FACTORS INFLUENCING COST OF ROAD CONSTRUCTION PROJECTS WITHIN SELECTED URBAN AREAS IN KENYA

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DECLARATION

This research project report is my original work and has not been presented by anybody else for the award of a degree in any other university.

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This research project report has been submitted for examination with my approval as the University Supervisor.

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DEDICATION

A special feeling of gratitude to my loving mother, Benter whose words of encouragement and push for tenacity ring in my ears; to my husband Dickson whose constant support, dedication and love enlightened me; to my son Deon and daughter Leona whose innocent energy was and still is a source of inspiration; to my sisters (Lorna & Monica) for being my best cheerleaders; to all of my friends and family who stood beside me with great commitment; I dedicate this research, hoping that I made you proud.

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ACRONYMS AND ABBREVIATIONS

EACC: Ethics and Anti-Corruption Commission

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

KURA: Kenya Urban Roads Authority

KeNHA: Kenya National Highways Authority

MSPI: Ministry of Statistics and Programme Implementation

NACOSTI: National Commission for Science, Technology and Innovation

NCA: National Construction Authority

NEMA: National Environmental Management Authority

SGR: Standard Gauge Railway

SPSS: Statistical Package for Social Sciences

ABSTRACT

In Kenya the number of construction projects is increasing radically. However, majority of these Projects are not completed within allocated cost and time. Controlling cost of road construction has become one of the major challenges in Kenya Construction Industry. The main objectives of this study was to investigate factors influencing cost of Road construction projects within selected urban areas in Kenya with a specific reference to construction projects in the three Cities namely Nairobi, Mombasa and Kisumu. The study determine the extent to which contract management influence cost of road construction projects within urban areas, assessed how project schedule influence cost of road construction projects within urban areas and examined the level at which design and documentation influence cost of road construction projects within urban areas. The study also determined the extent to which financial control systems influence cost of road construction projects within urban areas and assessed how government policies influences cost of road construction projects within urban areas. The study adopted descriptive research with a study population of 200 staff from KURA, KeNHA, Construction and Consultancy firms who have been involved in the supervision of large road construction projects within the three urban areas completed between the years 2000 to 2019. The study employed purposive sampling design by using a stratified random sampling technique to select a sample size of 134 respondents. The main data collection instrument was questionnaires containing both open and close ended questions. Descriptive statistics data analysis method was applied to analyze data aided by Statistical Package for Social Science (SPSS) to compute response frequencies, mean, standard deviation and covariance. Finally linear regression model was used to establish the significance of the independent variables on the dependent variable. The study findings indicated that contract management explains 28.6% of changes in cost of road construction projects when other factors are constant while project schedule accounts for 22.5% of changes in cost of road construction projects when other factors are held constant. The study also established that Project Design accounted for 33.7% of changes in cost of road construction projects, financial control systems accounted for 27.9% of changes in cost of road construction projects and Government's policies accounted for 7.1% of cost of road construction projects when all the other factors are kept constant. The combined effect of all the five factors contributed to 65.8% of changes in cost of road construction projects within selected urban areas in Kenya.

CHAPTER ONE
INTRODUCTION

1.1. Background of the Study

Construction industry, these days is confronting extreme issue of poor cost management bringing about enormous measure of cost variance. The issue of changes in project cost is a major issue in both developed and developing countries. This needs serious attention for improving the construction cost performance as rarely projects are completed within budget. Within the past years, massive construction projects have been recognised for their cost fluctuation and delay in completion (Aljohani Ahiaga-Dagbui & Moore, 2017).

According to the Kenya Construction Industry Status Report, 2015, construction industry is a prime indicator of economic activity as the industry is often utilized not only to stimulate growth but also to assist economic recoveries from recessions. Given the large capital amounts associated with construction projects, the performance in terms of cost are closely monitored, especially where tax payers' money is involved (Kerzner & Kerzner, 2017). Therefore, construction projects occupy an essential place in the country's economic system. As a public sector, a considerable part of the self-reliant investments arise therein. These investments pull and push alongside different investments in the non-public corporate and small and cottage industries sectors. The hassle of project postpone and cost fluctuation is of global concern (Shehu, Endut & Akintoye, 2014).

In the construction industry, the aim of project control is to ensure that projects finish on time, within cost and achieve other project objectives. Lamentably, cost Fluctuation is a totally common phenomenon and is related to almost all projects within the construction enterprise (Kerzner, 2015) similarly, cost fluctuation is a major problem in project development and is a regular feature in construction industry. The projects that had faced cost fluctuation problem were reported in numerous countries. According to Rahman (2013), cost fluctuation were major problem in the construction industry of Portugal where the project had experienced cost fluctuation of around 40% of the contract time. While, average cost fluctuation was recorded as 12% of the contract cost.

In Nigeria, Aljohani Ahiaga-Dagbui and Moore (2017) found that average escalation of the cost were 188% and 14% respectively. Similarly in Malaysia, several studies have been carried out to investigate the performance and factors of cost fluctuation in construction industry.

As reported by Mbaluku and Bwisa (2013), about 17.3% of 417 government contract projects in Malaysia were considered sick and abandoned in the year 2005. Besides that, a study conducted in Klang Valley found that most of construction projects were affected by cost fluctuation due to inaccurate or poor estimation of original cost (Sovacool, Nugent & Gilbert, 2014). Malaysia's construction industry is one of major industry contributing significant growth to socio-economic development. In recent years, there has been rapid growth of the industry in Malaysia. Although a lot of money has been spent in construction, the industry is facing a lot of challenges such as expenditure exceeding the budget, construction defects and dependency on foreign workers (Jomo, 2016).

In Malaysia, to control construction projects, various procurement strategies are commonly adopted. Many factors are responsible for these cost fluctuation such as underestimation of costs to make the projects more viable, change of scope during later stages of project planning and even during construction, changed conditions, etc. One of the most important contributing factors to the magnitude of cost fluctuation in construction projects are the project schedule (Ahiaga-Dagbui & Smith, 2014).

In Nigeria, cost variations are constantly occurring in road construction projects and they could causes great impact on economic growth. It is one of the most common problems that upset the construction companies in terms of competitiveness and long term sustainability in the global market. Due to the population growth, industrialization and urbanization, more roads and highways are required for the easy access to market, economy and other vital purposes such as transportation and delivering goods and services (Shah, 2016). He highlights that cost is one of the major issues which has to be considered throughout the project life cycle and it can be considered as one of the most important factors causing the project delay and failure if appropriate consideration is not taken into account. The issue of cost fluctuation in project is attracting more researchers over the past decades and still more research are running to address the issue.

The Kenya Vision 2030 aims to transform Kenya to a middle-income country by 2030. The government recognizes that the attainment of Vision 2030 will depend heavily on the quality of the road infrastructure through the reduction of transport costs, improvement of accessibility and road safety. The centrality of the road infrastructure in the Vision 2030 and the heavy annual budgetary allocations to the sector, underscores the need to investigate the time and cost drivers that contribute to cost fluctuation. Despite the fact that construction project cost

fluctuation create a significant financial risk to the government with a history of construction projects that were completed with significant cost fluctuation, literature on the subject of road construction cost fluctuation in Kenya remains scanty (Adams, 2015).

Due to the significance of roads in socio-financial development of the country, the government has in the past progressively accelerated budget allocation to the road subsector. Road projects in Kenya are facing diverse challenges, which encompass postponement in completion and cost fluctuation (Wanjiku, 2015). The figure varies from country to country, however in step with Murimi (2016), authorities spending on public services accounts for anywhere between 15-forty five% of GDP. The sheer quantity of this spending has a large impact on the financial system. In step with Kenya Roads Board report, Kenya national Highways Authority is yearly allotted about forty five (45) % of the entire fund allocated to the ministry of roads. Many projects experience price fluctuation and thereby exceed preliminary contract amount.

In Kenya, the quantity of public road construction ventures are expanding every once in a while. Considering the rare assets of the nation, cost change is one of the serious issues in Kenya. Statistics from the Republic of Kenya report show that Road agencies have been experiencing cost fluctuation in Roads projects. For instance, in the construction of Thika Super Highway by Kenya National Highways Authority (KeNHA), the cost escalated from Kes.26.44 billion to Kes.34.45 billion (World Bank, 2014). In addition, the initial deadline of the Thika super highway project was July 2011, which was later revised to July 2013.

Cost changes have obvious effects for the key stakeholders in particular, and on the construction industry in general. To the client, cost fluctuation implies added costs over and above those initially agreed upon at the onset, resulting in less returns on investment. To the consultants, cost fluctuation implies inability to deliver value for money and could well tarnish their reputations and result in loss of confidence reposed in them by clients. To the contractor, it implies loss of profit. To the industry as a whole, cost fluctuation could bring about project abandonment and a drop in construction activities, bad reputation, and inability to secure project finance or securing it at higher costs due to added risks. All these consequences undermine the viability and sustainability of the construction industry (Markenson, 2016).

1.2. Statement of the Problem

One major worry to professionals in the construction industry is the wide gap between final account figures, the tender sum and the preliminary estimates earlier arrived at, at the pre-contract stage. This has caused a lot of anxiety to clients in going into infrastructural project development.

Before a project is embarked upon, bills of quantities are prepared for which the agreed sum becomes the contract sum on which tenders are floated for tenderers to tender. The contract sum in the bill of quantities is expected not to be exceeded after the project but, interestingly, upon completion when the final account is prepared it is realized that there has been fluctuations; either the contract sum exceeds the final account or the final account exceeds the contract sum. Due to the issue of fluctuation, some researchers like (Pheng & Ming, 1997) have criticized the bills of quantities as lacking precision. However, Davis et al. (2004) claim that the bill of quantities still remains an unsurpassed model on which to obtain bids and is a useful tool for post-cost control activities.

The tradition in Kenya has been that project expenditure is monitored to the final stage after which the final accounts are prepared. If the contract sum exceeds the final accounts, then the general convention is that the remainder is given to the client and it becomes an advantage to the client or the financiers as well as the contractor's team and that of the consultant. This may imply that the contractor's outfit may have employed very stringent cost control systems to keep the construction cost within budget. The client would have also achieved value for the money committed into the project. Additionally, the consulting team would have gained the credibility of being able to supervise and manage a construction project within its initial established budget. However, if the final account exceeds the contract sum, additional money will then be required and this becomes a disadvantage to the client, the project's consulting team, and the contractor as well, causing a whole lot of disappointment on the part of the client. A great deal of prospective clients have had to shelve future infrastructural development schemes due to previous experiences where the initial budgets were exceeded when the construction phase of the projects came to an end as there was the sense of not having achieved value for money.

One other occurrence these days is the abandonment of most funded projects by the Government of Kenya. The major reason that is known to be responsible is the lack of funds to finance these projects to completion stage as estimates prepared, which formed the basis for

initiating these projects. Such occurrences signify injudicious spending of the tax payer's money. Again, foreign donors may quit funding developmental projects and on the whole the country gains a bad economic rating and reputation.

From the discussion above, the country is in no winning position; hence, this study sought to identify key factors influencing cost of Road construction projects so they can be catered for at the various stages of the project cycle.

1.3. Purpose of the Study

The purpose of this research was to investigate key factors influencing cost of Road construction projects within selected urban areas in Kenya with reference to the three cities.

1.4. Research Objectives

The study was guided by the following objectives:

i. To determine the extent to which Contract Management influence cost of Road construction projects within selected urban areas in Kenya.
ii. To assess how project schedule influence cost of Road construction projects within selected urban areas in Kenya.
iii. To examine the level at which design and documentation influence cost of Road construction projects within selected urban areas in Kenya.
iv. To determine the extent to which financial Control systems influence cost of Road construction projects within selected urban areas in Kenya.
v. To assess how government policies influences cost of Road construction projects within selected urban areas in Kenya.

1.5. Research Questions

The study was to answer the following questions;

i. To what extent does contract management influence cost of Road construction projects within selected urban areas?
ii. How does project scheduling influence cost of Road construction projects within selected urban areas in Kenya?
iii. To what level does design and documentation influence cost of Road construction projects within selected urban areas in Kenya?
iv. To what extent does Financial Control Systems influence cost of Road construction projects within selected urban areas in Kenya?

v. How does government policies influence cost of Road construction projects within selected urban areas in Kenya?

1.6. Research hypothesis.

This study was hinged upon the following null hypothesis:

i. Contract management does not have significant influence on cost of Road construction projects within selected urban areas
ii. Project schedule does not have significant influence on cost of Road construction projects within selected urban areas
iii. Design and documentation does not have significant influence on cost of Road construction projects within selected urban areas
iv. Financial Control Systems does not have significant influence on cost of Road construction projects within selected urban areas
v. Government policies does not have significant influence on cost of Road construction projects within selected urban areas
vi. There is no significant relationship between the independent variables and cost of road construction projects in Kenya.

1.7. Significance of the Study

The findings of this study may be used as reference by all the parties involved in Construction projects which include the clients (Government and other Donors), contractors and consultants. The stakeholders need the understanding of the driving forces behind cost variations which is a necessity if the performance and ultimate objective of the construction industry are to be realized.

This study may also enable the stakeholders to take stock of the past performance and incorporate lessons learned on future project implementations. The study will contribute to the body of knowledge in Project management by providing an in-depth post mortem analysis of factors that influence cost of road construction projects and thus strengthen the understanding of why urban road projects can vary substantially above or below project budget. It may also provide a quantitative and qualitative project assessment that will help the decision makers define unforeseeable disturbances more reliably ahead of time, so that corrective measures can be better taken into account during project design.

The result of the study are significant to other researchers and scholars who may want to develop more practical skills on how to carry out research. The study has also identified gaps which other researchers can conduct research on.

The study may be viable to various organizations either private or public. Public sector may gain a lot from this study since it highlights the major factors influencing cost of road construction projects in public sector. However, they may be at an advantage in that they can be able to identify the critical success factors that can help advance the possibility of avoiding or preventing adverse cost changes in public sector construction projects. In some cases, the private sector may be able to track the mistakes undertaken by the public sector and improve their main operations in a way that they can be effective and efficient in project management especially in managing project cost.

Finally, the study may help the Government of Kenya with useful information for the formulation and review of other related construction policies through the concerned authorities as the country‘s financial regulator that may better help manage and maintain efficiency in the construction sector in the country that would as a result lead to development and growth of its economy.

1.8. Basic assumptions of the Study

The study assumed the selected three cities namely Nairobi, Mombasa and Kisumu adequately represented the urban areas in Kenya. The Cities have been considered because they are fast growing with high demand for infrastructure projects, they have unique characteristics interms of composition of the population, demand for road infrastructure, traffic volumes and economic activities. The study also assumed that there were no serious changes in the composition of the target population that might affect the effectiveness of the study sample, the respondents were honest, cooperative and objective in the response to the research instruments and was available to respond to the research instruments in time.

The study assumed that the authorities would grant the required permission to collect data from their institutions and that the contractors, consultants and project implementers would be easily reached and the letter from the University and research permit from NACCOSTI assured the respondents that the research was for academic purpose hence giving information freely.

1.9. Limitations of the Study

The study anticipates encountering some limitations that might hinder access to information that the study seeks. The respondents targeted in this study were reluctant in giving information fearing that the information being sought could be used to intimidate them or print a negative image about them. The researcher handled this by carrying an introduction letter from the University to assure them that the information they gave was treated with confidentiality and was used purely for academic purposes.

Further, the results of the study was limited to the extent to which the respondents were willing to provide accurate, objective and reliable information. The researcher checked for consistency and tested the reliability of the data collected. The other limitations were that the contractor may not be on site and the stakeholders being diverse and hard to reach. Also some projects being already closed might make it hard to find or reach implementers for data collection.

1.10. Delimitations of the Study

The study was to investigate factors influencing cost of road construction projects within selected urban areas in Kenya. The study area for this research was Nairobi, Mombasa and Kisumu Cities. The choice of the study area was because these cities are centres of the country's economy, commerce and 'power'; coupled with high population and high demand for transport infrastructure. A list of the sampled roads is attached in Appendix IV for ease of reference.

The study specifically established the influence of contract management, project schedule, design and documentation, financial control systems and government policies on cost of road construction projects within selected urban areas in Kenya. The study collected data from the stakeholders of projects within the three cities and other related stakeholders. The study was carried out in a period of four months.

1.11. Definition of the Significant Terms

Cost of road construction Project: Refers to the total funds needed to complete a road project and consists of a direct and indirect cost. Project costs are any expenditure made or estimated to be made, or monetary obligations incurred or estimated to be incurred to complete the project which are listed in the Bill of Quantities.

Contract management: It can be defined as the process of systematically and efficiently managing contract creation, execution, and analysis for the purpose of maximizing financial and operational performance and minimizing risk.

Project schedule: In project management, the project schedule is a document that, if properly prepared, is usable for planning, execution, monitoring/controlling, and communicating the delivery of the scope to the stakeholders. The main purpose of project scheduling is to represent the plan to deliver the project scope over time. A project schedule, in its simplest form, could be a chart of work elements with associated schedule dates of when work elements and milestones (usually the completion of a deliverable) are planned to occur. In addition to guiding the work, the project schedule is used to communicate to all stakeholders when certain work elements and project events are expected to be accomplished. The project schedule is also the tool that links the project elements of work to the resources needed to accomplish that work. At a minimum, the project schedule should include the following components: All activities, planned start date for the project, Planned start dates for each activity, Planned finish dates for each activity, planned finish date for the project, resource assignments, calendar based activity durations, the "flow" (sequence) of the various activities, the relationships of activities, an identified critical path(s) and total and free float

Design and Documentation: This is documentation of early phase of the project where a project's key features, structure, criteria for success, and major deliverables are all planned out. The point is to develop one or more designs which can be used to achieve the desired project goals.

Financial control systems: Project Financial Control system is a process which brings together planning, budgeting, accounting, financial reporting, internal control, auditing, procurement, disbursement and the physical performance of the project with the aim of managing project resources properly and achieving the project's objectives.

Like the concept of Project Management, it is a strategic competency for organizations and can make the difference between a successful project and audit reports.

Government Policies: A government policy is a rule or principle that hopefully better guides decisions, resulting in positive outcomes that enhance the community or unit. Government policies contain the reasons things are to be done in a certain way and why. This leads to the development of procedures and protocols to see that policies are conducted in an appropriate manner. Procedures and protocols dictate the "how," "where," and "when" of how policies were executed. Government policy describes a course of action, creating a starting point for change. They can influence how much tax the community pays, immigration status and laws, pensions, parking fines, and even where you go to school. While policies are driven to be non-

discriminatory, they can affect specific groups of individuals. Policies are not laws, but they can lead to laws.

1.12. Organization of the Study

This study was organized into five chapters. Chapter One contained the introduction to the study. It presented the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, and significance of the Study, basic assumptions, and limitations of the Study, delimitations of the study and the definition of significant terms. On the other hand, chapter Two reviewed the literature based on the objectives of the study. It further looked at the conceptual framework and finally the summary. Chapter Three covered the research methodology of the study. The chapter described the research design, target population, sampling procedure, tools and techniques of data collection, pre-testing, data analysis, ethical considerations and finally the operational definition of variables. Chapter Four presented analysis of the findings of the study, interpretation and discussion as set out in the research methodology. The study closed with chapter Five which presented the summary of the findings, conclusion, and recommendations for action and further research.

CHAPTER TWO
LITERATURURE REVIEW

2.1. Introduction

This chapter is a review of the work done by other researchers on factors influencing cost of road construction projects across the globe. The review is based on the study where the emphasis lies on the extent to which factors such as contract management, project schedule, design and documentation, financial control systems, and government policies influences cost of road construction projects. Towards the end, the theoretical review and the conceptual framework is presented. Knowledge gap that has resulted to the need for this study is pointed out just before the presentation of a summary of the literature review

2.2. Cost of Road Construction Projects in Urban Areas

Cost of road construction projects is the total funds needed to complete the project or work items that consists of direct and Indirect Cost. They are any expenditures made or estimated to be made, or monetary obligations incurred or estimated to be incurred to complete the project which are listed in a project Bill of Quantities (BoQ).Cost changes involve unexpected costs variations above or below budget amounts due to different factors. It has been a common phenomenon in civil engineering projects and has been the source of conflicts between stakeholders of projects. Following on this identifying the main causes of cost changes and developing mitigating measures have been the subject of discussions in construction project management profession (Kerzner, 2015). The factors that lead to successful projects include: Clearly defined goals and objectives, a well-defined project management process, a proven set of project management tools, a clear understanding of the role of project management. For a project to be termed as successful, it has to be implemented as per the plan, within the budget and as per the objectives (Choge & Muturi, 2014).The growing need for construction of all types coupled with a tight monetary supply has provided the construction industry with a big challenge to control cost. The attendant dwindling economic fortune of nations' economies around the World have geared up the participant in these sectors (the client in particular) to take up the challenge of ensuring efficient use of their resources to obtain value for money in terms of performance (Markenson, 2016). The total cost of construction in normal circumstances is expected to be the sum of the following cost: Materials, Labor, Site Overheads, Equipment/Plant, Head office Cost and Profit but in many parts of the world, there are other costs to be allowed for. Poor cost estimation leads to poor cost control thus poor cost performance of a project. This can also lead to underestimation, which subsequently translates

into increases in project cost as errors and omissions are exposed (Cantarelli, Flybjerg, Molin & Van Wee, 2013). Estimation documentation must be in a form that can be understood, checked, verified, and corrected. The foundation of a good estimate is the formats, procedures, and processes used to arrive at the cost. Poor estimation includes general errors and omissions relating to plan details and project quantities as well as general inadequacies and poor performance in planning and estimation procedures and techniques (Choge & Muturi, 2014). Poor quantity survey leads to inconsistent contingencies. This causes confusion as to exactly what is included in the line items of an estimate and what is covered by contingency amounts. Contingency funds are typically meant to cover a variety of possible events and problems that are not specifically identified or to account for a lack of project definition during the preparation of planning estimates. Misuse and failure to define what costs contingency amounts cover can lead to estimation problems (Williams & Gong, 2014). In many cases, it is assumed that contingency amounts can be used to cover added scope, and planners seem to forget that the purpose of the contingency amount in the estimate is lack of design definition. Projects run into problems when the contingency amounts are applied inappropriately. During project execution, contingency funds are often inappropriately used to cover project overruns, instead of being applied to and available for their intended purpose (Adams, 2015).The construction progress of projects are directly linked with the cash-flow and hence any unlikely performance of construction progress will directly hit the financial commitments. Traditionally, cost-benefit analysis is practiced for the investment purpose. It represents a most likely value of the project rather than the actual value. The input variables are carefully considered in 'what-if' scenarios or sensitivity tests for the analysis. However, the assessment of construction projects increasingly requires a greater understanding of its complexity on project progress and corresponding cash-flow. Hence, the number of 'what if' scenario combinations were generated which makes the decision-making process more difficult. Therefore cost related risk factors are analyzed in this research which will give strong base rather than having analysis on mythical or impractical situations (Adam, Josephson & Lindahl, 2017).

2.3. Contract Management and Cost of Road Construction Projects

Contract management is the process of systematically and efficiently managing contract creation, execution and analysis for maximizing operational and financial performance and minimizing risk (Subramani, Sruthi & Kavitha, 2014). Most professionals operating in Africa use their accumulated experience and judgment. Track performance, financial capacity and technical capacity are the most important criteria considered crucial by the selection of main

contractor to undertake the construction project (Marzouk & El-Rasas, 2014). Xiaohong (2011) concurs and says that construction contractors have big influences upon projects and their successes.

A contractor is the one who carries out the real construction; the contractor who has been offered the tender begins by figuring out the satisfactory plan, allocating each manpower and required assets, linking all of the legal partners and especially turning in in the assumed timeline and cost (Ali, 2012). In his work of the 21st century projects in LDCs that are emerging like Angola, Libya, Ghana, SA and East Africa‟s Rwanda, Kaming et al. (2012) argue that the contractor's knowledge, competence and experience in construction projects have forced up to 85% of these countries run to sourcing for external experts from countries like China, Japan, Israel and many more so that their projects can achieve the time frames, budget and quality targets. This was rated as one of the highest benefactor that is experienced across the world. In Kenya, a number of scholars have conducted researches on why the contractor is responsible for the failure/delay of construction projects and various results have been achieved over time as follows.

A study by Omran (2011) on 120 selected contractors in Kenya and Malaysia found out that, 80% of the respondents indicated that experience with rating "high" is a significant factor to adherence to cost estimates and time in the construction industry. At pre-qualification stage, the study established that contractors past experience in similar assignments and environment coupled with the entire team is among the parameters used in qualifying the contractors invited to bid for works. The study established that aspects of contractor's experience that affect adherence to cost and time estimates to a great extent or quantum are poor distribution of labour, poor site management, technical and managerial skills.

Quality has been known to be having hidden costs which cannot be quantified quite easily and extra time that cannot be measured. When proper controls are not put in place, the project is put in jeopardy. However, the bankruptcy and communication skill on adherence to time was found to affect adherence to time to a greater extent. Material price escalation is a business risk faced by all contractors. Gakuu & Kidombo (2013) observation attested that in contracts where the contractors‟ experience is questionable, there is a strong likelihood of cost escalations .However no research has been done on the role of the contractor's experience on projects implemented by the Road agencies within urban areas. The competence of the project manager during project implementation will also affect the timely completion of a project. Positive

attitude of project manager and project participants has emerged to be the most important success attribute for quality compliances at project sites (Kaming, olomolaiye, Holt & Harris, 2012).

The authors additionally observed that some of the attributes that are with high importance are all related to the project manager. For example effective monitoring and feedback by the project manager, project managers technical capability, leadership quality of the project manager, effective monitoring and feedback by the project team members. Also looked at is the Authority to take day to day decisions by the project managers‟ team at site. Furthermore, the success of project hinges on the efficacy of the project team in managing the process (Olatunji, 2010).

According to McMiniminee et al. (2010), a weak link in the process such as a lack of project management experience, could adversely affect timely execution/ timely completion of the projects. When there is no proper inspection/supervision, quality control is greatly compromised. Chism and Armstrong (2010) agree by stating that inspection and workmanship standards are quite important to achieve quality.

Fapohunda and Stephenson, (2010) state that to achieve the pre-determined project objectives, the construction site manager should have a significant influence over cost, time, scope and quality which make it paramount for the manager to have ability of exercising authoritative and absolute control. Wambugu, (2013) concluded in a study that inadequate supervision and inspection of work in construction project led to rework in instances of poor workmanship and this led to delay in project timely completion. This also leads to project cost fluctuation and may result to project abandonment. Inadequate site inspection is one of the factors identified as causing project delays in timely completions. Proper site identification, inspection and continuous monitoring becomes effective when it is carried out by the present, continuous monitoring, supervision and evaluation but not absentee monitoring and supervisors as witnessed by almost 42% of construction projects in Kenya and Nigeria (EU, 2012).

A study carried out by Omran, Abdalrahman and Pakir, (2012) shows that in 2005, 211 road projects in Kenya, southern Sudan, and Malawi states had variations mainly attributed to incompetent craftsmen because of insufficient working skills and knowledge of drawings or to incompetent supervisors because of lack of experience leading to deficient supervision. The study clearly emphasized the impact of management and supervision on the overall success of the construction project. If there is no proper supervision, workers will tend to take break whenever they desire and work will tend to delay. Timely inspection is of great importance to

ensure effective operation, material quality, and timely progress of the project schedule. Subsequent activities on a construction schedule may not be carried out before the required inspection is carried out on the preceding activities. Chai and Yusuf, (2013) identified poor site management and supervision as ranking high in the order of causes of construction project cost variations.

Studies in Kenya have shown that besides corruption, favoritism and nepotism in tender awarding in the Kenyan construction industry, other factors like absentee supervisors and managers has eaten into the future of most projects. In north eastern for example, it was found that up to 18% of the roads maintained by the national government had up to 97% absentee supervisors situated in Nairobi and absently supervising the projects by use of quarks in the ground most of who have little or no knowledge of the construction industry. In Kiambu for example, 20 roads were delayed between 2000 to 2011 because they had to be redone or had to be stopped due to the changes by contractors from the original plans, a factor that came up due to poor supervision of the projects in the rural or impassable areas (Republic of Kenya, 2011).In the Coast, the redoing of roads categorized as A, B and C have been hit by up to 45.01% cost overrun due to lack of proper inspection and supervision of their progress. In the case of Roads terminals Liking Kwale from Likoni, Likoni to Lungalunga border, Taita-Taveta, Mariakani to Voi and many more have been on the sport for a long time with some being cancelled due to the fact that the major supervisors are the employees under the various bodies working with the MoR, who are few and to some extent corrupt; thus making it difficult for them to be on the ground to offer supervision work and instead opt to send representatives (GOK, 2013).

2.4. Project Schedule and Cost of Road Construction Projects

Construction project like roads and railway lines generally takes various stages. The first stage is usually project initiation where the project is identified and a feasibility study carried out to establish the viability and build a business case. The second stage is the project planning stage and in here the project design is carried out, resources and finances allocated. Project execution which is the third phase involves implementing the designs within the allocated resources in the set duration and to the set specification and quality (Mohammed, 2012). Failure to clearly comprehend the project, all its aspects can lead to works being executed erroneously and the correctional steps to remedy the errors will cause project delay and additional cost. The

consequences are actually grave, ranging from litigation to claims and disputes, to outright abandonment of the project (Olatunji, 2010).

Hussin and Omran (2011) argue that, when a project cost variation can no longer be absorbed by the client, the project is abandoned. It helps then to predict and identify problems in the early stages of the project life cycle. Planning stage is therefore very key to success of construction project. "Delivery of materials on site will quite affect project progress. If the supply does not ensure quality materials are delivered on site, it will cause delay in project completion" (Wambugu, 2013). This is because material not meeting specifications will most likely be rejected and the process of getting the right material will take more project implementation budget. When materials are lacking on site it means that the employees will not have work to do. This is quite demoralizing and will affect the project delivery negatively.

According to global leading practices, land acquisition should be complete before a project is tendered. In Kenya projects are often awarded with only partial acquisition of land by project owners. Delay in subsequent land acquisition and inadequacy in project planning considering the impact of deferred land acquisition is possibly the single largest factor causing the project schedule to keep changing. This shift causes project delays and ultimately cost fluctuation.

Land acquisition problem is more pronounced in transportation sector such as Highway-Roads and Railway projects. For example, for a new rail line project in India, land for the first phase of the project was to be acquired by October 2009. However, due to delays in initiating the land acquisition process and inter- State disputes, the land was re-scheduled to be acquired by January 2011. Similarly, one of the most prestigious projects in road sector was delayed by around six years due to the land acquisition issues. The project which was started in 2000 with scheduled completion date of December 2004 got completed only in January 2012 (Subramani, Sruthi & Kavitha, 2014).

Chilipunde, (2010) identifies contractors' improper planning as one of the causes of project delay. If a contractor fails to come up with a workable work program at the initial stages, this will affect project timely completion. A similar observation is made by Jagboro and Aibinu, (2002) in Nigeria. Equally emphasizing on the need for proper planning of construction project is Pakir et.al (2012) in a study carried out in Sudan. McMiniminee et. al., in (2009) found that it was clear investments in advance planning and project development paid off. Mojahed, (2005) states that proper planning in all phases and components of construction project are necessary to avoid re work which in turn leads to delay in project completion. Pakir et al.,

(2012) state that accurate construction planning is a key determinant in ensuring the delivery of the project on schedule and within budget. In his writing about the role played by planning in determining the future of the developing countries, Kaming et al., (2009) argue that, just like it is difficult to properly plan for finances, labour, risks, monitoring and evaluation, materials providence and many more in the manufacturing industry, the infrastructure implementation sector in developing states has been hit with the same problem for long. The World Bank (2013) report shows that the state of infrastructure in Kenya is hindered by planning as a major element whereby the people involved in developing plans do quality planning on paper that considers the project implementation and evaluation only but it is limited in terms of actualization. This has left up to 60% of the Kenyan projects taking longer than planned and incurring additional costs or others dying on the way.

Ameh and Osegbo (2011) identified inaccurate program of works is another cause of delay in projects. If a project manager underestimates the time necessary to complete all aspects of the project, it has the potential to result in cost fluctuation in a variety of areas. For example, if a project runs over schedule by a week, additional costs will be accrued for payroll of individuals working on the project. If a project is delivered to a client later than anticipated, there could be late fees or liquidated damages.

Ayudhya (2011) state that project manager who underestimates human resources needs on a project can directly cause additional cost to the project. For example, if a project requires more manpower than originally planned or requires specialty or expertise not found in the company that has to be outsourced, it can raise the overall cost of the project. Additionally, if a project manager assigns tasks to employees unsuitable for particular project phases, it could take longer for the work to be completed, or the quality may be undermined and the steps repeated by someone else, again resulting in additional cost for manpower. A good project manager will have an accurate representation of material costs associated with all phases of the project prior to implementing a work plan. If a project manager guesses or estimates anticipated costs, the project could go seriously over budget. This often means a client may be charged additional fees, or the company is faced with absorbing the costs itself. All project team members should regularly check their budget allocations and report back to the project manager with status updates to avoid this scenario.

Most projects have multiple phases, with one phase relying on the effective completion of a preceding phase. A project manager who doesn't monitor progress appropriately, troubleshoot where necessary or manage teamwork issues can experience a phase delay. This can have a cost domino effect. For example, there are contracts with consultants and design firms for preliminary studies and design, contracts with builders to perform the work, and contracts with consultants for work supervision. Some lending agencies require that the same consultant does the design, assists the owner in the bidding process and supervises the work later. This means that any delay in the bidding process would be costly to the client even before the work starts or the contractor is selected. Often extra cost is due to the consultant being paid for a longer period. "Time delay" for such an owner is more a matter of a "project delay" rather than a "contract delay." The delivery of one physical project consists of different types of contracts.

2.5. Design and Documentation and Cost of Road Construction Projects

Design mistakes are some of the reason of cost variations in Road construction Projects initiatives. it is critical to observe that right illustration of customer's requirement and the blue print to achieve proper technical input to task execution are typically mapped out based on project design. Moreover, a layout with errors almost means incorrect or inadequate representation of project deliverables. this will lead to incorrect utility of strategies in attaining end result, such that as the actual execution phase of the project unfolds these design mistakes, attempt to correct it will lead to delay and additional cost (Love, Smith, Simpson, Regan & Olatunji, 2015).

Another way in which design errors could lead to cost Variation and delay could be seen in the fact that project estimations are done based on the produced designs, as such, having errors in design in a form of omission or misrepresentation will mean that the estimation for the project cost will also include these omissions, thereby leading to extra works, change order etc., thus resulting in additional cost to the project. Achieving an error free design entails good communication with the entire design team and integrating design process that is properly planned, giving enough time for corrections and extensive investigation. Similarly, an effective project planning, controlling and monitoring should be established to enhance project performance through the project life cycle (Agyeman, Asare & Ankomah, 2016).

Proper investigations should be done to ensure that all site conditions are noted in the design, and application of value management could be used to obtain the best cost effective design options.

A study done by Boru (2016) affirmed that delay and changes in Project cost could be as a result of scope change which defines the entire deliverables that are expected at the end of the project. Therefore, logically, it can be said that all project plans, estimation, schedule, quality and base lines are usually designed based on the initial project scope. Thus, any change in the project scope during execution mean that the entire initial project plan will have to be reviewed such that a reviewed budget, schedule and quality will have to be developed. This means more time and resources will be needed as against the initial baseline. With each scope change, precious project resources are diverted to activities that were not identified in the original project scope, leading to pressure on the project schedule and budget. Project scope change could be as a result of wrong initial scope definition, inherent risk and uncertainties, sudden change of interest, project funding change, etc. This could lead to change request which in turn could lead to change in project deliverables, budget and/ or even the entire project team. Poor scope change management could lead to dispute that may require spending time and money on arbitration and litigation for what the contractor or the client believes he is entitled to.

This will no doubt lead to delay and cost fluctuation of the project. He recommended that, to achieve a proper control for scope change, it is important to first identify the fact that change is inevitable in project and could equally be beneficial to the entire project success. Thus, the most important thing to do is to integrate proper management plan such that a proactive approach could be adopted involving the project stakeholders and incorporating their needs throughout the project lifecycle (Agyeman, Asare & Ankomah, 2016).

Design changes, materials shortage, and inadequate planning were the most significant contributors to cost fluctuation in road projects. It was also affirmed by Odeck (2014) who indicated that material shortages, overstretching of technical personnel and design changes were the most important causes for project delays and owners were for the opinion that that design errors and insufficient documentation, excessive bureaucracy in project owner organization and labor shortages contributed most to time delays.

He recommended viable project design upon proper care by the project owner to reverse on the fluctuation and increase efficiency in project execution and success. Abdelhak (2012) made an observation in his study of project delay in the field of public sector on analysis of causes of deadline slippage in construction projects completed in several regions of Morocco were identified and errors made in the initial budget assessment, volatility of the architecture and engineering programme which had multiple design modification requests and construction site

hazards. A change in project‘s design can arise for a number of reasons. It may be that the project sponsor wants additional elements to be included in the project or changes to existing ones according to a study done by Williams and Gong (2014).

Usually, these design changes require additional time inputs from architects and engineers as well as the additional time and cost inputs from the contractor and for additional materials and this end up influencing on cost fluctuation. Some cost fluctuation are unavoidable because they cannot be reasonably prevented, such as those due to unanticipated events, however fluctuation due to design plan or project management problems are avoidable because they could have reasonably been foreseen and prevented. The project control procedure can help management identify its current position related to a future position (Mwawasi, 2015).

Methods used for cost estimation during the project cost scheduling are not adequate enough to cover all aspects of projects costs as a result various cost items necessary for the project remain unidentified at the estimation stage and appears as cost fluctuation later.

2.6. Financial control systems and Cost of Road Construction Projects

Key to financing projects is sustainability. The traditional forms of financing projects have been equity and debt. However in the recent past innovative ways of financing projects have come up and these include special project vehicle, venture capital etc. construction projects are also funded by multilateral bodies and foreign aid. Contributions to the changes in Project cost emanating from the government/owner of these road projects can include late release of funds. If the client/government/financier does not pay the services of the contractor in time, then the project implementation may greatly be affected by contractors’ poor cash flow. This will affect the contractors’ ability to ensure sustained supply of the construction materials. Clearly therefore, owners financial position will greatly affect project finance flows which will influence construction project completion and cost.

Olatunji (2010) identifies project finance as one of the constraints or circumstances/situations which outside the immediate control of parties to the contract agreement but still affect the smooth flow of scheduled activities. Many observers agree that if payment by project owner is slow, the contractor may begin to commit fewer resources to a project, and may even ease work if cash flows become a problem. Structure and timing of financial provision may impose certain constraints on the design and scheduling of the project. This may be simply because all the funding for the project is not yet in place and/or the risk is too great to commit even the design costs of a project that may not receive the grant.

Hammarlund and Lim (2012) of Saudi Arabia in his study identified that progress payments as the most important cost variation and delay factor. Project owners' belief that financial difficulties by the contractors and improper contract knowledge increased cost in most of the public sector infrastructure projects. Moreover, he said that inclusion of late payment of completed work as cause of delay referred to the result of late payment on continuing site activities and contractors halting work unless payment for completed work had been processed after the agreed date resulting into huge extra cost and project delay (Boru, 2016).

Lack of proper financing of road projects caused changes in Project cost as proper preparation of projects was disregarded and hence lead to late approval of drawings, inadequate early planning of projects and slowness of client's decision making process. This caused unexpected delays culminating into cost fluctuation that resulted into costly projects on the government and its stakeholders. Cost fluctuation generally are caused by ineffective construction management and poorly established finance control systems, inflation of prices, financing and payment of completed works which could be delayed most of the times, unstable interest rates on finances borrowed to facilitate the construction projects name them. Moreover, he said that planning, inaccurate project cost estimation, high cost of needed resources (money, men, materials and machinery), lack of skilled workforce, price of construction materials and high land prices were the main causes of cost fluctuation (Cantarelli, Flybjerg, Molin & Van Wee, 2013).

Delay and changes in project cost can be generated by inaccurate evaluation of the target financing options to be used in facilitating the construction projects to the required levels but instead the inaccuracies influences overshot in project costs as well as delay in project completion. He recommended proper and accurate evaluation of the financing structure to be used in execution of the planned construction projects to avoid facing financing difficulties. Cantarelli, Flybjerg, Molin and Van Wee (2013) discovered in their study that the top factors influencing construction project cost included increment in material prices due to continuous delay in construction, fluctuation in cost of construction materials, unsettlement of local currency in relation to dollar value, funds and associated auxiliaries not ready, lack of finance planning and monitoring during pre-test and post contract stages culminating into inaccurate construction project take-off (Ogutu, 2017).

Changes in Construction Project cost can also be attributed to finance and payment arrangements, poor contract management, and shortages in materials, inaccurate estimation and overall material price fluctuation. Extensive experience and decision are needed to develop a reasonable approximate estimate for the project cost, since the estimator has to modify the unit costs for quantities of materials, labor, location, and construction contingencies Cost estimation techniques utilized locally don‘t carry out the in depth analysis, assumptions and forecasting on cost rates are done on experience without incorporating price index. Most popular method of cost estimation is based on the bill of quantities which cumulates the anticipated cost estimate quite lesser than the scheduled cost in result imparts cost fluctuation to the project. One major problem that forces contractors to stick to this method is that if estimated otherwise they might end up having cost estimates more than others in competition and they may not remain competent to win contracts especially when lowest bidding method is adopted for bidding (Karimi, 2012). There are cases where the prime contractor and sub-contractors go into bankruptcy during the construction period. This can lead to significant delays and extra costs arising as the project owner has to re-tender the remaining work to be undertaken by another contractor.

2.7. Government Policies and Cost of Road Construction Projects

Government policies guide decision making towards achieving a rational outcome in matter of public interest. A strategic and broad based approach to formulating construction policies should be based on certain fundamental criteria such as equitable national integration , accessibility to public and private construction products, health and safety, economic viability, technical viability, political and administrative considerations, environment soundness and addressing the basic need for shelter. Another issue that leads to delays in regulatory approvals is the multiplicity of approval requirements from Central, State and local Government (Markenson, 2016). There is often a recurring delay in securing regulatory approvals from governing bodies and various ministries. For Example, inability to secure forest approvals for tree cutting required for a highway expansion project led to substantial project delays. Similarly, a major highway project could face a delay of around one year due to delay in executing the State-support agreement towards shifting the utilities services to make way for construction. In many cases even after securing clearances, it has been observed that time taken for activities such as relocation of power lines is often prolonged to as much as 12 months, primarily due to resistance from local communities. The complexity and size of infrastructure projects being undertaken in India has increased substantially during the last decade. As a

result, the regulatory frameworks related to infrastructure projects have also witnessed a significant transformation (Mwawasi, 2015).

Considering large scale magnitudes, these infrastructure projects require an explicit consideration of the regulatory issues during the planning stage to avoid any delays during the implementation stage. For timely action, project developers should ensure early identification of the required regulatory compliances and the corresponding procedural difficulties associated with it. This could help in detection and prevention of cost and schedule changes with better control on projects. The construction industry in Kenya has not had a regulating body since the disbandment of the National Construction Cooperation in 1988. The National Construction Authority (NCA) was then established in 2012 to regulate the construction sector and was mandated to register and regulate the undertakings of contractors. The need to establish the NCA was due to increase of quack contractors in the construction industry and the lack of regulation of the construction sector as a whole, cases of collapsed buildings and corruption as contractors offered bribes so as to obtain compliance certificates from the respective authorities (Esther, 2015).

Labour law mediates the relationship among workers (personnel), employers, trade unions and the authorities. Collective labour law relates to the tripartite relationship between worker, organization and union. Individual labour law concerns personnel' rights at work and thru the agreement for work. Employment requirements are social norms (in a few instances also technical standards) for the minimum socially desirable situations underneath which employees or contractors are allowed to work. Labour laws defend the personnel but this could develop into hurting the project. An instance is an intensive increase in labour wages. This commonly impacts the contractor specifically massive scale projects wherein the project with the employer is fixed contract. This affects the project being that the contract isn't always flexible to permit these modifications; this immediately influences the cost overall performance (Bell, 2013).

Currently, the public sector procurement of construction is largely based on the lowest bid award system. The customary practice of awarding contracts to a lowest bidder was established to ensure the least cost for completing a project. In public construction works, this practice is almost universally accepted since it not only ensures a low price but also provides a way to avoid fraud and corruption (Irtishad, 1993). While the low-bid procurement system has a long-standing legal precedence and has promoted open competition and a fair playing field, a long-

standing concern expressed by owners and some of their industry partners is that a system based Developing Country Studies www.iiste.org ISSN 2224-607X (Paper) ISSN 2225-0565 (Online) Vol.5, No.3, 2015 133 strictly on the lowest price provides contractors with an incentive to concentrate on cutting bid prices to the maximum extent possible (instead of concentrating on quality enhancing measures), even when a higher cost product would be in the owner's best interest, which makes it less likely that contracts will be awarded to the best performing contractors who will deliver the highest quality projects. As a result, the low-bid system may not result in the best value for money expended or the best performance during and after construction. Moreover, the traditional low-bid approach tends to promote more adversarial relationships rather than cooperation or coordination among the contractor, the designer and the owner, and the owner generally faces increased exposure to contractor claims over design and constructability issues (Rizwan, 2008).

2.8. Theoretical framework

This is the structure that can hold or support a theory of a research study. The theoretical framework introduces and describes the theory that explains why the research problem under study exists and the relevance of each theory to this study.

2.9. System theory

This theory was advanced by Ludwing Von Bertalanfty, Lawrence J. Henderson, W.G. Scott, Deniel Katz, Robert L. Kahn, W. Buckley and J.D. Thompson. Stating in 1960. Systems theory is one of the dominant organizational theories in management today. It treats an organization as either an open or closed system. A system is a set of distinct parts that form a complex whole. Systems technique is based on the generalization that the entirety is inter-related and inter-structured. A machine consists of related and dependent element which when in interaction, forms a unitary complete. A system is actually an assemblage or aggregate of factors or components forming a complex whole. One of the most crucial characteristic of this theory is that it is composed of hierarchy of sub-systems, this is the components forming the fundamental system and so on. As an example, the sector may be taken into consideration-to be a system in which various countrywide economies are sub-structures.

In a business enterprise as a system a minimum one subsystem has to have a system-manage characteristic (Ackoff, 1971) owning the capabilities of sensor, data processing, choice-making, controlling, and information storage (Johnson et al., 1964). Such subsystems direct the system thru figuring out the preferred outcomes, evaluating achieved results with preferred

results, and controlling different subsystems to achieve desired results. Past studies (e.g. Ackoff, 1971; Johnson et al., 1964; Nevo & Wade, 2010) suggest that management is one such subsystem that might direct the entire system. This implies that the executive ought to steer through with the aid of preserving a stability between conflicting forces and occasions. AN excessive order of accountable management makes the executives effective. H. Simon regarded organization as a complicated system of decision-making process.

2.10. Conceptual framework

The purpose of this study was to investigate how the independent variable influence the dependent variable. The conceptual framework illustrates how the system of concepts, expectations, beliefs, assumptions and theories informed and support the research and form key part of the research design. In this study, the dependent variable was cost of road construction projects within selected urban areas in Kenya while the Independent variables were contract management, project schedule, design and documentation, financial control systems and government policies. The conceptual framework illustrates diagrammatically how these variables relate to each other

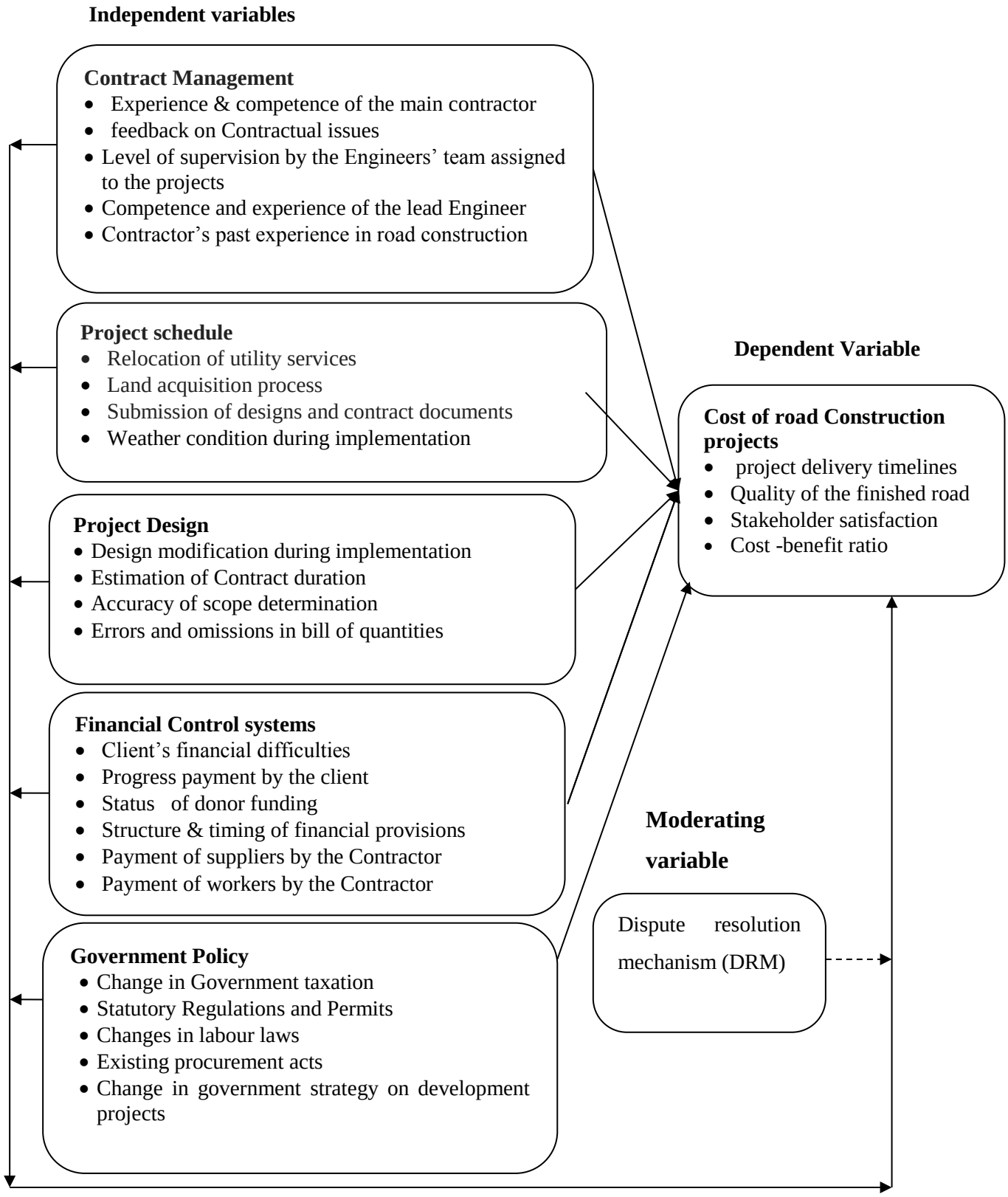

Figure 1: Conceptual Framework

2.11. Summary of the Literature Review

A change in cost of road construction projects involves unexpected costs incurred in excess of budget amount or expenditure being less than the budget due to different factors. It has been a common phenomenon in Road construction projects and has been the source of conflicts between stakeholders of projects. Following on this, identifying the main factors influencing cost of road construction projects and developing mitigating measures was the subject of discussions in construction project management profession. Contract management is the process of systematically and efficiently managing contract creation, execution and analysis for maximizing operational and financial performance and minimizing risk. According to global leading practices, land acquisition should be complete before a project is tendered. In Kenya projects are often awarded with none or partial acquisition of land by project owners.

Design errors and ommisions of key project items in the contract documents are among the cause of changes in cost of road construction projects. It is important to note that proper representation of client‘s requirement and the blue print to achieve good technical input to project execution are usually mapped out based on project design. Structure and timing of financial provision may impose certain constraints on the design and scheduling of the project. This may be simply because all the funding for the project is not yet in place and/or the risk is too great to commit even the design costs of a project that may not receive the grant. Infrastructure projects require an explicit consideration of the regulatory issues during the planning stage to avoid any delays during the implementation stage. For timely action, project developers should ensure early identification of the required regulatory compliances and the corresponding procedural difficulties associated with it. This could help in detection and prevention of cost and schedule changes with better control on road projects.

2.12. Research Gaps

Various studies have been conducted on cost fluctuation in road construction projects as shown in Table 2.1.

Table 2.12-1: Knowledge Gap

Author/Year	Focus of study	Findings	Research Gaps	Focus of current study
Ogutu B., O. (2017)	Factors influencing successful completion of road construction projects in Kenya: the case of Kisumu county	The findings were presented in tabular format, and there is a strong correlation between procurement process, communication, and successful completion of road projects.	The study was focused on the delay in project completion.	Factors influencing cost of road construction projects within urban areas in Kenya
Mwawasi, S. W. (2015)	Time and cost overruns in road construction projects in Kenya Under Kenya National Highways Authority	Time overrun constituted the project time extension in months while cost overrun was measured by the total cost overrun from the initial project cost estimates. Increase in scope of work can be considered to have been the lead factor in contributing to time and cost overrun on the road projects.	The study focused on effect of time and cost overruns on road Projects under KeNHA.	Factors influencing cost of road construction projects within urban areas in Kenya

Author/Year	Focus of study	Findings	Research Gaps	Focus of current study
Kwatsima, S. A. (2016)	An investigation into the causes of delay in large construction projects in Kenya	The study results revealed that contract administration, finances, design variation and technology significantly influence delays in the completion of large construction projects in Kenya.	The study did not specifically focus on the fluctuation of project cost	Factors influencing cost of road construction projects within urban areas in Kenya
Author/Year	**Focus of study**	**Findings**	**Research Gaps**	**Focus of current study**
Boru, A. (2016)	Determinants of delay and cost overruns in Kenya's public sector construction projects: a case of Meru County, Kenya	The major research findings revealed that public sector construction projects were frequently faced by delay and cost overruns due to rising contractual issues, changes in project financing, lack of qualified labor and modern equipment in use, changes in project scheduling and irregular changes in project design and documentation.	This study mainly focused on delay and cost fluctuation	Factors influencing cost of road construction projects within urban areas in Kenya

CHAPTER THREE
RESEARCH METHODOLOGY

3.1. Introduction

This chapter explains the research methods that were used by the researcher to find answers to the research questions. The research methodology is presented in the following order, research design, target population, sampling procedure, data collection methods, instruments of data collection and the pilot study. The section also explains how data was analyzed to produce the required information necessary for the study. Finally, the chapter provides the ethical issues and operationalization of the variables.

3.2. Research Design

Research design refers to the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose (Lewis, 2015). The study adopted a descriptive survey research design. The method was considered because it is more precise, accurate and involved description of events in a carefully planned way (Babbie, 2004). This research design also portrays the characteristics of a population fully (Creswell & Creswell, 2017).

3.3. Target Population

The target population for these study was 200 staff from KeNHA, KURA, Construction and consultancy firms who have been involved in supervision of large road construction projects completed between the years 2000 to 2019 within the three cities as shown in table 3.3-1.

A list of the selected projects is attached in Appendix IV.

Table 3.3-2: Target population

Categories of the target population	**Target Population**	**Percentage**
Road contractors (project managers)	50	25
Consultants (resident engineers, surveyors, environmentalists, design Engineers, structural engineers)	40	20
Client engineers	110	55
Total	**200**	**100**

3.4. Sample Size and Sampling Procedure

3.4.1. Sample Size

Yamane (1967:886) provides a simplified formula to calculate sample sizes. A 95% confidence level and P = .5 are assumed for the Equation below.

The project sample size selection was based on the Yamane's Formula

(Yamane, 1967)

$$n = \frac{N}{1 + N(e)^2} = 200/1+200(0.05)^2 = 134$$

Where; *n* = Size of the sample, *N* = Size of the population given as 200, e = Acceptable error given as 0.05

3.4.2. Sampling Procedures

A total of 134 senior Staff of the contraction companies, client representatives and the consultants were targeted where they gave their feedback on factors influencing cost of road construction projects within urban areas in Kenya. Purposive sampling was used since the research was confined to specific target sample space meaning known respondents provide information. According to Oso and Onen (2005), purposive sampling starts with a purpose in mind and the sample is thus selected to include people of interest and exclude those who do not suit the purpose. Saunders and Thornhill (2003) also posited that purposeful sampling is useful when one want to access a particular subset of people and thus the study used it to select only the project managers in the large construction companies since they are likely to be well conversant with the subject matter of the study.

Table 3.4-1: Sampling Procedure

Categories	**Population**	**Sample size**
Road contractors (senior managers)	50	33
Consultants (resident engineers, surveyors, environmentalists)	40	27
Client engineers	110	74
Total	**200**	**134**

3.5. Data collection Instruments

Primary data was collected using structured questionnaires. Sekaran (2003) indicated that questionnaire is a popular method of collecting data because researchers can gather information easily and the questionnaire responses are easily coded. The questionnaire is attached as Appendix II. The data was collected using 'drop and pick later' method. The target respondents were one hundred and thirty four (134) senior officials of the targeted firms, with good education, adequate knowledge in Project management, and over four years' experience in the road construction industry. Secondary data was collected through contract documents and progress reports from the identified projects. The questionnaire was made up of both open ended and closed ended questions covering issues associated with factors influencing cost of road construction projects within urban areas in Kenya. The open-ended questions were used to encourage the respondent to give an in-depth and heartfelt responses without feeling held back in illuminating any information while the closed ended questions allowed respondent to answer from limited options that have been stated. According to Saunders, Lewis and Thornhill (2012), the open ended or unstructured questions allow profound response from the respondents while the closed or structured questions are generally easier to evaluate. The questionnaires were used in an effort to conserve time and money as well as to facilitate an easier analysis as they are in immediate usable form.

The questionnaire was organised into two parts namely 1& 2. Part 1 consisted of respondent demographic data where the respondent was required to give details such us gender, level of education, number of years in the construction industry, profession, name of the organisation and their position in the firm. This section also required the responded to list the projects they have been involved, location and indicate whether the project had any changes in cost. Part 2 was organised into the five factors influencing cost of road construction project and the factors were broken down into ten closed ended questions for each factor.

3.6. Pilot Testing

The researcher piloted the questionnaires prior to the main study for a group of 14 respondents; five for each of the two clients (KeNHA & KURA), two for contractors and two for consulting firms involved in supervision of Nakuru town roads. Nakuru was chosen because it has an almost similar characteristics to the chosen three cities. This was intended to test the reliability and validity of the data intended to be collected. The result was satisfactory, therefore the instrument was deemed to be reliable and was therefore suitable for use in the study.

3.7. Validity of Research Instruments

According to Saunders (2012), validity is the accuracy and meaningfulness of inferences, based on the research results. One of the main reasons for conducting the pilot study was to ascertain the validity of the questionnaire. The study used both face and content validity to ascertain the validity of the questionnaires. Content validity draws an inference from test scores to a large domain of items similar to those on the test. The researcher sought assistance from supervisor in the university to ascertain content validity of the data collected.

3.8. Reliability of Research Instruments

Reliability analysis was done using Cronbach's Alpha which measures the internal consistency by establishing if certain items within a scale measure the same construct. A construct composite reliability co-efficient (Cronbach's alpha (α)) of 0.6 or above is generally acceptable (Silverman, 2016). A co-efficient of 0.7 or above for all the constructs was considered adequate in this study. Cronbach's alpha (α) was computed as follows:

$\alpha = k/k\text{-}1 \times [1 - \sum (S2)/\sum S2sum]$

Where:

A = Cronbach's alpha

k = Number of responses

$\sum (S2)$ = Variance of individual items summed up

$\sum S2sum$ = Variance of summed up scores

The findings were as shown in table table 3.8-1.

Table 3.8-2: Reliability Analysis

	Cronbach's Alpha	Number of items	Decision
Contract management	0.866	10	Reliable
Project schedule	0.873	10	Reliable
Design and documentation	0.778	10	Reliable
Financial Control Systems	0.821	10	Reliable
Government Policies	0.732	10	
Cost of Road Construction Projects	0.766	4	

The findings showed that all the five variables were reliable as their reliability values exceeded the prescribed threshold of 0.7 (Kothari, 2004). This, therefore, indicated that the research instrument used was reliable therefore needed no amendments.

3.9. Data Collection Procedures

The drop and pick method was used to administer questionnaires so as to give respondents enough time to give well thought out responses. The researcher administered the research instruments to the respondents in person. This enabled the researcher to establish rapport, explain the purpose of the study and the meaning of items that may not have been clear as observed by Sekaran and Bougie (2010).

3.10. Data Analysis Techniques

Descriptive statistics such as frequencies, percentages, mean score, variance and standard deviation was computed for all the quantitative variables using Statistical Package for Social Sciences (SPSS Version 26.0) which is the most recent version and information presented inform of tables. The qualitative data from the open-ended questions were analysed using conceptual content analysis and presented in prose.

Inferential data analysis was done using regression and correlation analysis. The regression analysis was used to establish the relations between the independent and dependent variables. The study regression model generally assumed the following equation;

$$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon}$$

Where: -

Y= Cost of road construction projects within urban areas in Kenya

β_0=constant

$\beta_1, \beta_2, \beta_3$ β_4 and β_5= Regression coefficients

X_1= Contract Management

X_2= Project scheduling

X_3= Design and Documentation

X_4= Financial control systems

X_5= Government policies

ε=Error Term

3.11. Ethical Considerations

The researcher observed the following standards of behaviour in relation to the rights of those who became subject of the study or were affected by it: First, in dealing with the respondents, they were informed of the objective of the study and the confidentiality of obtained information, through a letter to enable them give informed consent. Once consent was granted, the participants maintained their right, which entails but was not limited to withdraw or decline to take part in some aspect of the research including rights not to answer any question or set of questions and/or not to provide any data requested; and possibly to withdraw data they have provided. Caution was observed to ensure that no participant was coerced into taking part in the study and, the researcher used minimum time and resources in acquiring the information required. Secondly, the study adopted quantitative research methods for reliability, objectivity and independence of the researcher. While conducting the study, the researcher ensured that research ethics were observed. Participation in the study was voluntary. Privacy and confidentiality was also observed. The objectives of the study was explained to the respondents with an assurance that the data provided was used for academic purpose only. The researcher obtained an introduction letter from the university as well as a research permit from National Commission for Science, Technology and Innovation (NACOSTI), which was presented to each institutional head so as to be allowed to collect the necessary data from the respondents.

3.12. Operationalization of Variables

The operationalization of variables is as shown in table 3.12-1.

Table 3.12-2: Operationalization of Variables

Objectives	Variable	Indicators	Measurement Scale	Type of analysis	Tool of Analysis
To determine the extent to which Contract Management influence cost of road Construction projects within selected urban areas in Kenya.	Contract Management	• Instructions by the Resident Engineer • Frequent design changes by the Engineer during project implementation • Speed of decision making by the Engineer (Approval of Contractors key staff, payment Certificates, design modifications, appraisals etc.) • Level of supervision by the Engineer's team • Construction methodology/approach by the • Contractor technical expertise and site management skills • Project management knowledge by engineer's staff assigned to the project e.g. Resident Engineer • Adequacy of quality control by the contractor and Resident Engineer during construction • Approval of completed sections by the Resident Engineer • Additional work by the client during project Implementation	Nominal ordinal	Descriptive statistics Regression analysis Correlation analysis	Mean, standard deviation
To assess how project schedule influence cost of road Construction projects within selected urban areas in Kenya.	project scheduling	• Relocation of utility services (power, water and sewer lines) • Giving possession/access of site to the contractor by the client (a site free of encumbrance) • Time frame between design and procurement phase	Nominal ordinal	Descriptive statistics Regression analysis Correlation analysis	Mean, standard deviation

Objectives	Variable	Indicators	Measurement Scale	Type of analysis	Tool of Analysis
		• Rate of mobilization by the contractor • license by NEMA • Bad or inclement weather due to heavy rains and flooding, • Preparation of drawings and other Contract documents by the client • Political interference during project implementation • Availability of skilled , unskilled labour & experts for specialized work items • Securing approval for proposed subcontractors by the Engineer			
To examine the level at which design and documentation influence cost of road Construction projects within selected urban areas in Kenya.	Design and documentation	• Accuracy in design and documentation • Consistencies and ambiguities in specifications and drawings • Accuracy of quantity take-off • Changes in ground conditions contrary to what was captured at design stage by the Engineer • Accuracy of scope identification and specifications • Deliberate underestimation of project cost by the client to make it more feasible • Computation of Project duration • Adequacy of provision for Contigency • Engineer's professional design experience and competence • Methods of cost estimation	Nominal ordinal	Descriptive statistics Regression analysis Correlation analysis	Mean, standard deviation
To determine how financial control systems influence cost of road Construction projects	Financial control systems	• Regularity of progress payments by the client • Employer's cash flow status	Nominal ordinal	Descriptive statistics Regression analysis	Mean, standard deviation

Objectives	Variable	Indicators	Measurement Scale	Type of analysis	Tool of Analysis
within selected urban areas in Kenya.		• Speed of payments to the suppliers by the contractor • Fluctuation in material, labour and plant cost over and above the project provisions • Stability of the local currency in relation to dollar value for donor funded projects • Status of donor funding • Contractor's cash flow status • Speed of payments to the Contractor by the client before they are due may lead to overpayment of some work items due to difficulties in tracking/controlling payment for approved work • Speed of payment to sub-contractors by the Contractor • Frequency of payment by the client for work already done by the contractor		Correlation analysis	
To assess how government policies influences cost of road Construction projects within selected urban areas in Kenya.	Government policies	• Economic stability affecting expenditure in ongoing projects • Sudden changes in minimum wage by the government • materials monopoly by some listed Government suppliers • Interest rates charged by banks on loans/investment borrowing • Lowest bidding procurement procedures by the Government • Change in Government leadership • Formation of Dispute resolution Board • Change in Government monetary and fiscal policies	Nominal ordinal	Descriptive statistics Regression analysis Correlation analysis	Mean, standard deviation

Objectives	Variable	Indicators	Measurement Scale	Type of analysis	Tool of Analysis
		• Changes in technology			
Cost of Road construction projects within urban areas	Dependent	• Project delivery timelines • Communication between different stakeholders • weather conditions • Project delivery method • Procurement method • Economic conditions (inflation, exchange rate, interest rate etc.) • Complexity of the project • Price fluctuation • Speed of decision making by the client • Financial position of the client	Nominal ordinal	Descriptive statistics Regression analysis Correlation analysis	Mean, standard deviation

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION &DISCUSSION

4.1. Introduction

This chapter focuses on data analysis, presentation interpretation and discussion. The purpose of this research was to identify factors influencing cost of Road construction projects within urban areas in Kenya with reference to the three cities. As such the study sought to establish how Contract management, Project schedule, Design and documentation, financial control systems and Government policies influence cost of road construction projects in urban areas in Kenya. The data was gathered from questionnaire as a research instrument and secondary data was utilized to supplement the primary data obtained. The questionnaire was designed in line with the study objectives. The chapter is organized to present the findings by first looking at the response rate, the demographic data and study variables.

4.2. Questionnaire return rate

The research study had a sample size of one hundred and thirty four (134) senior officials of the Construction firms, client representatives and consultants with adequate knowledge in Project Management and experience in construction industry who have supervised large road projects within the three cities. Out of this sample size 107 questionnaires were filled and returned to the researcher. This represented a response rate of 79.9%. According to Mugenda and Mugenda (2003), a 50% response rate is adequate, 60% good and above 70% rated very good. This also concurs with Kothari (2004) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. Therefore based on these assertions; the response rate of 79.9% for this study is satisfactory.

Table 4.2-1: Questionnaire return rate

	Number of respondents	**Percent**
Response	107	79.9
Non- Response	27	21.1
Total	**134**	**100**

4.3. Background Information

The demographic characteristics of the respondents were investigated in the first section of the questionnaire. They are presented in this section under gender, age, education, experience in construction Industry, and Nature of the organization.

Table 4.3-1: Respondents background information

Variable	Frequency	Percentage
Gender	**107**	**100**
Male	88	82.2
Female	19	17.8
Age (Years)	**107**	**100**
25 - 34 years	16	15.0
35 - 44 years	31	29.0
45 - 54 years	42	39.2
55 years and above	18	16.8
Education	**107**	**100**
Bachelor's Degree	68	63.6
Master's Degree	27	25.2
PhD	12	11.2
Number of years in Construction Industry	**107**	**100**
1-5 years	5	4.70
6-10 years	20	18.7
11-15 years	50	46.7
More than 16 years	32	29.9
Nature of the Organization	**107**	**100**
KeNHA	35	32.7
KURA	39	36.4
Contractor	18	16.8
Consultant	15	14.1

From the findings male respondents were more than their female counterparts at 82.2%. Traditional, Kenyan construction industry is male dominated due to the earlier belief that male are more suited for technical jobs than female. Number of years the respondent has had in Construction Company was also very significant in this study. Management of construction projects should be carried out by specially trained professionals with necessary knowledge and possess sufficient practical experience. Researchers have found many reasons that contribute to project delays, such

as the lack of knowledge and experience of incorporating the conditions and specifications of contract to the details and the procedure of the construction process (Bramble and Callahan (1992). Overall, most of the respondents had served for a reasonably long time hence they understood their work properly to provide accurate reliance on the data they offered about delay and cost overruns in public sector construction projects in Kenya and their causes.

4.4. Factors Influencing Cost of Road Construction Projects within urban areas

The purpose of the study was to investigate factors influencing cost of road construction projects. The study sought to establish the influence of contract management, project schedule, design and documentation, financial Control systems and government policies on cost of road construction projects within selected urban areas in Kenya. As such the study provided the various factors influencing cost of road construction projects in urban areas in Kenya and required respondents to rate the factors by ticking the appropriate scale ranging from 1-5 where 5 meant Strongly agree, 4 meant agree, 3 meant neutral, 2 meant disagree and 1 meant strongly disagree.

4.4.1.Contract Management

The study identified contract management as a factor leading to change in cost of road construction projects as shown in table 4.4-2 below:

Table 4.4-1: Contract management mean and standard deviation

Variable	N	Mean	Std. Dev.
Issuing site Instructions by the Resident Engineer	107	4.22	1.022
Frequency of design changes by the Engineer during project implementation	107	4.07	0.939
Speed of decision making by the Engineer (Approval of Contractors key staff, payment Certificates, design modifications, appraisals etc.)	107	3.96	1.427
Adequacy of supervision by the Engineer's team	107	3.68	1.322
Construction methodology/approach by the Contractor	107	3.91	1.178
Contractor's requisite experience (technical expertise, site management skills)	107	3.93	1.113
Project management knowledge and skills by engineer's staff assigned to the project e.g. Resident Engineer	107	3.97	1.201
Adequacy of quality control by the contractor and Resident Engineer	107	3.87	1.198

Variable	N	Mean	Std. Dev.
Rate of approval of completed sections by the Resident Engineer leading to slow progress of works by the Contractor	107	3.48	1.176
Scope changes by the client during project Implementation	107	4.21	0.714
Average	**107**	**3.93**	**1.1129**

The computed mean from the study showed that majority of respondents agreed that all the listed indicators of contract management influence cost of road construction projects in urban areas. However, frequency of design changes by the engineer during projects implementation, adequacy of supervision by the Engineers team assigned to the project and scope changes by the client during project Implementation were identified as the main indicators of contract management influencing cost of road construction projects within urban areas. The low standard deviation values recorded implied that the computed means were close to the actual responses from the respondents.

Slow decision making by the Engineer and poor qualification of the Engineer and staff assigned to the project were some of the main causes of cost overruns in projects. These findings also concur with Xiaohong (2011) that construction contractors and Engineers have big influences upon projects and their successes. A contractor is the one who carries out the real construction; the contractor who has been offered the tender begins by figuring out the satisfactory plan, allocating each manpower and required assets, linking all of the legal partners and delivering the project within the set timeline and cost. The findings were also line with Akinsola et al. (1997) who noted that design changes are any additions, omissions or adjustments made to the original scope of work after a contract is warded and may cause an adjustment to the contract price or contract time, and it occurs regularly on construction projects. Design changes usually result into uncertainties that make construction dynamic and unstable hence the contractor cannot adequately program for the works.

Assaf and Mohammed (1995) studied the cause of delay in large infrastructure projects in Saudi Arabia and identified lack of experience in understanding the principles of contract management by the top management of the supervision team may create conflict during project execution. A study done by Aibinu and Odeyinka (2006) on public sector construction projects delay and cost overruns and what influences them emphasized that inappropriate and adequate procurement and faulty contractual management system leads to cost overrun and delay in project execution.

Contracts read out virtually every aspect of a business correlation, including payment terms, pricing, and service levels. Therefore a contract that has not highlighted the entire project scenario may lead to dispute in the contract system; example is where if the initial contract does not completely specify every relevant aspect of the project work. This may lead to long chains of negotiations, arbitration contractual agreement with unclear and/ or mitigation due to work change

4.4.2.Project Schedule

The study findings show that project schedule influence cost of road construction projects since challenges associated with relocation of services, lengthy land acquisition process, prolonged abnormal weather conditions delay commencement and completion time for construction projects urban areas in Kenya as tabulated in table 4.4-2.

Table 4.4-2: Project schedule mean & standard deviation

Variable	N	Mean	Std. Dev.
Relocation of utilities (power, water, data services and sewer lines)	107	4.08	0.859
land acquisition process	107	4.57	0.601
Time lines between design and procurement phase	107	4.03	0.874
Supply of raw materials and equipment by contractors (mobilization)	107	3.85	1.062
Issuance of EIA and mining license by NEMA	107	4.21	0.810
Weather condition due to heavy rains and flooding,	107	4.03	1.022
Time lines for reparation of drawings and other Contract documents by the client	107	3.40	1.063
Political interference during project implementation	107	4.21	0.922
Availability of manpower , skilled , unskilled labour & experts for specialized work items	107	3.66	0.921
Approval of proposed subcontractors by the Engineer	107	3.65	1.125
Average	**107**	3.969	0.926

The findings indicated that majority of the respondents indicated that relocation of utility services, land acquisition process, and weather conditions during project implementation and timelines for preparation of drawings and other contract documents were the key schedule indicators influencing cost of road construction projects. All the listed projects schedule indicators were found to be have influence on cost of road construction projects within urban areas, however, delays attributed to lengthy land acquisition process and Inclemental weather condition during project implementation were found to have significant effect on project schedule hence influencing cost of road construction projects.

Delays due to utility relocation are very significant, often observed to be in the range of 6-12months according to the study. The critical factors causing these delays are slow response from utility agencies, difficulty in identification of the nature and location of underground utilities often due to lack of information, as well as conflict between agencies. The study noted the process of acquiring land for road construction was a lengthy and tedious process that involved many legal and social procedures and complex financial settlements for the project affected people which ultimately affect road construction cost if not adequately dealt with during planning. Abnormal weather conditions such us too much rainfall outside the documented rainy seasons and flash floods greatly slowed down the progress of work since certain work items such as Earthworks, laying of bituminous mixes and concrete works can only be done during dry season. Adverse weather conditions entitles a contractor to extension of time beyond the contract provisions resulting to extra cost on the road construction projects. The study also found that manpower shortage skilled, unskilled labour & experts for specialized work items, delay in supply of raw materials and equipment by contractors (mobilization) result in change in cost of road construction projects in Kenya.

The findings are in line with Findings from a study done by Kogi (2013) reported that delay and cost overrun of public sector construction projects occur entirely in the early stages of the project i.e. during the planning stages of project development. The project owners may be responsible for the delays, suspensions or interruptions to all or part of the work are caused by an act or failure to act by the owner resulting from breaches of owner‘s obligations, stated or implied. These include failure of the owner or his representative (consultants) to furnish the contractor with relevant information, details, etc, for which the contractor has specifically requested in writing. In addition, he said that the project owners were responsible for delays in issuing approvals, signing contracts and allowing site access. These findings also concur with Jeykanthan and Jawardena (2012) that Inadequate feasibility studies, Errors and omissions in detail designs, Improperly harmonized procurement documents, Shortcomings in contract document, Stakeholder identification and management issues, Variation and scope changes, Land acquisition and resettlement, Extreme weather, Shortage of construction materials were major factors influencing cost of road construction projects.

Pathiranage and Halwatura (2010) also found that Financial problems of the owner as well as the contractor, Poor site management by the contractor, Poor weather condition, Contract modification, Incomplete document/slowness in making decision, Shortage of site labour and material, Lack of sub contractor's skill/ poor skills, Construction mistakes and defective works, Poor site condition were main causes of changes in cost of infrastructure projects. Chilipunde, (2010) noted that contractors' improper planning is one of the major causes of project delay. Failure by the contractor to come up with a workable work program at the initial stages of the project affect project timely completion leading changes in project cost.

4.4.3.Design and Documentation

In its third specific objective the study sought to examine the level at which design and documentation influence cost of Road construction projects within urban areas and the findings were as shown below;

Table 4.4-3: Design and documentation mean &standard deviation

Variable	N	Mean	Std. Dev.
Errors and omissions in the design and documentation	107	3.40	1.063
consistency and clarity in specifications and drawings	107	4.57	0.601
Accuracy of quantity take-off leading to inaccurate Engineer's estimate	107	4.21	0.922
Changes in ground conditions during project implementation	107	4.03	1.023
Incomplete scope identification and unclear specifications leading frequent change orders during implementation	107	3.84	1.117
Deliberate underestimation of project cost by the client to make it more feasible	107	3.79	1.108
Methods for computation of project duration	107	4.01	0.986
Adequacy of provided contingencies in the contract	107	3.81	0.859
Engineer's lack of professional design experience and competence	107	3.99	1.005
Cost estimation methods	107	4.29	0.880
Average	**107**	**3.994**	**0.9564**

The study findings indicate that majority of the respondents agreed all the listed design and documentation indicators influenced cost of road construction projects in urban areas. However consistency and clarity in specifications and drawings, accuracy of quantity take-off, changes in ground conditions during project implementation, methods for computation of project duration and cost estimation methods had higher influencing on cost of road construction projects in Kenya.

Challenges associated with incomplete scope identification and unclear specifications, Engineers lack of professional design experience and competence and errors and ommisions led to delays in delivery timelines. Design reviews done during project implementation due to errors, ommisions and inadequate scope definition during planning resulted into additional work to the contractor through introduction of new work items or addition quantities in the Bill of Quanties. It is there to important to engage competent engineers at the design state to prevent cost changes as a result of errors, ommisions and underestimation of project duration. Design Engineers should constantly update themselves with new design technologies that are geared towards elimination of human errors at the design stage.

This findings correlates with Love, Smith, Simpson, Regan and Olatunji (2015) who argues that another way in which design errors could lead to cost Variation and time delay could be seen in the fact that project estimations are done based on the produced designs, as such, having errors in design in a form of omission or misrepresentation meant that the estimation for the project cost will also include these omissions, thereby leading to extra works, change order etc., thus resulting in additional cost to the project. Achieving an error free design entails good communication with the entire design team and integrating design process that is properly planned, giving enough time for corrections and extensive investigation. The study is also in line with a study done by Llyvberg (2009) on causes of delay and time overruns on construction projects, he attested that one major factor that has been identified to influence cost and time overruns in most projects is design errors. It is important to note that proper representation of client‘s requirement and the blue print to achieve good technical input to project execution are usually mapped out based on project design.

Moreover, a design with errors practically means wrong or insufficient representation of project deliverables. This will lead to wrong application of techniques in achieving result, such that as the actual execution phase of the project unfolds these design errors, attempt to correct it will lead to delay and cost overrun. He further said that another way design errors could lead to cost overruns and delay could be seen in the fact that project estimations are done based on the produced designs, as such, having errors in design in a form of omission or misrepresentation will mean that the estimation for the project cost will also include also include these omissions, thereby leading to extra works, change order etc., thus resulting in delay and cost overrun. He said that achieving an error free design entails good communication with the entire design team and integrating design

process that is properly planned, giving enough time for corrections, extensive investigation. Similarly, an effective project planning, controlling and monitoring should be established to enhance project performance through the project life cycle. Proper investigation should be done to ensure that all site conditions are noted in the design, and application of value management could be used to obtain the best cost effective design option

4.4.4.Financial Control Systems

The respondent sought to determine the extent to which financial Control systems influence cost of road construction projects within urban areas and the findings were shown;

Table 4.4-4: Financial control systems mean & standard deviation

Variable	N	Mean	Std. Dev.
Employer's cash flow position	107	4.21	0.714
Frequency of progress payment by the client for works already done by contractor	107	4.08	0.859
Delayed payments to the suppliers by the contractor hence shortage of material supply on site	107	3.91	1.178
Variation in material, labour and plant cost over and above the project provisions	107	3.93	1.113
Stability of the local currency in relation to dollar value for donor funded projects	107	3.97	1.201
Reliability of donor funding	107	3.87	1.198
Contractor's cash flow	107	3.48	1.176
Monitoring/controlling payment for works done	107	3.96	1.427
Payment to sub-contractors by the Contractor	107	3.68	1.322
Speed of payment the client's organization	107	3.66	0.921
Average	**107**	**3.875**	**1.1109**

The study indicates that respondents agreed that majority of the listed financial control systems influenced cost of road construction projects in Kenya. However, Employer's cash flow position followed by frequency of progress for work done and finally Stability of the local currency in relation to dollar value for donor funded projects indicators of were the main financial control systems indicators influencing cost of road construction projects in urban areas in Kenya.

The study established that delayed progress payments by the client affects cash flow of the contractor since the client delays payment for work already done by the contractor. This implies that the contractor does not have enough cash flow to continue with more work. Payment delays due to Complex payment structure within the client's establishment e.g. long chain of approvers'

leads to increase in cost of road construction project due to interest charged by the Contractor on late payments usually 6months. Most donor funded projects have their payment currency in dollars hence any loss of value of the local currency against the dollar means that the client has to incur the extra cost leading to increase in cost of the project. Contractor's cash flow problems leading to delay or non-payment of workers' wages result to strikes leading to slow progress hence time overruns. High inflation in the Country lead to increase in material, labour and plant prices way above the project provisions. This costs over and above the contract provisions are borne by the client.The study also established that cost of road construction projects was affected by withdrawal of donor funding due fraudulent practices including kickbacks, inflating of land prices in case of land acquisition and failure to account for donor funds by the Government. The withdrawal of funding pose financial challenges to road construction projects since the client if forced to look for funds from the already limited resources to finance the project leading to payment delays and sometimes termination of such Contracts. The study further found that making payments to the Contractor for works not yet done lead to overpayment of some work items due to difficulties in tracking/controlling payment for approved work. This findings concur with a study conducted by Roachanakanan (2005) which found out that the structure and timing of financial provision may impose certain constraints on the design and scheduling of the project. This may be simply because all the funding for the project is not yet in place and/or the risk is too great to commit even the design costs of a project that may not receive the grant. Majority of constructors are small players who have weak financial positions, outdated labor-intensive technology and poor organizational structures and vision for growth and development. They are highly vulnerable to government policies and changes in government policies which is a leading factor of cost overrun related to Business and Regulatory environment, which encourages corner cutting and unsound construction methods is the prevailing practice of the government to implement its lowest bid price method, which has various inbuilt problems and cannot produce the best value. Often, such an occurrence works to the owner's and contractor's harm by creating disputes, cost overruns, and schedule delays methods used for cost estimation during the project cost scheduling are not adequate enough to cover all aspects of cost of projects in result various cost items necessary for the project remain unidentified at the estimation stage and appears as cost overruns later. Olawale (2010) in his study identified delay and cost overrun as generated by inaccurate evaluation of the target financing options to be used in facilitating the construction projects to the required levels but instead the

inaccuracies influences overshot in project costs as well as delay in project completion. He recommended proper and accurate evaluation of the financing structure to be used in execution of the planned construction projects to avoid facing financing difficulties.

4.4.5. Government Policies

The study sought to assess how government policies influence cost of road construction projects within urban areas in Kenya and the findings are shown below;

Table 4.4-5: Government Policies mean & standard deviation

Variable	N	Mean	Std. Dev.
Economic stability	107	4.02	1.447
Sudden changes in minimum wage by the	107	4.03	0.895
Project materials monopoly by some listed Government suppliers	107	3.87	1.214
Interest rates charged by banks on loans/investment borrowing	107	3.95	1.111
Public Procurement Act	107	3.93	1.257
Change in Government leadership result in changed development priorities by the new	107	3.88	1.257
Formation of Dispute resolution Board	107	3.41	1.259
Sudden change in taxation by the government	107	4.24	0.698
Changes in technology	107	3.68	1.418
Environmental protection and mitigation costs emissions, rehabilitation of quarries and borrow pits etc.)	107	3.71	0.932
Average	**107**	**3.872**	**1.1488**

The findings show that all the listed government policies indicators influence cost of road construction projects in urban areas. However, sudden change in taxation, change in technology and sudden changes in minimum wage by the government had higher influencing on cost of road construction projects in urban areas.

The study found that delay in securing statutory and regulatory approval and various licenses such as Environmental and Impact Assessment certificates, Occupation, Health and safety approvals, Licenses for construction equipment and work permits for foreign experts affect the commencement of road construction projects affecting projects delivery timelines. Delayed commencement meant more was required to complete the project hence extra cost requirement. Public Procurement and Asset Disposal Act encourages contract awards to lowest evaluated

bidders. This has led to bidders quoting rates way below the market rate for work items hence they are not able to deliver the projects at the agreed contract sum. The study established that change in Government leadership may result in change of development priorities by the new government leading to reduced financing or abandonment of ongoing construction. The payment delays and or termination of ongoing roads projects led to increase in cost due to interest charged on delayed payment and claims/damages charge by contractor due to termination. Increase in minimum wage by the government forced the Contractor to increase the wages of project workers and sudden increase in taxation by the government forced the contractor incur additional costs on materials and operational costs, a cost difference which was transferred to the client. The study also established that economic instability in the Country had forced the government to cut down on Infrastructure expenditure affecting cash flow in ongoing projects. The study further revealed that changes in technology required the Contractor to incur additional cost of acquiring new machinery and that late formation of Dispute resolution Board lead to delayed arbitration process resulting into stalemate or termination of some of the road projects. These findings concurs with Markenson (2016) who argues that there is often a recurring delay in securing regulatory approvals from governing bodies and various ministries. For Example, inability to secure forest approvals for tree cutting required for a highway expansion project led to substantial project delays. Similarly, a major highway project could face a delay of around one year due to delay in executing the State-support agreement towards shifting the utilities services to make way for construction. In many cases even after securing clearances, it has been observed that time taken for activities such as relocation of power lines is often prolonged to as much as 12 months, primarily due to approval structures within the Government utility agencies.

4.4.6.Cost of Road Construction Projects

The study sought to establish the factors that determine cost of roads construction projects in Kenya and the findings are shown in the table below.

Table 4.4-6: Cost of Road Construction Projects mean & standard deviation

Variable	N	Mean	Std. Dev.
Project delivery timelines	107	4.01	.986
Availability of quality construction materials	107	3.81	.859
Stakeholder satisfaction	107	3.99	1.005
Land tenure	107	4.29	.880
Average	**107**	**4.025**	**0.9325**

Majority of respondents agreed that land tenure, project timelines, stakeholder satisfaction and availability of quality construction materials influence cost of road construction projects in urban areas,

Table 4.4-7: Composite mean & standard deviation

	N	Mean	Std. Dev
Contract management	107	3.930	1.1129
Project scheduling	107	3.969	0.926
Design and documentation	107	3.994	0.9564
Financial control systems	107	3.875	1.1109
Government policies	107	3.872	1.1488
Composite mean	**107**	**3.928**	**1.051**

From the findings the respondents agreed that contract management, project schedule, design and documentation, financial control systems and government policies all influence cost of road construction projects in urban areas. Majority of respondents indicated that design and documentation and project schedule have higher influence on cost of road construction projects within urban areas.

4.5. Regression Analysis

Inferential data analysis was conducted using multiple regression analysis. Multiple regression analysis was conducted to establish the relations between the independent and dependent variables. The multiple regression model was chosen because it is useful in establishing the relative importance of independent variables to the dependent variable. Regression analysis shows how dependent variable is influenced by independent variables. The study sought to investigate on factors influencing cost of road construction projects within urban areas in Kenya.

The study sought to finds out the relationship between the independent variables and the dependent variables

4.5.1.Contract Management and cost of road construction projects

Table 4.5-1: Contract Management model summary

Model	R	R^2	Adjusted R^2	Std. Error
	.535[a]	.286	.279	.747

a. Predictors: Contract management

Table 4.5-1 displays the R, R^2, the adjusted R^2 and its standard error of estimate. These show how a regression model can fit into the data. The value of R^2 is 0.286 which implies that contract management accounts for 28.6% of changes in cost of road construction projects within urban areas.

Table 4.5-2: Contract Management One Way ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	23.440	1	23.440	42.015	.000[b]
	Residual	58.579	105	.558		
	Total	82.019	106			

a. Dependent Variable- cost of road construction projects
b. Predictors- contract management

From ANOVA table 4.5-2, the value of F is 42.015 and the *p* value is .000 which is <.05. This implies that the influence of Contact management on cost of road construction projects was significant. Subsequently, we reject the hypothesis that contract management has no significant influence on cost of road construction projects within urban areas.

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.735	.251		10.915	.000
	Contract management	.392	.060	.535	6.482	.000

a. Dependent Variable- cost of road construction projects

Table 4.5-3: Contract Management coefficients

The value of β in table 4.5-3 is .535 meaning that on its own, a unit increase in contract management leads in 0.535 increase in cost of road construction projects. The value of *t* is 10.915 higher than +2, which is the critical value. This means that on its own, Contract management's influence on cost of road construction projects is significant at a confidence level of 95%

4.5.2. Project Schedule and cost of road Construction projects

Table 4.5-4: Project Scheduling model summary

Model	R	R^2	Adjusted R^2	Std. Error
	.475[a]	.225	.218	.815

a. Predictors: Project schedule

Table 4.5-4 shows values for R, R^2, the adjusted R^2 and its standard error of estimate. The value of R^2 is 0.225; this is an indication that project schedule accounts for 22.5% of changes in cost of road construction projects when all the other factors are held constant.

Table 4.5-5: Project Schedule One way ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	20.296	1	20.296	30.548	.000[b]
	Residual	69.760	105	.664		
	Total	90.056	106			

a. Dependent Variable- cost of road construction projects
b. Predictors- Project scheduling

From ANOVA table 4.5-5, the value of F is 30.548 and the *p* value is .000 which is <.05 meaning that on its own the effect of project schedule on cost of road construction projects was significant. Subsequently, we reject the hypothesis that project schedule has no significant influence on cost of road construction projects within urban areas.

Table 4.5-6: Project Schedule coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.996	.234		12.792	.000
	Project scheduling	.331	.060	.475	5.527	.000

a. Dependent Variable- cost of road construction projects

The value of β in table 4.5-6 is .475 implying that a unit increase in project schedule leads to 0.475 increase in cost of road construction projects. The value of *t* is 12.792 higher than +2, which was the critical value. This means that project scheduling influence on cost of road construction projects in urban areas was significant at a confidence level of 95%.

4.5.3.Design and documentation and cost of road construction projects

Table 4.5-7: Design and documentation model Summary

Model	R	R^2	Adjusted R^2	Std. Error
	.580[a]	.337	.330	.822

a. Predictors: Design and documentation

Table 4.5-7 shows values of R, R^2, the adjusted R^2 and its standard error of estimate. The value of R^2 was 0.337 meaning design and documentation accounts to 33.7% of changes in cost of road construction projects within urban areas in Kenya.

Table 4.5-8: Design and documentation One Way ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	36.027	1	36.027	53.306	.000[b]
	Residual	70.964	105	.676		
	Total	106.991	106			

a. Dependent Variable- Cost of road construction projects
b. Predictors- Design and documentation

From ANOVA table 4.5-8, the value of F is 53.306 and the *p* value is .000 which is <.05 meaning that on it's the influence of design and documentation on cost of road construction projects was significant. Subsequently, we reject the hypothesis that design and documentation has no significant influence on cost of road construction projects within urban areas.

Table 4.5-9: Design and documentation Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.367	.236		10.019	.000
	Design and documentation	.441	.060	.580	7.301	.000

a. Dependent Variable- cost of road construction projects

The value of β in table 4.5-9 is .580 meaning that on when all factors are constant, a unit increase in design and documentation led to 0.580 increase in cost of road construction projects within urban areas. The value of *t* is 10.019 higher than +2, which is the critical value. This means that on its own, design and documentation's influence on cost of road construction projects within urban areas was significant at a confidence level of 95%.

4.5.4.Financial Control Systems and cost of road construction projects

Table 4.5-10: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error
	.529[a]	.279	.273	.750

a. Predictors: Financial Control Systems

Table 4.5-10 displays values of R, R^2, the adjusted R^2 and its standard error of estimate. The value of R^2 was 0.279; this was an indication that Financial Control Systems can explain 27.9% of changes in cost of road construction projects within urban areas.

Table 4.5-11: Financial Control Systems One Way ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.920	1	22.920	40.720	.000[b]
	Residual	59.099	105	.563		
	Total	82.019	106			

a. Dependent Variable- cost of road construction projects
b. Predictors- Financial Control Systems

From ANOVA table 4.5-11, the value of F was 40.720 and the *p* value is .000 which is <.05 meaning that on its own the influence of design and documentation on cost of road construction projects was significant. Subsequently, we reject the hypothesis that financial control systems have no significant influence on cost of road construction projects within urban areas.

Table 4.5-12: Financial control systems coeffients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	2.788	.246		11.323	.000
	Financial Control Systems	.388	.061	.529	6.381	.000

a. Dependent Variable- cost of road construction projects

The value of β in table 4.5-12 was .529 meaning that on its own, a unit increase in design and documentation leads in 0.529 increase in cost of road construction projects. The value of *t* is 11.323 higher than +2, which is the critical value. This means that on its own, Financial Control Systems' influence on cost of road construction projects was significant at a confidence level of 95%.

4.5.5.Government Policies and cost of road construction projects

Table 4.5-13: Government Policies model summary

Model Summary				
Model	R	R^2	Adjusted R^2	Std. Error
	.266[a]	.071	.062	.852

a. Predictors: Government Policy

Table 4.5-13 shows R, R^2, the adjusted R^2 and its standard error of estimate. The value of R^2 was 0.071; an indication that Government Policy can explain 7.1% of changes in cost of road construction projects within urban areas.

Table 4.5-14: Government Policies One Way ANOVA

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.785	1	5.785	7.967	.000[b]
	Residual	76.234	105	.726		
	Total	82.019	106			

a. Dependent Variable- cost of road construction projects
b. Predictors- Government Policy

From ANOVA table 4.5-14, the value of F is 7.967 and the *p* value is .000 which is <.05 meaning that when all the other factors are constant the influence of Government Policies on cost of road construction projects was significant. Subsequently, we reject the hypothesis that government policies have no significant influence on cost of road construction projects within urban areas.

Table 4.5-15: Government policies coefficients

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.545	.276		12.827	.000
Government Policy	.192	.068	.266	2.823	.006

a. *Dependent Variable- cost of road construction projects*

The value of β in table 4.5-15 was .266 meaning that on its own, a unit increase in Government Policy led to 0.266 increase in cost of road construction projects within urban areas. The value of *t* is 12.827 higher than +2, which is the critical value. This means Government Policies influence on cost of road construction projects was significant at a confidence level of 95%.

4.6. Multiple regression analysis

Multiple regress analysis was applied to investigate the combined effect of all the independent variables on cost of road construction projects within urban areas in Kenya.

Table 4.6-1: Multiple regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.811[a]	.658	.641	.527

a. *Predictors: (Constant), contract management, project schedule, design and documentation, financial control systems, government policies*

Table 4.6-1 gives values of R, R^2, adjusted R^2 and its standard error of estimate, showing how a regression model fits into the data. The value of R^2 is 0.658, an indication that all the five independent variables notably; (X_1) Contract management; (X_2) Project scheduling; (X_3) Design and documentation; (X_4) Financial control systems and (X_5) Government polices account for 65.8% of Y= cost of road construction projects. This meant that 34.2% of cost of road construction projects within urban areas was influenced by other factors not covered in this study.

Table 4.6-2: Multiple regression One Way ANOVA

ANOVA[a]					
Model	Sum of Squares	df	Mean Square	F	Sig.

Regression	53.977	5	10.795	38.883	.000[b]
Residual	28.042	101	.278		
Total	82.019	106			

a. Dependent Variable: Cost of road construction projects
b. Predictors: (Constant), contract management, project schedule, design and documentation, financial control systems, government policies

From ANOVA table 4.2-6, the value of F is 38.883 and the *p* value is .000 which is <.05 meaning that collectively; contract management, project schedule, design and documentation, financial control systems and government policies had significant influence on cost of road construction projects within urban areas. Subsequently, we reject the hypothesis that there is no the combined independent variables have no significant influence on cost of road construction projects within selected urban areas

Table 4.6-3: Multiple regression coefficient of determinant

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.268	.305		.879	.382
Contract Management	.203	.068	.278	2.995	.003
Project schedule	.548	.070	.574	7.791	.000
Design and documentation	.241	.077	.275	3.129	.002
Financial Control systems	.180	.080	.245	2.259	.026
Government policy	.166	.044	.228	3.752	.000

a. Dependent Variable- cost of road construction projects

From the regression results in table 4.27, of the five variables, project scheduling has the highest contribution to cost of road construction projects (β=0.574) followed by contract management (β=0.278), then design and documentation (β=0.275), then financial control systems (β=0.245) and lastly Government policies (β=0.228).

The significance, *p* value for contract management is .003, meaning that contract management had a significant effect on cost of road construction projects. This is confirmed by the *t* value being 2.995 which is greater than the critical value of +2.

The significance, *p* value for project scheduling is .000, meaning that project scheduling had a significant effect on cost of road construction projects. This is confirmed by the *t* value being 7.791 which is greater than the critical value of +2.

The significance, *p* value for design and documentation is .002, meaning that design and documentation had a significant effect on cost of road construction projects. This is confirmed by the *t* value being 3.129 which is greater than the critical value of +2.

The significance, *p* value for financial control systems is .026, meaning that financial control systems had a significant effect on cost of road construction projects. This is confirmed by the *t* value being 2.259 which is greater than the critical value of +2.

The significance, *p* value for government policy is .000, meaning that government policy had a significant effect on cost of road construction projects. This is confirmed by the *t* value being 3.752 which is greater than the critical value of +2.

The regression equation used for the study was ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5$), where:

Y was cost of road construction projects within urban areas in Kenya

X_1 was contract management

X_2 was project scheduling

X_3 was design and documentation

X_4 was financial control systems

X_5 was government policy

Substituting the standardized β coefficients for three variables to the above equation yields

$Y = 0.268 + 0.278X_1 + 0.574X_2 + 0.275X_3 - 0.245X_4 + 0.228X_5$ which was interpreted as:

Cost of road construction projects within urban areas in Kenya = 0.268 +0.278 contract management + 0.574 Project scheduling+ 0.275 design and documentation – 0.245 financial control systems + 0.228 government policy.

Therefore, if all factors were at zero, cost of road construction projects within urban areas in Kenya would be at 0.268. The findings also displayed that putting all other variables constant, a unit increase in contract management led to a 0.278 change in cost of road construction projects within urban areas in Kenya. A unit increase in project schedule led to a 0.574 change in cost of road construction projects within urban areas in Kenya; a unit increase in design and documentation will lead to a 0.275 change in cost of road construction projects within urban areas in Kenya; a unit increase in financial control systems will led to a 0.245 change in cost of road construction projects within urban areas in Kenya; lastly a unit increase in government policies led to a 0.228 change in cost of road construction projects within urban areas in Kenya.These findings relate to those by Chinn and Kramer (2010) that major factors that lead to changes in cost of many construction projects include government policies, contract management methods and project schedule

4.7. Correlation Analysis

The study sought to finds out the correlation between the independent variables and the dependent variables. The results show a positive correlation between the independent variables and dependent variable shown in table 4.11.

Table 4.7-1: Correlation between variables

Correlations							
		Contract management	Project schedule	Design & documentation	Financial control systems	Govern policies	Cost of Road Construction Project
Contract management	Pearson Correlation	1	0.423	0.602	0.771	0.166	0.535
	Sig. (2-tailed)		.000	.000	0.000	0.088	0.000
	N	107	107	107	107	107	107
Project schedule	Pearson Correlation	0.423	1	.563	0.564	0.076	0.725
	Sig. (2-tailed)	0.000		.000	0.000	0.437	0.000
	N	107	107	107	107	107	107
Design and documentation	Pearson Correlation	0.602	0.563	1	0.696	-.016	0.590
	Sig. (2-tailed)	.000	0.000		0.000	0.866	0.000
	N	107	107	107	107	107	107
Financial control and systems	Pearson Correlation	0.771	0.564	.696	1	0.196	0.529
	Sig. (2-tailed)	0.000	0.000	.000		0.043	0.000
	N	107	107	107	107	107	107
Government policies	Pearson Correlation	0.166	0.076	-0.016	0.196	1	0.266
	Sig. (2-tailed)	0.088	0.437	.866	.043		0.006
	N	107	107	107	107	107	107
Cost of Road Construction Projects	Pearson Correlation	0.535	0.725	0.590	0.529	0.266	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.006	
	N	**107**	**107**	**107**	**107**	**107**	**107**

From the study, the Pearson's correlation coefficients were as follows: Contract management and Project scheduling ***r***=0.423; Contract management and design and documentation ***r***=0.602; Contract management and financial control systems ***r***=0.771; Contract management and government policies ***r***=0.166; Contract management and cost of road construction projects ***r***=0.535; Project scheduling and design and documentation ***r***=0.563; Project schedule and financial control systems ***r***=0.564; Project schedule and government policies ***r***=0.076; Project schedule and cost of road construction projects ***r***=0.725; Design and documentation and financial control systems ***r***=0.696; Design and documentation and government policies ***r***=0.016; Design and documentation and cost of road construction projects ***r***=0.590; Financial control systems and government policies and ***r***=0.196; Financial control systems and cost of road construction projects ***r***=0.529; and Government policies and cost of road construction projects ***r***=0.266.

The results indicate that all the five factors, contract management, project schedule, design and documentation, financial control systems and government policies have a positive correlation with cost of road construction projects within urban areas. However, project schedule has the highest influence on cost of road construction projects at a correlation coefficient of r=0.725 while government policies have the least influence on cost of road construction projects within urban areas at a correlation coefficient of r=0.266.

CHAPTER FIVE
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presented summary of the findings, conclusions as well as the recommendations of the study. This study focused on the factors influencing cost of Road construction projects within urban areas in Kenya.

5.2. Summary of Findings

5.2.1. Contract Management

The study sought to determine the extent to which Contract Management influence cost of Road construction projects within urban areas in Kenya. The study established that when all the other factors are kept constant, contract management contributes to 28.6% of changes in cost of road construction projects within urban areas. However with other factors into play, a unit change in contract management led to 0.278 change in cost of road construction projects in urban areas. This changes were as a result of inadequacy of supervision by the Engineer's team, project management knowledge and skills by engineer's staff assigned to the project, speed of decision making by the Resident Engineer (Approval of Contractors key staff, payment Certificates, design modifications, appraisals) , delays in issuing site Instructions by the Resident Engineer leads to increase in project costs. The study also established that increase in projects costs is attributed to additional work by the client during project Implementation, construction methodology/approach by the Contractor, adequacy of quality control by the contractor and Engineer's supervision team during construction and delay in approval of completed sections by the Resident Engineer leading to slow progress of works by the Contractor influence cost of road construction projects..

5.2.2. Project Schedule

The study further sought to assess how project schedule influence cost of Road construction projects within urban areas. The study revealed that project schedule contributes to 22.5% of changes in cost of road construction projects when all the other factors are kept constant. A unit increase in project schedule lead to 0.574 change in costs of road construction projects within urban areas. These changes were attributed to delay in giving possession/access of site to the contractor by the client due to relocation of utility services and delays caused by lengthy and

expensive land acquisition process, late preparation of drawings and other Contract documents by the client and delay in approval of proposed subcontractors by the Engineer. The study also established that other contributors of increased project costs are delays between design and procurement phase, bad or inclement weather due to heavy rains and flooding, political interference during project implementation and delays in issuance of statutory and regulatory approvals and licenses. The study also found that manpower shortage skilled, unskilled labour & experts for specialized work items, delay in supply of raw materials and equipment by contractors (mobilization) and delay in relocation of services (power, water and sewer lines) may result in increase in project costs.

5.2.3. Design and Documentation

The study also sought to examine the level at which design and documentation influence cost of Road construction projects within urban areas. The study established that design and documentation contributes 33.7% of changes in cost of road construction within urban areas when all other factors are constant. A unit change in design and documentation led to 0.275 change in cost of road contraction projects within urban areas. Tis changes were attributed to incomplete scope identification and clear specifications leads to frequent changes during implementation Moreover, it was established that increase in project costs may be attributed to errors and omissions in the design and documentation, engineer's lack of professional design experience and competence, inconsistencies and ambiguities in specifications and drawings, lack/inadequate provision to take care of Contingency sum, inaccurate quantity take-off leading to inaccurate Engineer's estimate, deliberate underestimation of project cost by the client to make it more feasible and underestimation of Project duration leading to insufficient time available for completing all the components of the project. It was also established that incorrect and inappropriate methods of cost estimation and unforeseen ground conditions during design stage by the Engineer may also lead to cost overruns.

5.2.4.Financial control systems

The study sought to determine the extent to which financial Control systems influence cost of Road construction projects within urban areas. The study found that financial control systems contributes 27.9% of changes in cost of road construction projects when all the other factors are held constant. However a unit in decrease in financial control systems led to 0.245 change in cost of road

construction projects within urban areas. These changes were as a result of delayed payments to the suppliers by the contractor hence shortage of material supply on site, delay in payment due to Complex financial procedures in the client's organization, unsettlement of the local currency in relation to dollar value for donor funded projects, contractor's cash flow problems leading to delay or non-payment of workers' wages resulting to strikes by workers and fluctuation in material, labour and plant cost over and above the project provisions. The study also established that cost of road construction projects is affected by withdrawal of donor funding due fraudulent practices including kickbacks may result in Project financial challenges. The study further found that making payments to the Contractor by the client before they are due may lead to overpayment of some work items due to difficulties in tracking/controlling payment for approved work and that employer's cash flow problems may lead to late payment to the contractor hence interest on late payment. The study further established that respondents were however neutral that delayed payment to sub-contractors by the Contractor may lead slow progress, abandonment, poor quality and contractual claims and that irregular progress payments by the client affecting Contractor's cash flow hence progress.

5.2.5.Government policies

The study sought to assess how government policies influences cost of Road construction projects within urban areas. The study found that government policies contribute only 7.1% of changes in cost of road construction projects when all other factors are constant. A unit increase in government policies however led to 0.228 change in cost of road construction projects within urban areas. The preference accorded to the lowest evaluated bidder by the current Public Procurement Act has led to bidders using rates way below the market prices ultimately not being able to deliver the project at the awarded contract sum, that change in Government leadership may result in change of development priorities by the new government leading to reduced financing or abandonment of ongoing projects, sudden increase in minimum wage by the government may force the Contractor to increase the wages of labourers a cost which is ultimately passed on to the client.

The study also established that sudden increase in taxation by the government may force the contractor incur additional costs on materials and operational costs which amount to price variations, that economic instability may force the government to cut down on Infrastructure expenditure affecting cash flow in ongoing projects. The study further revealed that changes in

technology may require the Contractor to incur additional cost on acquiring new machinery and late formation of Dispute resolution Board may lead to delayed arbitration process resulting into possible stalemate or termination of the contract.

5.3. Conclusions

The study concluded that contract management, project schedule, Design and documentation, financial control systems and government policies influence cost of road construction projects within urban areas in Kenya significantly. The study noted that contract management influences cost of road construction projects due to inadequate supervision by the Engineer's team, project management knowledge and skills by engineer's staff assigned to the project, speed of decision making by the Engineer, delays in issuing site Instructions delays progress of works. Moreover, change in projects costs was attributed to additional work by the client during project Implementation hence the contractor had to mobilize more resources not envisaged at the planning stage, construction methodology/approach by the Contractor and adequacy of quality control by the contractor and Resident Engineer during construction led to reworking of failed sections resulting into change in cost of road construction projects.The study also established that project schedule influence cost of road construction projects within urban areas in Kenya due to delayed relocation of utility services by the service providers, lengthy land acquisition process, late preparation of drawings and other Contract documents by the client, delay in approval of proposed subcontractors by the Engineer. The study noted delays between design and implementation phase implied by the time the project is implemented so many variations interms of prevailing market prices, ground conditions and traffic demands would have occurred leading to extra cost requirements for the project. Inclemental weather due to heavy rains and flooding slowed down progress of activities falling on the critical path, ultimately affecting the project completion timelines. Political interference during project implementation such as labour issues, mining rights and route locations also delayed road construction projects leading to changes in cost. The study concluded that design and documentation influenced cost of road construction projects within urban areas significantly. Increase in road construction project costs was attributed to errors and omissions during design and documentation, engineer's lack of professional design experience and competence, inconsistencies and ambiguities in specifications and drawings, lack/inadequate provision to take care of Contingency sum, inaccurate quantity take-off leading to inaccurate Engineer's estimate, deliberate underestimation of project cost by the client to make it more

feasible and underestimation of Project duration leading to insufficient time available for completing all the components of the project. It was also established that incorrect and inappropriate methods of cost estimation and unforeseen ground conditions during design stage contribute to changes in cost of road construction projects during implementation.

The study concluded that financial Control systems influence cost of road construction projects within urban areas in Kenya. The study found that delayed payments to suppliers by the contractor led to shortage of material supply on site, delayed payment by the client due to complex payment structure within the client's organization, unstable local currency in relation to dollar value for donor funded projects, contractor's cash flow problems leading to delay or non-payment of workers' wages resulting to strikes by workers and fluctuation in material, labour and plant cost over and above the project provisions had great influence on the cost of road projects within urban areas in Kenya. The study further noted that making payments to the Contractor for work not yet done make it difficult for the Engineer to monitor and control the cost of the project and this led to overpayment of some work items. Client's cash flow problems also led to late payment to the contractor attracting interest on delayed payment as stipulated in the contract. The study concluded that government policies influences cost of road construction projects due to late statutory and regulatory approvals and licenses. It was noted that the prevailing Public Procurement and Asset Disposal Act put more emphasis on the bidding price rather than competency and bidder's ability to deliver the project within set budget and timelines. The study established that change in Government leadership resulted in change in priorities by the new government leading to reduced financing or abandonment of ongoing projects, sudden increase in minimum wage by the government forced the Contractor to increase the wages of labourers and sudden increase in taxation by the government forced contractors to incur additional costs on materials and operational costs which was transferred to the client ultimately changing the cost of road construction project.

5.4. Recommendations

The study recommends that:

i. Projects managers in construction companies embrace effective contract planning methods. Effective contract management should be implemented through systematically and efficiently managing contract creation, execution and analysis for maximizing operational and financial performance and minimizing risk. The project management staff should liaise with the government and the affected communities and institutions to speed up the land acquisition process. Project scope should be clearly defined and effective project risk management strategies employed.

ii. Land acquisition process and settlement of legal land disputes in settlement of the affected communities should be shortened through community dialogues and effective undertaking and implementation of environmental impact assessment reports recommendations.

iii. Project managers should source qualified local contractors; award road construction tenders to construction companies with project managers with professional project management skills and look at the capacity of contractors in terms of construction equipment's. Local contractors should also acquire qualified project implementation staff that are capable of executing complex infrastructure projects.

iv. Government should enact and enforce effective government policies that help in promotion of construction sector in the country. The road regulatory bodies should enforce policies on road construction and prosecute contractors who fail to complete projects in time. The government should speed up statutory approvals and lengthy licensing procedures for road construction companies should be reduced.

v. Design engineer should get all project information ready at the design, documentation and construction stage of any projects to minimize change orders and correction of errors during the implementation phase.

vi. The Engineers should be well trained on modern methods of calculating the projects duration and quantity take off to ensure that that the contract period adequately covers the scope of project and adequately provides for contingencies during implementation. Contractors should as well ensure that adequate site visit and project assessment is carried

out before embarking on construction project pricing and makes sure that necessary cost data is provided to the estimator for the purpose of cost efficiency and adequacy.

vii. Contractors should understand the possible long term effect of site conditions on overall construction cost and time. This will invariably reduce the level of delay and changes in cost of road construction projects in urban areas in Kenya.

5.5. Recommendations for Further Research

i. This study was done within urban areas and the focus was on the road construction projects implemented by the Kenya National Governments under the traditional contract model. Similar study should be repeated for Road projects under the various models of Public Private Partnership such as Design- Build-Finance-Operate –Transfer model, a case study of the proposed Mlolongo-Rironi expressway.

ii. Similar study should also be undertaken for road construction projects financed, constructed and supervised by the financier, a case study of Ngong road phase I & III under Japanese Government.

iii. The research recommends that a study be done in the construction industry/sector so as to find out the different strategies adopted by construction companies and Government agencies on implementing infrastructure projects within the budget and set timelines.

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APPENDICES

Appendix I: Letter of Introduction

Dear Respondent,

Re: Request for Questionnaire Responses

I am a candidate at the University of Nairobi pursuing a Masters in Project Planning and Management and part of the requirements for successful completion of my studies is to conduct a research. The topic of my research is; **Factors influencing cost of Road Construction Projects within urban areas, Kenya.** The purpose of this research will be to examine factors influencing cost of Road construction projects within urban areas in Kenya. This survey will contribute to the body of knowledge in the Project Construction Management by providing an in-depth post mortem analysis of factors contributing to variation in Road Construction projects thus strengthen the understanding of Project Costing. The stakeholders considered in the study include; client Project Implementation team, Contractors and Consultants.

You have been identified to participate in this study as a respondent because of your role as a participant in the implementation of road infrastructure in Kenya. The purpose of this letter is to request you to kindly participate in this research by filling the attached questionnaire as accurately as you can. I seek your understanding and assistance in this research. The information you provide will be treated as **strictly confidential**.

The data, including findings, will be used for academic purposes only.

I thank you most sincerely for your time and cooperation

Yours faithfully,

Carren A. Oyolla

Appendix II: Research Questionnaire

This questionnaire contains the following two parts, 1 and 2

Please kindly tick [√] in the appropriate box or write in the blank spaces provided, to indicate your opinion.

PART 1: PERSONAL PROFILE			
RD 1	Questionnaire serial no. 01		
RD 2	Date:		
RD 3	**Gender**		
		a)Male	☐
		b)Female	☐
RD 4	**Age**		
		a)21-30 years	☐
		b)31-40 years	☐
		c) 41-50 years	☐
		d) 51 years and above	☐
RD 5	**Highest level of education**		
		a)Bachelor's Degree	☐
		b)Master's Degree	☐
		c)PhD	☐

RD 6	**No. of years in Construction Industry**		
		a) 1-5	
		b) 6-10	
		c) 11-15	
		d) More than 16	
RD 7	**Name of your Organization**		
		a)KeNHA	
		b) KURA	
		c) Contractor	
		d) Consultant	
RD 8	Position in the organization		
RD 9	Department in the organization		

RD 10: Kindly indicate the name of the projects that you have been involved in and your position in the Project

S/No.	**Project Name**	**Location**	**Position held**
1.			
2.			
3.			
4.			
5.			

PART 2: FACTORS INFLUENCING COST OF ROAD CONSTRUCTION PROJECTS IN URBAN AREAS, KENYA

This section contains a list of factors influencing cost of road construction projects in Kenya. Based on your experience on the past and / or current project, please indicate your answer to the factors below by ticking the appropriate scale 1-5 among the following: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree(1).

	Factors	Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
	Contract Management					
C-01	Issuing site Instructions by the Resident Engineer					
C-02	Frequency of design changes by the Engineer during project implementation					
C-03	Speed of decision making by the Engineer (Approval of Contractors key staff, payment Certificates, design modifications, appraisals etc.)					
C-04	Adequacy of supervision by the Engineer's team may affect the workmanship hence rectification of already completed work items					
C-05	Construction methodology/approach by the Contractor					
C-06	Contractor's requisite experience (technical expertise, site management skills)					
C-07	Project management knowledge and skills by engineer's staff assigned to the project e.g. Resident Engineer					
C-08	Adequacy of quality control by the contractor and Resident Engineer during construction may lead to reworking of failed sections					
C-09	Delay in approval of completed sections by the Resident Engineer leading to slow progress of works by the Contractor					
C-10	Additional work by the client during project Implementation					

	Factors	Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
	Project Scheduling					
C-21	Relocation of services (power, water and sewer lines)					
C-22	Giving possession/access of site to the contractor by the client (a site free of encumbrance)					
C-23	Timelines between design and procurement phase					
C-24	Supply of raw materials and equipment by contractors (mobilization)					
C-25	Ease of securing EIA and mining license by NEMA					
C-26	weather due to heavy rains and flooding,					
C-27	Preparation of drawings and other Contract documents by the client					
C-28	Political interference during project implementation					
C-29	Availability of manpower skilled , unskilled labour & experts for specialized work items					
C-30	Approval of proposed subcontractors by the Engineer					
	Design and Documentation					
C-31	Errors and omissions in the design and documentation					
C-32	Consistency and clarity of specifications and drawings					
C-33	Accurate of quantity take-off					
C-34	Changes in ground conditions during implementation					
C-35	Adequacy of scope identification and specifications					
C-36	Deliberate underestimation of project cost by the client to make it more feasible					
C-37	Methods of computation of Project duration					
C-38	Adequacy of provision of Contigency in contract documents					
C-39	Engineer's professional design experience and competence					
C-40	methods of cost estimation					
	Financial Control Systems					

	Factors	Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
C-41	Regularity of progress payments by the client					
C-42	Employer's cash flow problems					
C-43	Payments to the suppliers by the contractor					
C-44	Fluctuation in material, labour and plant cost over and above the project provisions					
C-45	Stability of the local currency in relation to dollar value for donor funded projects					
C-46	Withdrawal of donor funding due fraudulent practices					
C-47	Contractor's cash flow problems					
C-48	Level of monitoring and control of payments to the Contractor by the client for work done					
C-49	Payment to sub-contractors by the Contractor					
C-50	Delay in payment due to Complex financial procedures in the client's organization					
	Government Policy					
C-51	Economic stability					
C-52	Sudden change in minimum wage by the government					
C-53	Project materials monopoly by some listed Government suppliers					
C-54	Interest rates charged by banks on loans/investment borrowing					
C-55	Procurement procedures laws					
C-56	Change in Government leadership leading to change of priorities by the new government on development funding					
C-57	Formation of Dispute resolution Board					
C-58	Sudden change in taxation by the government					
C-59	Changes in technology					
C-60	Environmental protection and mitigation costs					
	Cost of Road Construction Projects					

	Factors	Strongly Agree(5)	Agree(4)	Neutral(3)	Disagree(2)	Strongly Disagree(1)
C-61	Project delivery timelines					
C-62	Availability of quality construction materials					
C-63	Stakeholder satisfaction					
C-64	Land tenure					

2 (a) Did you encounter any challenge(s) in your effort to meet the time, cost and quality aspects of the projects you were involved in? Yes ( ) No ( ). If yes, state the challenges

……

……

……

2 (b) If the project was not completed within the budget, what was the percentage increase in the cost to the project? In your own opinion what factors led to the additional cos?

……

……

……

2 (c) Kindly give your opinion on what is the biggest factor Influencing cost of Road Construction projects in Kenya.

……

……

……

Thank You for Your Participation

Appendix III: Letter of Transmittal

UNIVERSITY OF NAIROBI
OPEN, DISTANCE AND e-LEARNING CAMPUS
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING
NAIROBI LEARNING CENTRE

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
N A I R O B I

REF: UON/ODeL/NLC/31/040

22nd July, 2019

TO WHOM IT MAY CONCERN

RE: OYOLLA CARREN AOKO - REG.NO. L50/70100/2013

The above named is a student at the University of Nairobi, Open Distance and e-Learning Campus, School of Open and Distance Learning, Department of Open Learning pursuing a Masters course in Project Planning and Management.

She is proceeding for research entitled "***Factors Influencing Cost of Road Construction Projects within Urban Areas, Kenya.***"

Any assistance accorded to her will be appreciated.

UNIVERSITY OF NAIROBI ODEL CAMPUS P.O. Box 30197, 22 JUL 2019 NAIROBI NAIROBI LEARNING CENTRE

CAREN AWILLY
CENTRE ORGANIZER
NAIROBI LEARNING CENTRE

Appendix IV: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **776065**

Date of Issue: **09/September/2019**

RESEARCH LICENSE

This is to Certify that Ms.. CARREN OYOLLA of University of Nairobi, has been licensed to conduct research in Kisumu, Mombasa, Nairobi, Nakuru on the topic: FACTORS INFLUENCING COST OF ROAD CONSTRUCTION PROJECTS WITHIN URBAN AREAS,KENYA for the period ending : 09/September/2020.

License No: **NACOSTI/P/19/504**

776065

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Governor and County Commissioner before commencement of the research
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Appendix V: List of Road Projects Studied

KURA & KeNHA ROAD PROJECTS ABOVE KHS.200 MILLION IMPLEMENTED BETWEEN THE YEAR 2000-2019									
No	**Name of the Project**	**County**	**Constituency**	**Contractor**	**Contract Sum Cost (Kshs.)**	**Start Date**	**Expected Completion Date**	**Length (Km)**	**Year of Completion**
1	Rehabilitation and Upgrading of UpperHill Roads, Phase I	Nairobi		Mattan Construction Ltd	2,002,892,599.00	May-12	Jan-16	5	2017
2	Construction of Missing Link Roads and Non-Motorised Transport (NMT) Facilities In Nairobi	Nairobi		Reynolds Construction Company	4,578,162,618.04	Dec-13	Nov-16	17.2	2019
3	Nairobi Outering Road Improvement Project	Nairobi		Sinohydro Construction Company	7,395,183,298.13	Sep-14	Sep-17	13	2019
4	Construction to Bitumen Standard of Ngong Road - Kibera - Kungu Karumba - Langata Road (Missing Link No. 12)	Nairobi		H-Young Limited	2,097,520,695.00	Mar-16	Mar-18	4.2	2019

No	Name of the Project	County	Constituency	Contractor	Contract Sum Cost (Kshs.)	Start Date	Expected Completion Date	Length (Km)	Year of Completion
6	Dualling of Ngong Road Phase I (KNLS Nairobi-Dagoretti Corner)	Nairobi		World Kaihatsu Kogyo Co. Ltd	Yen1,454,900,000	Feb-16	Aug-17	2.6	2018
7	Upgrading to Bitumen Standards of Githurai – Kimbo Road (Phase II)	Kiambu		Dickways Construction Ltd	423,184,731.00	Mar-16	Jan-18	4.5	1
8	Upgrading to Bitumen Standards of Eastlands Roads	Nairobi		Tosha Holdings	347,142,134.06	Mar-16	Mar-17	5.2	2018
9	Rehabilitation and Upgrading of Eastleigh roads Phase II	Nairobi		H-Young Limited	677,078,139.00	Mar-16	Mar-18	2	2018
10	Construction of Access to Embakasi (Infinity) Industrial Park	Nairobi		Kiu Construction Company	382,478,143.50	Jun-16	Feb-18	2	2018
11	Construction of a Flyover Bridge Across the Northern Bypass and Approaches at Kahawa West	Nairobi		Frontier Engineering Limited	403,440,924.00	May-16	Jun-18	2	1
12	Construction of Upper Hill-Mbagathi Link Road	Nairobi		Interways Works Limited	1,249,921,540.63	Dec-16	Jun-18	11	Ongoing

No	Name of the Project	County	Constituency	Contractor	Contract Sum Cost (Kshs.)	Start Date	Expected Completion Date	Length (Km)	Year of Completion
13	Upgrading to Bitumen Standards of Mlolongo - Kware - Katani Link Road (Phase I)	Machakos		Ogle Construction Ltd.	1,629,487,068.99	Dec-16	Dec-18	6	0
14	Construction of Access Road to Ruai Police Station	Nairobi		Wak Construction Co. Ltd.	132,888,629.37	Dec-16	Dec-17	1	1
15	Rehabilitation and Upgrading of Upper Hill Roads Phase II	Nairobi		Tosha Holdings	2,258,531,258.11	Dec-16	Dec-18	6.5	Ongoing
16	UPGRADING TO BITUMEN STANDARD OF LENANA-MUCHUGIA – DAGORETTI MARKET ROAD.	Nairobi		Jomwak Enterprises Ltd.	513,177,612.75	Feb-17	Feb-18	7	2019
17	DUALLING OF NGONG ROAD (DAGORETTI CORNER - KAREN ROUNDABOUT)	Nairobi		China Qingjian International Group (K) Ltd.	1,987,981,992.59	Jul-17	Jul-19	9.8	Ongoing
18	CONSTRUCTION OF EASTLANDS ROADS (PHASE II)	Nairobi		Wak Construction Co. Ltd.,	1,111,111,222.32	May-17	May-19	10	ongoing

No	Name of the Project	County	Constituency	Contractor	Contract Sum Cost (Kshs.)	Start Date	Expected Completion Date	Length (Km)	Year of Completion
19	REHABILITATION AND UPGRADING OF EASTLEIGH ESTATE ROADS	Nairobi		Baraki International Ltd.	552,976,811.10	Apr-17	Oct-18	2	0
20	Construction of Kangundo Road - Greater Eastern Bypass Link Road	Nairobi		China Aerospace Construction Group (Kenya) Corporation Ltd.	1,160,691,029.40	May-18	May-19	10	Ongoing
21	Nairobi Roads Rapid Decongestion Programme Lot 9	Nairobi		Salan Company Ltd	253,435,315.00	28-Mar-17	27-Mar-18	2.4	1
22	Nairobi Roads Rapid Decongestion Programme Lot 10	Nairobi		Lesma Enterprises Ltd	303,378,048.00	15-Mar-17	14-Mar-18	3.6	1
23	Nairobi Roads Rapid Decongestion Programme Lot 11	Nairobi		Jofrim (E.A) Company Ltd	268,272,440.34	6-Mar-17	5-Mar-18	2.4	1
24	Nairobi Roads Rapid Decongestion Programme Lot 12	Nairobi		Star General Contractors Ltd	331,270,526.40	12-Feb-18	11-Feb-19	3.6	0
25	Nairobi Roads Rapid Decongestion Programme Lot 13	Nairobi		Salan Company Ltd	329,684,760.00	12-Feb-18	11-Feb-19	3.6	0

No	Name of the Project	County	Constituency	Contractor	Contract Sum Cost (Kshs.)	Start Date	Expected Completion Date	Length (Km)	Year of Completion
26	Improvement to Bitumen Standards of Nakuru CBD Roads	Nakuru		Weihai International Economic & Technical Cooperative Co. Ltd	1,815,176,216.74			22.00	Ongoing
27	Construction To Bitumen Standards of Jomvu Kuu – Jitoni – Rabai Road, Mombasa County	Mombasa		Associated construction Ltd	1,054,897,550.40			11.70	Ongoing
28	Rehabilitation of Old Malindi Road, Mombasa County	Mombasa		Equistar Limited	796,371,134.40			13.00	Ongoing
	KENHA ROADS								
29	Miritini-Mwache Kipevu Link Road	Mombasa						39.20	2018
30	Port Reitz Moi International airport Access	Mombasa						6.40	2017
31	Kericho – Nyamasaria	Kisumu						76.00	2014
32	Nyamasaria – Kisian including Kisumu Bypass (A1/B1) Road	Kisumu						22.00	2015
33	Kisumu Airport – Kisian (Busia Road Part 2) Road including Obote, Otieno Oyoo and Port Roads.	Kisumu						9.00	2016
34	Nairobi Southern Bypass	Nairobi						28.60	2016
35	Construction of mombasa southern bypass road kipevu	Mombasa						10.90	2018

No	Name of the Project	County	Constituency	Contractor	Contract Sum Cost (Kshs.)	Start Date	Expected Completion Date	Length (Km)	Year of Completion
36	Kisumu - Kakamega	Kisumu						152.00	2019
37	Kisumu Boys - Mamboleo	Kisumu						18.40	2019
38	Construction of 3 interchanges at Nakuru	Nakuru							2019
39	Nairobi Regeneration Program: Rehabilitation of Eastlands Roads Lot 1	Nairobi		Stecol Corporation	950,553,439.20	14-Aug-18	14-Aug-19	32.00	2019
40	Nairobi Regeneration Program: Rehabilitation of Eastlands Roads Lot 2	Nairobi		China Road & Bridge Corporation	1,025,812,039.60	14-Aug-18	14-Aug-19	27.03	2019
41	Nairobi Regeneration Program: Rehabilitation of Eastlands Roads Lot 3	Nairobi		China Wu Yi	895,586,265.00	14-Aug-18	14-Aug-19	22.80	2019
	Sub Total 1				**33,402,096,639.44**			**141.6**	