; Tavakol & Dennick, 2011). From the findings, the average Cronbach Alpha coefficient for the five variables was 0.817. This clearly indicated that the instrument was reliable as the Cronbach Alpha were closer to 1 and more than 0.7.

3.7 Data Collection Procedure

The research uses a specific data collection steps referring to data collection procedure. Data collection procedures are critical as it enhances validity of the research process. The study took permission letter from the university. A transmittal letter was obtained from Kenyatta University and the essential research permit was acquired from the National Commission for Science, Technology and Innovation (NaCoSTI). This facilitated easy data collection exercise and promoted good relationship with the respondents through formal procedures.

The questionnaires were administered on the participants by the researcher with the assistance of one research assistant trained on the structure of the research instruments and their application using the 'drop and pick later' approach. The respondents were visited at their offices or place of work, Initial contact was through telephone,

followed by physical visits to the offices, where the questionnaires were left for respondents to fill. The researcher and respondent agreed on a suitable timeframe after which the questionnaires were collected

3.8 Data Analysis Procedure and Presentation

The study collected both qualitative and quantitative data and therefore data analysis employed both quantitative and qualitative techniques. The qualitative data was categorized in themes and analysis through content analysis. The qualitative data was presented in narrative form alongside quantitative data.

The quantitative data was coded, edited and entered in the Statistical Package for Social Sciences (SPSS) Version 22. The data was analyzed in through descriptive statistics which include mean and standard deviation, and frequencies and percentages. Data presentation was done using, figures, tables and graphs. Analysis of regression was performed to demonstrate the magnitude of relationships among variables. This took place in the equation as shown:

$$Y = B_0 + B_1RA + B_2RI + B_3RP + B_4RCM + \epsilon$$

Where Y = Project Performance

RA = Risk Assessment

RI = Risk Identification

RP = Risk Planning

RCM = Risk Control Management

ϵ = Error term

$B_0 - B_4$ are coefficients.

3.9 Diagnostic Tests

The study was carried out diagnostic tests before conducting regression analysis to meet the various assumptions of the classical linear regression model. This was to eliminate unbiasedness and efficient. This ensures that the estimates produced are unbiased and efficient (Long & Ervin, 2000). Where assumptions of regression are not adhered results produced become unreliable and biased. The study conducted normality/ linearity test, test for heteroskedasticity, stationary test and multicollinearity test for all the study variables.

Regression analysis assumption requires that the residual must have a constant variance that is it should be homoskedastic. The study used the Modified Wald Test, to test for Heteroskedasticity. This is where the null hypothesis of the test is that error term has a constant variance.

Testing for Multicollinearity is critical in multiple regression analysis. The study uses the Variance Inflation Factor (VIF) which indicates multicollinearity among the variables. The study used a rule of thumb of VIF value of 10 as the threshold as supported by Garson (2012). The findings indicated that VIF value of the independent variable were within the thresholds of 10.

3.10 Measurement and Operationalization of Variables

Table 3.3: Measurement and Operationalization Variables

Objectives	Operational Definition of Variables				
	Variables	Indicators	Measurement	Scale	Data analysis tools
To determine the effect of risk assessment performance of road construction projects in Kenya.	<u>Independent Variable</u> Risk Assessment	-Project fund allocation -Material management -Transparency and accountability -Project fund disbursement - Project team competency	Company records	Interval	Percentages, Means score, standard deviation and -Correlation -Regression
				Interval	Frequencies, Percentages and Means. -Correlation -Regression
To establish the effect of project risk identification on performance of road construction projects in Kenya.	<u>Independent Variable</u> Project Risk Identification	-Information Sharing - Project environmental impact assessment -Screening of project risks -Technical specifications -Supervision of project teams	Baseline plan	Ordinal	
				Ordinal	Frequencies, Percentages and Means. -Correlation -Regression
To establish effect of project risk planning on performance of road construction projects in Kenya.	<u>Independent Variable</u> Project Risk Planning	- Risk knowledge sharing -Information analysis -Scheduling of project operations -Budget allocation -Responsibility sharing -Stakeholder involvement	Baseline plan	Ordinal	Frequencies, Percentages and Means.
				Ordinal	Frequencies, Means and Percentages
				Ordinal	Frequencies, Percentages and Means.
				Ordinal	Percentages and Means.

To determine effect of project risk control management on performance of road construction projects in Kenya.	<u>Independent Variable</u> Risk control management	-Project risk auditing -Design conformance -Contract management -Project redesigning -Project cost adjustment	Baseline plan	Ordinal	Percentages Frequencies and Means.
To determine how risk management practices affects the performance of road construction projects in Kenya.	<u>Dependent variable</u> Road Construction project performance	Timeliness Cost Efficiency Completion Rate	County road construction Report	Ordinal	Percentages, Means and standard deviation -Correlation -Regression

Source: Author (2020).

3.11 Ethical Considerations

The research adhered to ethical considerations by requesting relevant records and a National Council of Science and Technology (NACOSTI) study license for use in the field. The study's aim was disclosed to the participants and ensured that their reactions were kept confidential and were not forced into the study.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter gives the analysis of the results and discussion of findings as per the themes drawn of the research objectives. The subheading is questionnaire return rate, background data of respondents, effects of undertaking asset and the executives influence of the execution of street development in Kenya. It highlights how project risk identification affect execution of roads development in Kenya, Effect of venture chance arranging procedure on the execution of street development extends in Kenya and influence of undertaking risk on the execution of street development in Kenya.

Table 4.1: Analysis of Questionnaires Return Rate

Respondents Category	Frequency	Percent
Questionnaire filled and returned	168	93
Questionnaires not returned	16	7
Questionnaire administered	184	100

The study utilized one data collection instrument; the questionnaires. The study issued questionnaires to respondents to fill and they were collected for analysis after two weeks, and the results presented in table 4.1. From a sample of 184 questionnaires issued to respondents, 168 questionnaires were filled, returned and were usable. This constituted 93% return rate and was deemed adequate to make inferences about the research objectives. This return rate was supported by Kothari (2014) who says 30 units of a population are considered adequate for data analysis.

4.1.2 Reliability Results

Reliability of the research instrument was done . The results obtained are presented in Table 4.2 below.

Table 4.2: Reliability Results

Variable	Cronbach's Alpha	No. Of
Project risk assessment	0.8441	5
Project risk identification	0.7533	6
Project risk planning	0.7669	5
Project risk response	0.7834	5
Overall	0.7906	5

Source: Author (2019)

From the findings, the Cronbach Alpha coefficient for each of the four variables was as follows; Cronbach's Alpha coefficient of project risk assessment was 0.8441 making question items reliable. The Cronbach Alpha coefficient for project risk identification was 0.7533 making question items reliable, The Cronbach Alpha coefficient for project risk planning was 0.7669 while the reliability results on project risk response coefficient was 0.7834. Overall, Cronbach's Alpha coefficients for the items were found to 0.7906. This demonstrated that questionnaire was reliable and in a position of collecting reliable data. The results were supported by Nachmias and Nachmias, 2006; Kothari (2014) that where the overall Cronbach Alpha coefficient were closer to 1 and greater than 0.7 the instrument was regarded reliable and consistent

4.2 Respondents' Profile

This section describes demographic information of the respondents. This entails information of the contractors, consultants as well as the project engineers includes the, gender of the respondents and work experience.

4.2.1 Respondents' Gender

Respondents were requested to state their gender and results were illustrated in Table 4.1.

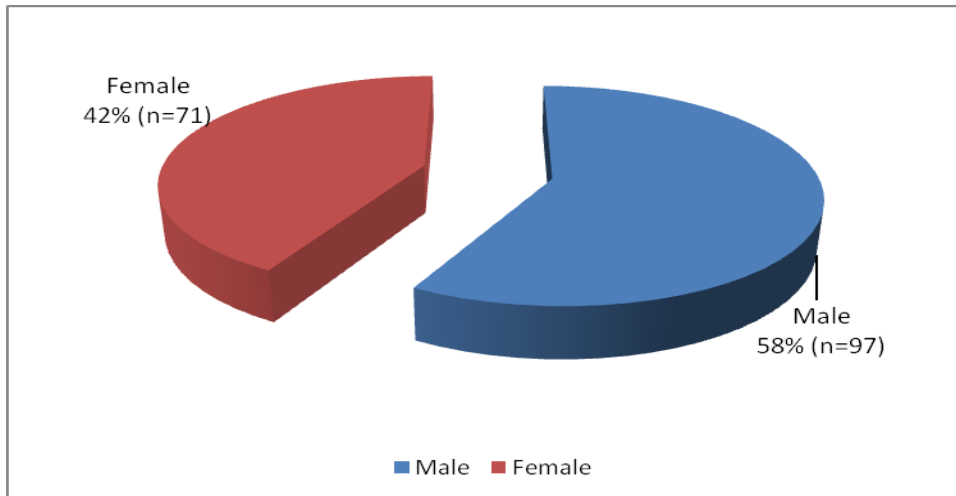


Figure 4.1: The respondents' Gender

The outcomes show that generally 97(58%) of the overviewed respondents were male while 71(48%) of the reviewed respondents were female. This suggests that both male and female were associated with execution of street development extends inside Nairobi County.

4.2.2 Respondents Working Experience

The respondents' experience work of work in street development extends in Nairobi County was basic as it would decide the unwavering quality of the information. The respondents were requested to indicate the period they had been experienced in road construction projects and results are shown in Figure 4.2.

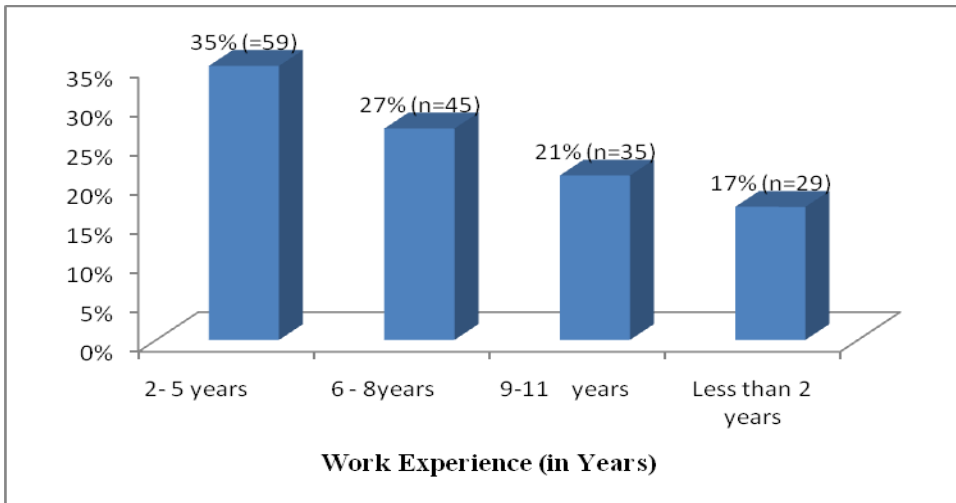


Figure 4.2: Distribution of Respondents based on Work Experience

From results presented in Figure 4.2, 59 (35%) of the respondents had been involved in road construction projects for 2 to 5 years, 45 (27%) of the respondents had been associated with road development ventures for 6-8 years, 35 (21%) of the respondents demonstrated they had been engaged with road development ventures for 9-11 years while 29 (17%) of the respondents had been associated with the road development ventures for less than 2 years. This inferred that respondents had aggregated sufficient experience to give information on how chance administration rehearses influences the presentation of street development extends in Kenya as greater part of the respondents had an encounter of over 2 years.

4.3 Risk Management Practices and Performance of Road Construction Projects

This section explored the extent to which project activities contribute to road project risks as well as the sources of road project risks in Nairobi City County.

4.3.1 Extent to which the project activities contribute to road project risks

The study also sought extent to which the given project activities contributes to road project risks. Respondent's responses are shown in Table 4.3 below. A scale of 1- 5 was

used where, where 1 = Strongly Disagree (SD), 2 = Disagree (D), 3 = Undecided (U), 4 = Agree (A), and 5 = Strongly Agree (SA).

Table 4.3: Extent to Which the Project Activities Contribute to Road Project Risks

	SD	D	U	A	SA	Mean	Std Devn
Absence from work	0	0	1	2	165	4.76	0.59
Cost of renting hardware	10	14	11	37	96	4.58	0.47
Absence of observing of temporary workers	8	12	27	33	88	4.54	0.52
Lack of materials	7	13	6	35	107	4.73	0.55
Breakdown in correspondence among government and temporary workers	9	12	23	27	97	4.70	0.72
Lack of necessary technical experience from contractors	5	6	5	34	118	4.89	0.75
Contractor delays	0	17	10	27	114	4.85	0.67
Unfamiliarity with local conditions	0	16	24	36	92	4.54	0.63
Composite Mean						4.698	0.613

From the findings, majority of the respondents were in strong agreement that lack of necessary technical experience from contractors contribute to road project risks with a mean of 4.89, contractor delays contribute to road project risks with a mean of 4.85, absence from work contribute to road project risks with a mean of 4.76 and lack of materials contribute to road project risks with a mean of 4.73 and breakdown in correspondence among government and temporary workers contribute to road project risks with a mean of 4.70. Further, the respondents were in strong agreement that cost of renting hardware, absence of observing of temporary workers and unfamiliarity with local conditions contribute to road project risks with a mean of 4.58, 4.54 and 4.54.

4.3.2 Other source of road project risks in Nairobi City County

The study shows respondent's view and other source of road construction projects risks in Nairobi City County. From the findings, respondents concurred on the risk sources. The study revealed that risk planning and finance aspects, equipment aspects, location and environmental aspects, natural aspects, government policy aspects, material aspects, human and energy aspects work, control aspects, aspects of health and safety, aspects of human error.

4.4 Project Risk assessment and Project Performance

The primary target of the research was to decide the impacts of project risk assessment on performance road construction project. The respondents were asked to rate statements on the extent to which project risk assessment affected performance of road construction project in Nairobi City County.

4.4.1 Project Risk Assessment and Project Performance

The study sought the extent which respondents agreed in regard to project risk assessment on road construction project performance. The study used a five point likert scale. Respondent's responses are shown in Table 4.4 below

Table 4.4: Project Risk Assessment and Project Performance

	NE	LE	ME	GE	VGE	Mean	Standard deviation
Project fund are effectively allocated based on project activities	0	0	1	4	163	4.67	0.47
The road project materials are effectively managed	0	0	1	6	161	4.62	0.49
Resource are allocated to alterations of road design	0	0	8	21	139	4.49	0.54
Increasing of risk awareness hence mitigation of project against incurring high costs.	0	0	0	14	154	4.55	0.63
Transparency and accountability on project finance	0	1	2	3	162	4.60	0.49
There is adequate fund disbursement	0	5	20	107	36	4.12	0.71
Top management put in place competent project teams	0	0	3	40	125	4.44	0.67
Composite Mean						4.498	0.571

Majority of the respondents as shown in Table 4.4 strongly agreed that the project fund being effectively allocated based on project activities and road project materials being effectively managed as well as transparency and accountability on project finance influence road construction project performance as shown by a mean of 4.67, 4.67 and 4.60. Further respondents strongly agreed that increasing of risk awareness hence mitigation of project against incurring high costs influence road construction project performance as indicated by a mean of 4.55. Most of the respondents agreed that resources are allocated to alterations of road design influencing road development project

performance with a mean of 4.49, top management put in place competent project teams influencing road construction project performance with a mean of 4.44 and that there is adequate fund disbursement thus influencing road construction project performance with a mean of 4.12. The respondents further indicated that project resource management through cost variance assessment, adequacy resource allocation, instituting effective budgeting, supply management and effective project team management was executed during road construction projects in Nairobi City County to a great extent. The outcomes showed that undertaking hazard evaluation was done by and large as demonstrated by a composite mean of 4.498 with a standard deviation of 0.571. The results concurred with Roque and de Carvalho (2013) assessing project risks in construction projects use of the risk management strategies contribute significant to project performance

4.5 Project Risk Identification

The second target of the examination was to set up the degree to which undertaking risk identification influence execution of roads development extends in Kenya. Impact of undertaking risks distinguishing proof affecting road venture execution and commitment of risk executives to road development execution in Nairobi City County are talked about on this area.

4.5.1 Project Risk Identification and Project Performance

Table 4.5 shows the respondent's reaction on the degree to which they conceded to the given explanation concerning impact of task chance recognizable proof on road development venture execution. A 1-5 likert scale was applied.

Table 4.5: Project Risk Identification and Road Construction Project Performance

	NE	LE	ME	GE	VGE	Mean	Std Dev
There is adequate information sharing among team members	0	0	9	125	34	4.227	0.215
There is adequate project environmental impact assessment	0	1	4	95	68	4.074	0.982
Screening of project risks and taking measure influence project being completed within time.	0	0	1	13	154	4.542	0.759
Technical specification are effectively done	0	0	0	17	151	4.535	0.872
There is effective supervision of project personnel reduces risk of time overruns	0	0	0	9	159	4.601	0.917
Identification of project cost such as compensation litigations	0	5	17	27	119	4.413	0.692
Risk registration ease risk mitigation during road project implementation	0	6	34	112	16	3.978	0.519
Composite Mean						4.338	0.708

The results in Table 4.5 indicated that effective supervision of project personnel reduces risk of time overruns to a very great extent as indicated by a mean of 4.601 and standard deviation of 0.917. Screening of project risks and taking measure to influence project being completed within time was done to an exceptionally extraordinary degree as showed by a mean of 4.542 with a standard deviation of 0.759 and that technical specification are effectively done to an extremely incredible degree as demonstrated by a mean of 4.535 with a standard deviation of 0.87. The outcomes likewise showed that there was the identification of project cost, for example, remuneration prosecutions and sufficient data sharing among colleagues by and large as demonstrated by a mean of 4.413 and 4.227 with a standard deviation of 0.692 and 0.215 separately. The outcomes further showed that there was sufficient venture ecological

effect appraisal by and large as demonstrated by a mean of 4.074 and a standard deviation of 0.982 and that endeavor hazard enrollment ease chance alleviation during road construction by and large as showed by a mean of 3.978 with a standard deviation of 0.519. This implied that project identification in risk management was executed during road construction to a great extent. The respondents further indicated that recognition of potential risks through screening of project activities, conceptualization of risks, planning for the risks, risk allocation, risk analysis and better information sharing promoted effectiveness of road construction in Nairobi City County. The finding demonstrates that identification of project risk as risk management practices was done during road construction project in Nairobi City County. The results concurred with Goh and Abdul-Rahman (2013) that project identification constitute a major project risks management practice in contribute to schedule outcome of construction project of Malaysian construction industry.

4.6 Road Construction Project Risk Planning

The third goal of the study was to set up the influence of risk and arranging systems on execution of road development in Kenya. This section analyzed project risk planning influence road project performance and assessed project risk planning influence on road development project performance in Nairobi City County

4.6.1 Project Risk Planning and Road Project performance

The study sought the extent to which project risk planning influence road project performance in Nairobi City County. Respondent's responses are shown in Table 4.6.

Table 4.6: Project Risk Planning and Road Project Performance

Project Risk Planning	NE	LE	ME	GE	VGE	Mean	Std Dev
Risk planning influence sufficient allocation of resources to mitigate against risks.	0	0	2	5	159	4.516	0.788
Competent project team are engaged	0	1	0	17	150	4.278	0.513
There is risk knowledge sharing to mitigate occurrence of risks	0	0	3	37	120	4.166	0.657
There is information sharing to enhance decision making	0	3	5	31	118	4.029	0.783
There is scheduling of project operations to ease project performance	0	0	23	101	44	3.836	0.624
There is effective sharing of project responsibilities	0	0	1	9	158	4.535	0.697
Promote project budget allocation to achieve success in funding project activities	0	3	35	110	22	3.993	0.701
Promote stakeholder involvement	0	0	1	12	155	4.587	0.615
There is effective risk sharing through outsourcing of non-core road project activities	0	1	20	121	27	4.012	0.581
Composite Mean						4.216	0.657

From the outcomes in Table 4.6 respondents demonstrated that advancement of partner contribution was done by and large as showed by a mean of 4.587 with a standard deviation of 0.615. That there was viable sharing of venture obligations by and large as demonstrated by a mean of 4.535 with a standard deviation of 0.697. The respondents additionally showed that hazard arranging impact adequate allotment of assets to moderate against dangers to an extremely incredible degree as demonstrated by

a mean of 4.516 with a standard deviation of 0.788. Illustrative outcomes in Table 4.7, respondents showed that capable task groups were locked in by and large as demonstrated by a mean of 4.278 with a standard deviation of 0.513, existence of risk knowledge sharing to mitigate occurrence of risks to a great extent as indicated by a mean of 4.166 with a standard deviation of 0.657. The findings also indicated that there was existence of information sharing to enhance decision making and effective risk sharing through outsourcing of non-core road project activities by and large as demonstrated by a mean of 4.029 and 4.012 with a standard deviation of 0.783 and 0.581 separately. Results additionally settled that advancement of undertaking spending allotment to make progress in subsidizing venture exercises and there is planning of task activities to ease venture execution by and large as showed by a mean of 3.993 and 3.836 with a standard deviation of 0.701 and 0.624 respectively. The respondents further indicated that risk planning informed deployment of the best risk management strategy, informed choice of risk responses like risk avoidance, risk transfer, informed the extent of scope of management, scheduling of project activities and budgeting of project activities to an extent. The results show risk planning was done in management of road construction projects in Nairobi City County to an extent as demonstrated by a composite mean of 4.338 and standard deviation of 0.708. The outcomes agreed with Ngundo (2014) that ascribed the low degrees of task accomplishment to inability to successfully get ready for venture dangers bringing about poor hazard distinguishing proof, evaluation, prioritization, relief and control and in general inability to make venture execution progress.

4.7 Project Control Risk Management

The fourth goal of the examination was to build up influence of venture chance arranging technique on execution of road development in Kenya. Extent to which project control risk management in road projects at Nairobi City County is discussed in this section. Respondent's responses are shown in Table 4.7 below

4.7.1 Project Control risk Management in road projects at Nairobi County

The study looked for the degree to which project control risk administration in road ventures at Nairobi City County is talked about in this segment. Respondent's responses are shown in Table 4.7 below

Table 4.7: Project Control risk Management in road Projects in Nairobi County

	NE	LE	ME	GE	VGE	Mean	Standard Deviation
Continuous project cost adjustments to mitigate project cost overrun	0	0	0	11	156	4.543	0.738
Deployment of scheduled budget for project activities	0	1	6	87	74	3.857	0.872
There is compliance with project contracts requirement	0	0	0	21	147	4.501	0.617
There is project risk auditing	1	3	8	71	85	3.927	0.734
Evaluation of project design to achieve project objectives	0	0	7	63	98	4.325	0.587
There is coordination of project operations	0	0	11	91	67	3.765	0.805
Monitoring of project progress	0	0	4	3	161	4.632	0.749
Error elimination to avoid deviation of the project from the intended direction	1	2	6	117	41	4.043	0.763
Composite Mean						4.221	0.728

From the discoveries, larger part of the respondent showed checking ventures progress was done to an exceptionally extraordinary degree as demonstrated by a mean of 4.632 with a standard deviation of 0.749, persistent task cost change in accordance with

moderate undertaking cost overwhelm and there existed consistence with venture contract prerequisite by and large as demonstrated by a mean of 4.543 and 4.501 with a standard deviation of 0.738 and 0.617 respectively. The outcomes additionally showed that assessment of development roads development configuration to accomplish venture goals and mistake end to keep away from deviation of the task from the expected heading was done generally as shown by a mean of 4.325 and 4.043 with a standard deviation of 0.587 and 0.763 respectively. The outcomes further showed that there was venture chance reviewing and that organization of booked spending plan for venture exercises by and large as demonstrated by a mean of 3.927 and 3.857 with a standard deviation of 0.734 and 0.872 individually. The outcomes additionally showed that there is coordination of road development tasks by and large as demonstrated by a mean of 3.765 with a standard deviation of 0.805. The respondents further clarified that controlling of street ventures included of risks, checking and assessment of task progress, possibility the executives, sharing of information and abilities on past undertaking dangers reactions and upgraded learning among partners improving viability in risk, the executives in road development in Nairobi City County. The outcomes exhibited that undertaking hazard control in street development was drilled generally as shown by a mean of 4.216 with a standard deviation of 0.657. This clearly demonstrated that road projects control risk management in Nairobi City County was executed to a great extent. The finding concurred with Ling and Ang (2013) that project control risk management strategies contributed to effective project performance among Singapore based construction firms.

4.8 Road Project Performance

The study shows the extent to which road project performance indicators were achieved.

Respondent's responses are shown in Table 4.8 below.

Table 4.8: Extent Road Project Performance Indicators Were Achieved

Statement	NE	LE	ME	GE	VGE	Mean	Standard Deviation
The roads project are completed within the budget allocated	0	1	29	104	33	4.231	0.602
Achieve project cost efficiency	0	9	51	97	11	3.789	0.838
Road completed within the time schedules	0	0	2	9	157	4.525	0.871
Project completion within the expected design	0	0	1	8	159	4.663	0.587
Road project accepted by road users	0	2	7	137	22	4.429	0.794
Composite Mean	0	3	6	125	34	4.286	0.748

From the findings, dominant part of the respondents showed that road construction completion with expected design was achieved to a greater extent as demonstrated by a mean of 4.663 and a standard deviation of 0.587. The outcomes set up that road construction were finished inside the time timetables by and large (mean = 4.525. The participants additionally demonstrated that road venture was acknowledged by street clients as showed by a mean of 4.429 with a standard deviation of 0.794. The outcomes also demonstrated that the streets extend in Nairobi City County are finished inside the financial plan apportioned by and large as showed by a mean of 4.231 with a standard deviation of 0.602. Further, the outcomes built up that road ventures accomplished tasks cost productivity by and large as showed by a mean of 3.789 with a standard deviation of 0.838. This showed road venture execution pointers were accomplished by and large as

demonstrated by a composite mean of 4.286 with a standard deviation of 0.738. The respondents further clarified that powerful hazard the executives rehearse that include observing and controlling of undertaking exercises, venture chance asset the board, successful hazard arranging, and distinguishing proof of task chance administration add to extend accomplishing the ideal venture results.

4.9 Diagnostic Tests

The study carried out diagnostic tests before conducting regression analysis to ensure that various assumptions of the classical linear regression model are adhered to. This will eliminate biasness and inefficiencies. The study conducted normality/ linearity test, stationary test and multicollinearity test for all the study variables.

Table 4.9: Multicollinearity Results

Return on Assets	VIF	1/VIF
Construction Road Project Performance	3.745	0.2670
Project risk assessment	4.112	0.2430
Project Risk Identification	2.816	0.3551
Project Risk Planning	1.945	0.5141
Project control risk management	2.921	0.3423

Testing for Multicollinearity is critical in multiple regression analysis. The study uses the Variance Inflation Factor (VIF) as an indicator of multicollinearity. The study used a rule of thumb of VIF value of 10 as the threshold as supported by Garson (2012). The findings indicated that VIF value of the independent variable were within the thresholds of 10. The demonstrated that there was no risk of Multicollinearity

problem and therefore the study could adopt linear regression model. The Tolerance of less than 0.1 could have indicated that the variables exhibit multicollinearity and therefore the Tolerance values for the study variable confirms that there was no risk of Muticollinearity.

Table 4.10: Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Road Construction project performance	.090	168	.177	.976	168	.141

Neither the Kolmogorov-Smirnov nor the Shapiro-Wilk tests were statistically significant, and the null hypothesis that the data are normally distributed was not rejected, implying that the data was normally distributed. If the data was not normally distributed, then the analysis would have adopted non-parametric tests.

Test of Homoscedasticity

Homoscedasticity was tested to establish whether the variance for the regression of the independent variables on the dependent variable was constant. The Levene’s test of homogeneity of variances was thus used. According to Gastwirth *et al.* (2009) the Levene statistic is significant at $\alpha= 0.05$, which implies the data lack equal variances.

Table 4.11: Tests for Test of Homogeneity of Variances

Test of Homogeneity of Variances				
Item	Levene Statistic	df1	df2	Sig.
Risk assessment	1.295	10	20	.115
Risk identification	1.895	10	20	.107
Risk planning	2.443	10	20	.172

a. Predictors: (Constant), Risk Assessment, Risk identification and Risk planning
b. Dependent Variable: Projects performance

Results in Table 4.11 show P-values of Levene's test of homogeneity of variances were greater than 0.05. The test therefore was not significant at $\alpha=0.05$, confirming homogeneity of variances. The data therefore met the condition for further statistics to be performed without any bias.

4.9.1 Correlation Analysis

Pearson Moment Correlation examination was done to inspect the relationship road venture chance administration practices and road development venture execution in Nairobi City County . This help in predicting the relationship between the study variables before further regression analysis. Table 4.12 shows the correlation matrix analysis.

Table 4.32: Correlation Analysis

		Road Project Performance
Project risk assessment	Pearson Correlation	.849**
	Sig (2-tailed)	.0001
Road Project Risk Identification	Pearson Correlation	.763*
	Sig (2-tailed)	.011
Road project risk planning	Pearson Correlation	.825**
	Sig (2-tailed)	0.002
Road Project Control Risk Management	Pearson Correlation	.731*
	Sig (2-tailed)	0.011

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

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

The results in Table 4.12 indicates that, there exists a strong, significant and positive correlation between Project risk assessment and Road Project Performance in Nairobi City County as shown by correlation factor, $r=0.849$, $P V=0.001<0.01$). The finding concurred with Roque and de Carvalho (2013) that project risks assessment contribute to successful implementation of Construction Project in Brazillian Vendor companies.

The correlation results indicated that there exist a strong, significant and positive correlation between Road project risk identification and Road Project Performance in Nairobi City County as indicated by a correlation factors, $r=0.763$ with $PV=0.011<0.05$.

From correlation findings in Table 4.12 there exist a big, positive and significant correlation between Road project risk planning and Road Project Performance in Nairobi City County as indicated by a correlation factors, $r=0.825$ with $PV=0.002<0.01$. This demonstrated that project risk planning contributes road project performance.

The correlation findings also indicated that there exist a strong, significant and positive correlation between Road project risk controlling and Road Project Performance in Nairobi City County as indicated by a correlation factors, $r=0.731$ with $PV=0.011<0.05$.

4.9.2 Regression

A multiple regression analysis was done to show the relations risk management practices and performance of road construction projects in Nairobi City County.

The regression model took the following form:

$$Y = B_0 + B_1 RA + B_2 RI + B_3 RP + B_4 RCM + \varepsilon$$

Where Y is Project Performance, RA is Risk Assessment, RI is Risk Identification, RP = Risk Planning and RCM = Risk Control Management, ε is Error term, while B_0 to B_4 are coefficients.

Model Summary

Table 4.13 shows the summary of the model that was used to test whether there exists a significant variation between study variables.

Table 4.13 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.86a	0.75	0.74	0.79

- a. Independent Variables: (Constant), Project risk assessment, Road Project Risk Identification, Road project risk planning and Road Project Control Risk Management
- b. Dependent Variable: Road Project Performance

From Table 4.13, The R is correlation coefficient which shows a value of 0.86. This implies that there was high relationship between the variables. The model summary R^2 is 0.75, Std Error= 0.79 indicating that there was a significant variation of 74.5% at confidence level of 95% between road project risk practice management and Road Project Performance in Nairobi City County. This is to mean that the risk management practices explained 74% of performance of road construction projects in project Nairobi City County.

ANOVA

The results presented in the Table 4.16 are the Analysis of variance (Anova) establishing the goodness of fit of the regression model.

Table 4.14: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	15.812	4	3.953	6.723	0.001a
Residual	98.196	163	0.588		
Total	114.008	167			

- a. Independent Variables: (Constant), Project Risk Assessment, Road Project Risk Identification, Road project risk planning and Road Project Control Risk Management
- b. Dependent Variable: Road Project Performance

From Table 4.14, total variance (114.008) was the difference in the variance which can be explained by the independent variables (Model) and the variance which can not be explained by the independent variables (Error). These results indicate that the model had an F-ratio of 6.723, $P=0.001 < 0.05$ far exceeds the F=statistic 0.1962 and $PV=0.001 < 0.05$. Based on the findings in Table 4.16, it was ascertained that the regression model adopted by the study had a significant goodness of fit.

Coefficients Analysis

Table 4.15 provides information on coefficients of the model predictors as used in this study. The estimates of the regression coefficients, t-statistics, standard errors of the estimates and p values are shown.

Table 4.15: Beta Regression Coefficients

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	3.083	0.308		10.011	.0012
Project Risk Assessment	0.618	0.0715	0.563	8.645	0.02
Road Project Risk Identification	0.552	0.058	0.507	9.515	0.03
Road project risk planning	0.443	0.071	0.411	6.251	0.001
Road Project Control Risk Management	0.395	0.0517	0.313	7.645	0.004

- a. Independent Variables: (Constant), Project risk assessment, Road Project Risk Identification, Road project risk planning and Road Project Control Risk Management
- b. Dependent Variable: Road Project Performance

The regression results on Table 4.15 indicated that project risk assessment had a statistically significant and positive effect on Road Project Performance in Nairobi City County as $\beta_1=0.618$, $PV=0.02<0.05$, $t=8645$. This suggested a unit increment in venture chance appraisal the board would bring about an expansion in venture execution by $\beta_1=0.618$ in Nairobi County. The findings concurred with Frans, Sutanto and Subandiyah (2018) that risk assessment during Implementation on Hospital Construction Project contribute to effective communication and coordination, utilization of equipment, material prices, equipment being feasible and the culture and customs resulting into implementation of the hospital construction project within cost and time schedule in Indonesia.

The regression findings on Table 4.17 indicated that road project risk identification had a statistically significant and positive effect on Road Project Performance in Nairobi City County as $\beta_2=0.552$, $PV=0.03<0.05$, $t=9.515$. This implied that increase in project road project risk identification would bring in an increase in project performance by $\beta_2=0.618$ in Nairobi County. The results were similar to Bakker *et al.* (2012) that project risk identification as the most influential risk management practices strength of project communications effects, enhance risk reporting, promote risk registration and risk allocation, risk analysis, and enhance risk control contributing to completing construction projects within the project budget and within the scheduled project schedule.

The regression results on Table 4.17 show that road project risk planning had a statistically significant and positive effect on Road Project Performance in Nairobi City County as $\beta_3=0.443$, $PV=0.001<0.05$, $t=6.251$. This implied that a unit increase in road project risk planning would result in an increase in project performance by regression factor $\beta_3=0.443$ in Nairobi County. The results concurred with Jun, Qiuzhen and Qingguo (2010) that revealed that project risk planning has significant effect on construction project performance improving construction project performance as project reported completion within time schedule, at the budgeted and vender firm improved on profitability level in China construction firms.

The regression results on Table 4.17 indicated that road project control risk management had a statistically significant and positive effect on road project performance in Nairobi City County as $\beta_1=0.395$, $PV=0.004<0.05$, $t=7.645$. This implied that a unit increase in road project control risk management would result in an increase in project performance

by $\beta_4=0.395$ in Nairobi County. The findings concurred with Leong *et al.* (2014) that assessed effectiveness of Quality Management System (QMS) maintenance and practices in the Malaysian construction industry and effective project control resulted into construction firms' projects in achieving cost, time and quality performance of their projects.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings, conclusion arrived at based on the findings, and recommendations for the study, as per the four objectives of the foregoing research study. In the final sub section, the researcher has suggested areas which further studies can focus on.

5.2 Summary of the study

5.2.1 Project Risk Assessment and Project Performance

Concerning the first objective, the results found evidence of a strong, significant and positive association between project risk assessment and Road Project Performance in Nairobi City County as indicated by correlation factor. This was supported by regression results that revealed the project risk assessment had big and positive impact on Road Project Performance in Nairobi City County demonstrating that a unit increase in project risk assessment contributed to a significant increase in project performance by in Nairobi County. The study shows that effective project funding, effective allocation based on project activities, transparency and accountability on project finance and increasing of risk awareness, top management, competent project teams, cost variance assessment, adequacy resource allocation, instituting effective budgeting, supply management and effective project team management contribute to effective risk management leading to timely completion of the project, lower project cost overrun and improve road project completion rate

5.2.2 Project Risk Identification

With regard to the second objective, there was evidence of a strong, significant and positive correlation between Road project risk identification and Road Project Performance in Nairobi City County as indicated by the correlation results. The regression results show that road project risk identification had a statistically significant and positive effect on Road Project Performance in Nairobi City County. This demonstrate that unit increase in project road project risk identification contribute to increase in project performance in Nairobi County. Descriptive findings also indicted that effective supervision of project personnel, screening of project risks, effective technical specification and identification of project cost such as compensation litigations as well adequate information sharing among team members has positive effective on project performance. Project risk identification practices through adequate project environmental impact assessment, risk registration to ease risk mitigation, recognition of potential risks through screening of project activities, conceptualization of risks, planning for the risks, risk allocation, risk analysis and better information sharing promoted effectiveness in project risk management and contribute to significant improvement in project accomplishment of road construction in Nairobi City County.

5.2.3 Road Construction Project Risk Planning

With regard to the third objective, the study established that there exist a strong, significant and positive association between Road project risk planning and Road Project Performance in Nairobi City County as indicated by the correlation factors. Regression finding demonstrate that project risk planning had a significant effect on road project performance and that increase in unit road project risk planning would lead to an increase in project performance in Nairobi County.

Project risk planning as risk management practices constitutes promotion of stakeholder involvement, effective sharing of project responsibilities, sufficient allocation of resources to mitigate against risks and employment of competent project team contribute to project performance. Risk planning management involving with existence of risk knowledge sharing to mitigate, information sharing to enhance decision making and effective risk sharing through outsourcing of non-core road project activities, promotion of project budget allocation to achieve success in funding project activities and scheduling of project operations contributed to project performance.

5.2.4 Project Control Risk Management

Regarding the fourth study objective, the results were evidence that there was a strong, significant and positive interlinkage between Road project risk controlling and Road Project Performance in Nairobi City County as indicated by a correlation results. The further regression results revealed that road project control risk management has significant and positive effect on road project performance in Nairobi City County showing that a unit increment in road project control risk management would bring about an expansion in venture execution by $\beta_4=0.395$ in Nairobi County. Road project risk control as a risk management practices involvement of monitoring projects progress, continuous project cost adjustment to mitigate project cost overrun and there existed compliance with project contract requirement and evaluation of construction road projects design to achieve project objectives. Risk controls management through error elimination to avoid deviation, project risk auditing and that deployment of scheduled budget for project activities, coordination of road project operations, contingency management, sharing of knowledge and skills on past project risks responses and enhanced learning among stakeholders improving effectiveness in risk management and improve road construction projects performance in Nairobi City County.

5.3 Conclusions

This study concluded that project risk assessment has a positive and significant effect on road construction project performance based on the survey focusing on The Nairobi City County. This was reinforced by the regression results that revealed that project risk assessment contributed to a significant increase in project performance in Nairobi County. Resource Risk management practices through effective road construction project funding, effective funding of road construction project activities, transparency and accountability on project finance and increasing of risk awareness, competent project teams, cost variance assessment, instituting effective budgeting, effective supply chain management and effective project team management contribute lead to timely completion of the road construction project, lower project cost overrun and improve road project completion rate.

The study showed that project risk identification has big and positive effect on road development project conducted in Nairobi City County. From the findings, road construction work risk identification practices through effective supervision of project personnel, screening of project risks, effective technical specification and identification of project cost such as compensation litigations as well adequate information sharing, adequate project environmental impact assessment, risk registration promoted effectiveness in road project risk management resulting into high rate of road construction project completion in the Nairobi City County.

From the findings, the study further was of the view that project risk planning had a notable effect on the success or failure of road projects as an increase in road project risk planning enhances performance of roads development project within Nairobi. Project risk

planning practices such as stakeholders involvement and commitment, sharing of project responsibilities, allocation of adequate resources and engagement of competent project team members, the existence of risk knowledge sharing, risk sharing through outsourcing of non-core road project activities and road construction project activities as well as the scheduling of project tasks contributed to the completion of road projects within set timeframes. The projects planning practices also were attributed to the successful of the road projects.

The study further established that road project risk control management practices has significant and positive effect on road project performance in Nairobi City County. Road project risk control practices involve monitoring projects progress, continuous project cost adjustment to mitigate project cost overrun, compliance with project contract requirements and evaluation of construction road projects design, error elimination to avoid deviation, project risk auditing, deployment of scheduled budget for project activities, coordination of road project operations, contingency management, sharing of knowledge and skills on past project risks responses and enhanced learning among stakeholders contribute to a significant increase in road construction completion rate and increase timeliness in completion rate.

5.4 Recommendations for Policy and Practice

From the conclusions, the study made several practice and policy related recommendations as follows. First it was deemed necessary that the county leadership should focus on risk management in road construction projects. This can be achieved through ensuring adequate funding of the projects' activities, promotion of transparency and accountability in project financial management and effective road project budgeting,

effective supply chain management and effective project team management to achieve road construction performance expected outcomes.

The study recommends that county government's management and policy makers should develop measures to foster utilization of project risk identification practices to achieve significant road construction project performance. Measures should be deployed to ensure effective supervision of project personnel, proper screening of project risks, ensure effective technical specification and identification of project cost such as compensation litigations, ensure information sharing, adequate project environmental impact assessment, promote risk registration to achieve expected road project outcomes.

The study recommends that management at county government level and national level should ensure effective road construction project risk planning practices. Policy framework should be instituted and deployed to enhance stakeholder involvement, sharing of project responsibilities, sufficient allocation of resources and employment of competent project team, existence of risk knowledge sharing, risk sharing through outsourcing of non-core road project activities and road construction project activities and scheduling of project operations to achieve road construction project performance outcomes.

The study recommend that management at County and national government level should deploy policy measures that should foster project control risk management practices such as monitoring projects progress, continuous project cost adjustment to mitigate project cost overrun and there existed compliance with project contract requirement and evaluation of construction road projects design, error elimination to avoid deviation, project risk auditing, effective scheduling of budget for project activities, coordination of

road project operations, contingency management, sharing of knowledge and skills on past project risks responses and enhanced learning among stakeholders contribute to a significant improve achievement of project performance outcomes.

5.5 Suggestions for Further Studies

The study looked at the effects of risk management work on the road construction project performance in Nairobi, Kenya. The study recommends that a further study should be carried out to investigate the effects of risk management strategies on the road construction project performance at national government level. The researcher also suggest further in-depths studies on each of the four risk management practices which were the scope of this study and how they contribute to success or failure of projects in Kenya.

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APPENDICES

Appendix I: Data Collection Introduction Letter

Jimmy Githere
P.O. BOX 206023-00100
NAIROBI

Dear (Respondent)

As a post graduate student at the Kenyatta University, I am conducting a research project on, **“Effect Of Risk Management Practices On Performance Of Road Construction Projects In Nairobi City County Government.**

Your organization has been selected for this study and you were selected as a participant in this research. Kindly respond to the questions in the given data collection tool. The information you provide shall exclusively and solely be used for academic purposes and the researcher will treat the data provided with the deserved confidentiality. Upon request, you will be furnished with a copy of the final report.

Your input and cooperation is appreciated with gratitude.

Yours Sincerely,
Jimmy Githere

Appendix II: Research Questionnaire:

Kindly mark with a tick (✓) the box that correspond with response to the listed questions items. For open ended questions write down your response in the provided space. Please answer honestly based on your experiences in the construction industry projects.

Section A: Background Information

- 1) 1. State your Gender :
 - i. Male []
 - ii. Female []
- 2) What is your work experience (Tick appropriate range).
 - i. Less than 2 years []
 - ii. 2- 5 years []
 - iii. 6 – 8years []
 - iv. 9-11 years []
 - v. 2 and above years []

SECTION: B

3. Kindly indicate the extent to which you feel the following project activities contribute to road project risks

Aspects	1	2	3	4	5
Absence from work					
Cost of renting hardware					
Absence of observing of temporary workers					
Lack of materials					
Breakdown in correspondence among government and temporary workers.					
Lack of necessary technical experience from contractors					
Contractor delays					
Unfamiliarity with local conditions					

4. In your own view, indicate other source of road project risks in Nairobi City County

Part 1: Project resource risk management Assessment

5. Indicate the extent to which you agree with the listed statements related to the influence of project risk assessment on project performance based on a likert scale with values 1-5.

Responses	1	2	3	4	5
Project fund are effectively allocated based on project activities					
The road project materials are effectively managed					
Resource are allocated to alterations of road design					
Increased risks awareness thus ensuring the project does not incur higher costs					
Transparency and accountability on project finance					
There is adequate fund disbursement					
Top management put in place competent project teams					

7. In your own opinion, indicate how project risk assessment contribute to road project performance in Nairobi City County.....

PART TWO: Project Risk Identification

8. Indicate the extent to which you agree with the listed statements related to the influence of project risk identification on project performance based on a likert scale with values 1-5.

Aspects	1	2	3	4	5
There is adequate information sharing among team members					
There is adequate project environmental impact assessment					
Project being completed within stipulated timelines is influenced by screening of project risks and corrective measure					
Technical specification are effectively done					
Risk of time overruns are reduced by effective supervision of					

project personnel					
Identification of project cost such as compensation litigations					
Risk registration ease risk mitigation during road project implementation					

9. In your own opinion, indicate how project risk identification management contribute to road project performance in Nairobi City County.....

.....

Part C: Project risk Planning

10. Indicate the extent to which you agree with the listed statements related to the influence of project risk planning on project performance in Nairobi City County.

Project Risk Planning	Strongly agree	Agree	Neutral	disagree	Strongly disagree
Risk planning influence sufficient allocation of resources to mitigate against risks.					
Competent project team are engaged					
There is risk knowledge sharing to mitigate occurrence of risks					
There is information sharing to enhance decision making					
There is scheduling of project operations to ease project performance					
There is effective sharing of project responsibilities					
Promote project budget allocation to achieve success in funding project activities					
Promote stakeholder involvement					
There is effective risk sharing through outsourcing of non core road project activities					

11. In your assessment how does project risk planning influence road project performance in your Nairobi City County?.....

.....

Part C: Project Control Risk Management

12. Indicate extent which you agree with the listed statements regarding project control risk management.

	1	2	3	4	5
Continuous project cost adjustments to mitigate project cost overrun					
Deployment of scheduled budget for project activities					
There is compliance with project contracts requirement					
There is project risk auditing					
Evaluation of project design to achieve project objectives					
There is coordination of project operations					
Monitoring of project progress					
Error elimination to avoid deviation of the project from the intended direction					

13. In your own view, indicate how project risk control management contribute to road project performance in Nairobi City County.....

Part E: Road Project Performance Indicators

17. To what extent has the following indicators of road project performance been achieved?

Statement	1	2	3	4	5
The roads project are completed within the budget allocated					
Achieve project cost efficiency					
Road completed within the time schedules					
Project completion within the expected design					
Road project accepted by road users					

Appendix II: List of Projects

1. Maintenance of Clay city road Kasarani County.
2. Maintenance of Mbagathi way
3. Rehabilitation of Padmore Road
4. Rehabilitation of Jogoo Road
5. Rehabilitation of Airport South and North roads
6. Street lighting in Kibra
7. Rehabilitation and installation of street lighting Waithaka road
8. Kamukunji Constituency flood lights
9. Eastleigh South public lighting
10. Construction of Western ring road