

**INFLUENCE OF CONTRACTOR RELATED FACTORS ON QUALITY OF ROAD
CONSTRUCTION PROJECTS IN MACHAKOS TOWN SUB-COUNTY, KENYA**

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A Research Project Proposal Submitted in Partial Fulfillment of the Requirements for the Award
of Master of Arts Degree in Project Planning and Management of the University of Nairobi

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DECLARATION

This research project proposal is my original work and has never been presented for a degree award in any other university.

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DEDICATION

I dedicate this work to my entire family, my father, Benson Muriithi, my mum Elizabeth Wangui and my sisters Sharon and Joy for their support and nurturing in me the spirit of hard work, resilience and patience. I am greatly indebted to them. I also dedicate this work to my friend Charles Wangai for being my biggest cheerleader in my academic and career work. Diana my daughter, I pray that this work will be an inspiration to you in future to work harder and surpass your mum academically.

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LIST OF ABBREVIATIONS & ACRONYMS

GCC: Gulf Cooperation Council

GOK: Government of Kenya

GDP: Gross Domestic Product

KEM: Kenya Engineer Magazine

KFF: Kenya Fact Figures

KNBS: Kenya National Bureau of Statistics

KRB: Kenya Roads Board

NCA: National Construction Authority

NACOSTI: National Commission for Science Technology and Innovation

NTSA: National Transport and Safety Authority

QAR: Qatari Rial

RCA: Root Cause Analysis

RTA: Road Traffic Accidents

SPSS: Statistical Package for Social Sciences

ABSTRACT

The National Transport and Safety Authority website records over 57,171 cases of RTA. Adopting the root cause analysis (RCA) technique, it is crucial to determine and to solve the cause of a problem in order to have a permanent solution for it. This study focuses on road construction projects since this is the actual onset of roads and RTA is dependent on various factors arising from the ideology of road construction projects to the operation of a sound or unsound vehicle on the road. Numerous studies have been done to research on the factors influencing quality of road construction projects but little has been done on how contractors related factors affect quality of construction projects. Due to the research gap in the pool of knowledge, this study is aimed at identifying and analyzing how contractor related factors influences the quality of road construction projects. The study area that will be analyzed in this project will be Machakos Town Sub-county situated in the Lower Eastern region of Kenya. The study will be guided by four objectives: To determine the influence of contractor's skills and knowledge on quality of road construction projects, to establish influence of contractor's exposure to technology on quality of road construction projects, to examine influence of contractors' duties as stakeholders on quality of road construction projects and to investigate influence of contractor's financial resources on quality of road construction projects. Theories that will be applied in this study are Wrecker's financial distress theory and Sustainability Theory. This study will employ a descriptive survey research design and a cross-sectional approach will be used to collect quantitative data by use of close-ended questionnaires. The total target population will be 414 and the Krejcie & Morgan formula will be applied to calculate the sample size that will be adopted in the survey research to get a sample size of 199 respondents. Stratified random sampling technique will be applied on the sample size of 199 respondents to classify them into homogenous groups. Questionnaires will be used as the main data collection instruments and will be issued to the sample size. A pilot study will be undertaken on an identical group of respondents in Malava sub-county, Kakamega County to pre-test the questionnaires for validity and reliability. The gathered data will be analyzed using descriptive and inferential statistics with the data being presented descriptively using frequencies and percentages. Pearson's product moment correlation procedure method will be used to analyze the inferential statistic data and the results presented.

CHAPTER ONE INTRODUCTION

1.1 Background to the Study

Road traffic accidents have been a major public outcry for a very long time now, with thousands of citizens losing their physical mobility, mental state and worse their lives. A report by the NTSA shows that approximately 57,171, of Kenyan citizens were involved in traffic road accidents between the years, 2016 and April 2020 (NTSA, 2020). A staggering 13,473 people during the same period, lost their lives as a result of road traffic accidents. This goes without saying, the country is losing a lot of citizens to maiming or deaths as a result of RTA. There are various causes of RTA and as categorized by Olemo (2016), drivers' factors, vehicle factors and roadway factors. Drivers' factors are the human related choices and decisions that lead to indefinite RTA which can be improved through trainings and or improved human culture. Vehicle factors in this case involves the condition of the vehicle prior the RTA. This can be managed by ensuring regular vehicle maintenance, regulations by the government such as one underway to prohibit importation of second hand vehicles above five years of age. This report will focus on the last category, the roadway factors.

RCA is a scientific or engineering technique used to determine the cause of a problem. In this regard, it is only prudent to visit the major causes of RTA, and the factors contributing to these causes. Since the contributing factors to be researched on would be too wide and vast, this project will majorly focus on roadway factors. This brings the necessity to research on the various contributing factors resulting in RTA right from the conception of the ideology to construct a road to the usage of a mechanically sound or unsound vehicle. Roadway factors, however, will again have a vast and wide area of coverage to be researched on and establish causes of RTA, this study will major on a specific stakeholder involved in the construction of roads. By analyzing the influence of the factors affecting these stakeholders on quality of road construction projects, this study aims to add to the pool of knowledge to the fight against rampant RTA in our country Kenya.

Human race has been known to undertake projects for as long as the beginning of organized human activities. Projects ranging from small such as hunters planning hunting activities to the large ones such as the construction of the pyramids of Egypt have for a long time been part of human beings. In every typical project, there exists stakeholders. These stakeholders can be grouped in two categories, the internal stakeholders and the external stakeholders (Watt, 2012).

Infrastructure projects for instance may have the internal stakeholders such as the project managers, senior managers, and other employees of the given body of authority among others. The external stakeholders of a project are such as, the government, suppliers, customers and finally the contractors (Watt, 2012). All these stakeholders have to have an understanding with each other in order to ensure smooth operation of the project for a final quality project to be achieved. Failure to any communication among these parties threatens the successful completion of a quality project. This, however, among other factors, is not the only cause that threatens the achievement of quality projects. Many factors affecting different stakeholders pose as a challenge towards achieving quality projects. This project study will focus on factors affecting contractors that influence quality of road construction projects.

A study done by Wondimu et al (2016) on the success factors for early contractor involvement in public infrastructure projects in Norway concluded that it is important for a client to hand a project to a contractor who has technical skills and knowledge of the given job. Majority of the interviewees in the study supported the idea of a contractor that has work experience in the given field of area as one of the few factors for considerations for the qualification of the contract.

According to Meed Projects (August 2014), 20% of the construction projects in the Gulf Cooperation Council were on hold, while 24% were cancelled. This meant that 89 billion QAR worth of projects were on hold and 107 billion QAR worth of projects were cancelled. This was as a result of calculated losses as a result of poor quality or delayed infrastructure projects. Project management institute, (2012), 80% of projects in the Middle East were delayed, and nearly half of the projects were behind by more than six months. When delay was experienced, there was bound to be an extra cost because of factors such as hired manpower, equipment rentals, increasing material cost and extension of third-party services. Developing countries are experiencing delays in the constructing industry which influence completion of the quality projects. A research by Mustapha (2013) on the factors causing delays in project delivery in Ghana, concluded that the major factors are delays in paying subcontractors, honoring payment certificates, price fluctuation and constraints in acquiring bank credits and loans. Basically, from the study, it is evident that these factors are financial related factors that lead to delay of these projects, however, it does not state how this factor influences quality of the projects.

A study by Murwira, D. (2017) on building an infrastructure project in North West Province, South Africa. He established that there were various factors resulting to poor performance of the projects in the province. He grouped the factors in three categories; owner-related, contractor-

related and consultant-related factors. According to the results, 70% of the top ten factors resulting to poor performance of the infrastructure projects were contractor-related factors.

It is observed that, lately there has been a spike in the number of construction projects in all over Kenya. Gwayo (2014) asserts that there has been a high concern as to why many clients are not being satisfied with the resulting product of their projects. Dissatisfaction of clients is a sign that projects are not of high quality and this brings about some negative repercussions such as poor contractor rating, contract violations and to some extent court cases.

Locally, Kenya has witnessed a high rate of infrastructure projects lately ranging from the construction of roads, buildings, drainage structures, power plants among others. Foreign investors have shown a lot of interest to have a stake in Kenyan road construction projects industry (Kenya facts and figures, Kenya National Bureau of statistics, 2012). They consider Kenya as a business hub in East and Central Africa and a Centre from which they can operate within Africa as a consequent, Nairobi and its environs has witnessed a boom in road construction projects. Other construction projects include government projects, private individual projects, private companies' projects, international businesses projects and institution sanctioned.

In Machakos town, many road construction projects fail to be completed in time causing cost overruns. This can be seen in the various number of road construction projects which have not been completed on time. Even more are those road construction projects that are in the end finished but at an inflated budget and at a date later than agreed in the road project schedule. Kariobagi Machakos town bridge for instance, was completed but within two months the bridge cracked due to poor workmanship of the contractors and this was due to either lack of technical skills and knowledge. Some road construction projects are completed but with very poor quality workmanship (Kenya Engineer Magazine, 2018). This research study therefore seeks to investigate the contractor related factors influencing quality of road construction projects in Machakos Town Sub-county, Kenya.

1.2 Statement of The Problem

The RCA strategy illustrates that one has to venture into the cause of the problem and solve it rather than masking the symptoms of the problem. It is important to determine how the RTA occur on our roads by first venturing in the construction stage of the projects. Scrutiny of all the stakeholders involved in the projects is crucial in order to understand where the final problem

arises from.

An examination of post-world-war planning history reveals that there have been many more failures than successes in the road construction projects especially in the developing countries (World Bank, 2010). The major contractor related factors that influence quality of road construction projects of roads are: technical skills, knowledge and experience of contractors; technology supporting the technical capability of contractors, contractors' duties as stakeholders and contractor's financial resources, availability of technical resources, formulation and design, faulty conceptualization of policy, etc. Numerous studies have been done to discuss and expound on factors influencing quality of road construction projects or conditions for successful implementation of safe quality road projects, but none has done a study on how contractor related factors have an influence of on quality of road construction projects. Due to the research gap in the body of knowledge, this study is aimed at identifying and analyzing how contractor related factors influences the quality of road construction projects.

A study conducted by Mucheke, J. (2019) on factors influencing performance of road construction projects in Nairobi city council revealed that project managers should employ monitoring and evaluation techniques to ensure good project performance. The study also revealed that financial resource is a major constraint in achieving proper performance of these projects. This cannot be further from how contractors should perform in a project. They should apply monitoring and evaluation technique in their financial resources to minimize any impending cost overruns. From the study, it is obvious that financial resource is a key factor that constraints the achievement of quality projects. In this regard, the quest to determine how contractor's financial resource influences quality of road construction project compelled this study.

In Kenya, counties have for about 4 years now carried out various projects successfully with counties like Embu, Meru and Kericho reporting up to 12% positive road construction projects, but quite a number of the 47 counties have failed due to prevailing factors like wrong prioritization of development projects, lack of financial resources, political influence, corruption, low levels of technology, poor infrastructure, lack of community involvement, poor management support among others (Musyoki, 2018). A study on the contractor related factors influencing road project performance in Kenya was conducted by Wafula E. (2017). The study found out that financial availability, organization culture and technical skills were among the key factors that influenced performance of road projects. He further recommends that County Governments

should hire skilled and competent contractors. In this regard, this study aims to determine to what extent the contractors' skills and knowledge influence quality of road construction projects. Other factors tied to quality of road construction projects include: lack of well-developed infrastructural facilities, poor linkage and networking between the county government and developers, poor political and local leadership, radicalization of youths and many more. Among other reasons, the type of contractors undertaking a specific road project are a major cause for how a project will turn out. A research by Roseline Kithinji (2017) on contractor related factors influencing completion of government road infrastructure projects in Meru county, Kenya, revealed that project finance and technological innovation largely influenced infrastructure project completion. Her study recommended that other studies involving other variables should be undertaken covering different counties to determine contractor related factors influencing infrastructural projects. Hence, this study aims to look at the influence of contractor's exposure to technology on quality of road construction projects in Machakos Town Sub-county, due to this insurgency of issues in the road construction projects of failure up to the tune of 47%, in the counties, the research therefore sought to examine the influence of these contractor related factors on quality of road construction projects in Machakos Town Sub-county, Kenya.

1.3 Purpose of the Study

The purpose of this study is to investigate the degree to which contractor related factors influence quality of road construction projects in Machakos Town Sub-county, Kenya.

1.4 Objective of The Study

This study will be guided by the following objectives:

- i. To determine the influence of contractor's skills and knowledge on quality of road construction projects in Machakos Town Sub-county, Kenya.
- ii. To establish influence of contractor's exposure to technology on quality of road construction projects in Machakos Town Sub-county, Kenya.
- iii. To examine influence of contractors' duties as stakeholders on quality of road construction projects in Machakos Town Sub-county, Kenya.
- iv. To assess influence of contractor's financial resources on quality of road construction projects in Machakos Town Sub-county, Kenya.

1.5 Research Questions

This study will be guided by the following research questions:

- i. To what extent does the Contractors' Skills and Knowledge influence quality of road

- construction projects in Machakos Town Sub-county, Kenya?
- ii. To what degree does the contractor's exposure to technology influence quality of road construction projects in Machakos Town Sub-county, Kenya?
 - iii. To what extent does contractors' duties as stakeholders, influence quality of road construction projects in Machakos Town Sub-county, Kenya?
 - iv. How does contractor's financial resources influence quality of road construction projects in Machakos Town Sub-county, Kenya?

1.6 Significance of the Study

The overall significance of this study is to contribute to the pool of information on causes of RTA. It may be of great significance to the county governments since it will improve on the important factors affecting contractors that influences the quality of road construction projects. The findings of this study may be used by the government to get the insights on how Contractors' skills and knowledge influence quality of road construction projects, how exposure to technology of contractors, influence quality of road construction projects, how contractors' duties as stakeholders, influence quality of road construction projects and how contractor's financial resource influence quality of road construction projects.

The research study may also assist future researchers by enriching existing body of knowledge and therefore be a vital source of reference in literature review for their research studies as well as a source of secondary data reference. Future researchers may use their research to compare their findings undertaken in the same field of study over some time.

The research finding and recommendations can be a useful source of information to other stakeholders in different infrastructure projects in other counties and countries because the challenges may be similar and the solutions can be transferable.

1.7 Delimitations of the Study

There are varying conceptual and operational definitions of quality of road construction projects among professionals in practice and academia, with limited consensus. This makes it difficult to comprehensively study the influence of contractor related factors on quality of road construction projects given the scope of this study. This study will focus on four factors only and the scope of quality of road construction projects will be limited to continuous provision of road construction projects.

1.8 Limitation of the Study

The researcher might encounter some limitations that might hinder access to information from respondents especially regarding road construction projects that have failed. Some of the respondents selected may be reluctant to give information fearing that the information sought would be used to intimidate them or paint a negative image about their performance or that of their organization/project.

Some of the questionnaires may not be returned in good time, probably because the respondent forgot or was held up in the job. Not forgetting that the people at the management level are very busy.

1.9 Assumptions of the Study

The researcher will have the following basic assumptions such as: That all target respondents would be willing to participate in the study; that all questionnaires administered to the respondents would be filled and returned for analysis; that all respondent would respond honestly to the questions in the instrument.

1.10 Definitions of Significant Terms Used in the Study

Several keywords and terms have been used in this report, which is defined in this study as follows:

Exposure to technology: The tendency to be exposed to the modification or usage of tools, machines, techniques or systems in order to solve a problem, improve a solution to a problem, or to achieve a goal.

Financial Resources: The money available to contractors for road construction process in the form of cash, liquid securities and credit lines.

Quality Road project: This is the state of project to attain the set goals with the set cost budget, within the set time duration and to be able to fulfill the customer's needs and expectations. Where value for the financial resource or investment is achieved.

Road: Is a long piece of hard ground which is built between two places so that people can drive or ride easily from one place to the other.

Road construction Project: An undertaking that has an objective of creation of roads on a specific budget and timeframe.

Road Contractor: These are the technical group of individuals who have a vested interest in a project and are involved in the construction process of the project as per the contract agreement with the gathered financial and human resources.

Skills and Knowledge: Abilities and information needed to perform specific tasks.

Stakeholders: These are individuals or group of individuals who have different vested interests in a project.

1.11 Organization of the Study

This study will be organized into five chapters:

Chapter one focuses on the background of the study, statement of the problem, the purpose of the study, research objectives, research questions and significance of the study, delimitations, limitations, and assumptions of the study. It also includes the definitions of significant terms as they are used in the study.

Chapter two focuses on a review of the literature of these contractor related factors and the influence of these factors on quality of road construction projects. The factors such as, contractor's skills and knowledge, contractor's exposure to technology, contractors' duties as stakeholders and contractor's financial resources will be discussed exhaustively in this chapter. It also focuses on Theoretical framework and conceptual framework showing the relationship between the independent and dependent variable. This chapter also highlights the knowledge gaps and summary of the literature review.

Chapter three focuses on research methodology which includes an introduction, research design, target population, sample size, research instruments, data collection procedure, validity and reliability of the research instruments and ethical considerations, Operationalization of the variables and methods of data analysis techniques.

The fourth chapter will consist of data analysis, presentation and interpretation, while the fifth chapter will consist of an introduction, summary of findings, and discussion of findings, conclusions, recommendation and suggestion for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This review of the literature assists the researcher to understand better the topic of study by briefly elaborating on what previous researchers have done that has necessitated this study. It therefore focuses on the following areas; quality of road construction projects, contractors' skills and knowledge, contractor's exposure to technology, contractors' duties as stakeholders and contractors' financial resources and how these factors influence quality of road construction projects.

2.2 Quality of Road construction projects in Kenya

Quality can be described as the degree of conformance to specifications. The quality of road construction projects can be measured on the degree of the road meeting the expected goal or usage or could be measured on the durability of the road. The National Construction Authority (NCA) is mandated to regulate the construction industry and is used to streamline, overhaul and control the industry in Kenya. A report by the NCA records that about 16,665 road contractors registered by the body countrywide (NCA, 2020). The construction industry is highly competitive since barriers to entry are low, companies are similar and information about companies is freely available.

The road network is a means of transporting people and goods; it interconnects to other modes of transport and provides access to social and basic services. Roads account for an estimated 93% freight and passenger services locally Wafula, (2017). A report by the Cabinet Secretary, National Treasury and Planning on the Economic Survey Report of 2020 confirmed that the length of roads paved during the 2018/2019 financial year rose by 14.2% to 21,295.1km. Road transport networks provide a platform for social, political and economic development of a country. This creates a supportive environment to do business and trade within and outside the country. It is therefore essential to manage and maintain road and infrastructure which is one of the fundamental pillars in achieving Vision 2030.

Wafula (2017) conducted a study which was set out to establish the contractor related factors influencing the performance of road construction projects. The objectives that were his pinnacle of research include how the availability of capital, management skills, organizational culture and technical skills influences performance of road construction projects. He found out that capital

availability, organizational culture and technical skills had the greatest influence on the performance of road construction projects. The study focused on determining the factors that affected the contractors and had an influence on the performance of road construction projects thus paving way for the idea of determining how these factors and to what degree they influenced the quality of the road construction projects.

Minde R. (2018), conducted a study that was aimed at analyzing the factors influencing quality throughout the lifecycle of a road project. The study incorporated quality at different stages such as quality of concept, quality of design, quality of construction, quality of conformance and quality of performance. The study found out that owner's policy and effective quality management system is a highly significant factor at conceptual stage. In the design stage, the quality, the nature and type of subgrade soil and design errors found to be extremely important factors. The quality of raw material is an important element for consideration in ensuring quality of construction projects. The study mainly focused on the factors influencing quality of the project at different stages regardless of which stakeholder was involved at which stage. Generalizing these factors and having the assumption that they emanate from equal parties is too big a mistake since each factor is dependent on many other factors such as the stakeholders involved, the functions of key stakeholders among others.

Ministry of Transport and Infrastructure is instructed to perform the following functions; National Transport and Infrastructure Development and Policy Management, Registration of Engineers and Registration of Roads Construction firms among others. Several road management agencies employ inefficient operational procedures in the bureaucratic civil service protocols and lack of transparency in the legal, operational and structural connections among them (Ministry of Transport and Infrastructure, 2015). The Kenya Roads Board (KRB) was set out by the Act of KBR in 1999 It's main goal was to coordinate, develop, rehabilitate and maintain all the roads in Kenya, as well as managing the KRB Fund account. The roads sub-sector, as an element of the physical infrastructural sector, is expected to make significant contributions towards achieving Vision 2030.

2.3 Contractors' Skills and Knowledge and Quality of Road construction projects

Contractor's skills and knowledge is the technical knowhow and abilities that is needed by the contractors to execute a task. It is the ability to perform role with the help of certain tools and

equipment. Such tools may be tangible or intangible. Employees having the right skills and knowledge perform their roles more efficiently because they possess practical aspects and expertise which in most cases is acquired through specialized training and development programs. (Sambasivan, 2011).

Mahamid (2011) carried out a study which was intended to identify factors affecting time delay in road construction projects in the West Bank in Palestine, from the owner's perspective. The findings from the study concluded that, the factors that were the biggest causes of cost overruns were poor communication between construction parties; poor resource management; delay in commencement of the project; insufficient job inspectors; repeat of work as a result of poor material quality; repeat of work as a result of poor workmanship; and payments delays.

It is only prudent to say that some of these findings such as rework from poor workmanship or rework from poor material quality may result from unskilled laborers. Contractors with poor skills and knowledge cause project delays which in return causes costs overruns. The study confirmed that poor workmanship has a financial strain to projects, however, it did not confirm how the skills and knowledge or lack of thereof, affects the quality of the project. This study intends to assess how contractor's skills and knowledge influence quality of road construction projects.

An organization seeking to achieve project performance should develop and maintain employees with Technical knowledge and expertise to accomplish their tasks efficiently. This can save the project huge costs and contribute towards efficient flow of activities. Projects that perform have been associated with presence of a technical team and a lean and competent team of employees. Project implementers are individuals who are required to have technical skills and are tasked in leading organizations to project implementation process.

Organizations that exploit its employees' Technical knowledge perform its functions efficiently, this helps to streamline coordination of activities and work towards set goals and targets. Karim and Marosszeky (2011) posit that through continuous training and development programs, employees are able to sharpen their Technical knowledge and expertise. These skills assist employees to easily solve technical problems and save the organization costs of hiring expertise. In so doing, this creates a platform to employees to exploit their innovation in providing products and services that add value to customers. Bygrave (2014) points out that employee skills and technical knowledge are important since it motivates the individual and gives them the right

attitude to overcome any challenge therein the project. In projects implementation, employees should be engaged in trainings to improve their skills in implementation and practical aspects of use of tools and equipment that support project implementation (Zulu and Chileshe, 2010). To effectively harness their Technical knowledge in implementation of projects, top management should ensure that employees' duties and responsibilities match their Technical knowledge and skills.

Biruta et al. (2015) conducted a study to investigate the expectations by employers on Skills, Knowledge and Attitudes of employees. Their findings were that 92%, 76% and 62% of employers find the work experience, the skills and knowledge and attitude of employees respectively are important to employers. This according to the study shows that employers prefer employees with higher level skills and knowledge over their' attitude for the job. It however, did not research on how the skills and knowledge of employees affected the job quality. This necessitated the study to find out to what extend the skills and knowledge influenced quality of road construction projects.

2.4 Contractor's Exposure to technology and Quality of Road construction projects

Technology can be defined as the collection of techniques or processes used in the production of goods or services. Karehka, (2012) postulates that IT technology has given rise to endless opportunities such as today's global economy, online studies at leisure hours, heavy and efficient farm machinery, computer software for structural designs, prototype creation of structures among others.

Graham and Mohamed (2012) conducted a study to establish the level of awareness on uses of technology in the construction of agricultural projects in Central Europe. The study found out that agricultural projects in Europe were characterized by technology that was appropriate, high level and adequate institutional capacity to utilize modern technological skills. The study further asserted that use of modern technology in road infrastructure projects would result in mass high quality projects and also reduce time and cost overruns. It confirms the importance of exposing contractors to appropriate and high level technology in order to increase the quality of the road construction projects. The study focused on establishing the level of awareness of technology in agricultural projects and did not research on how the uses of technology influences quality of agricultural projects. This, therefore, coerced the study on how influence of contractor's exposure to technology on quality of road construction projects.

According to Johnson, Kast and Rosenzweig (2012), it is important to create an effective technology structure in all institutions. Technological Infrastructure directly affects the quality of service experienced by international and external users of the system in terms of speed and responsiveness to their requests for information. Understanding the jargon of technology involved in the selection of information and communication technology is major challenge for non-literature office staff and business managers.

A study to determine the importance of technical resources in the performance of infrastructure projects in Kenya was conducted by one Stephene (2013) which revealed that no projects can succeed by applying ancient techniques. The study further advocated for the development of efficient and reliable information systems in managing road construction projects after they carried out a study on application of technology in project management. In addition, the study indicated that use of modern technology in business helped in efficient delivery of good roads that meet customer satisfaction. This study asserts that modern techniques prove to be advantageous to projects and thus, the exposure to technology of contractors is a key factor in ensuring quality of road construction projects. The study focused on infrastructure projects in general and did not zero down to road construction projects and the stakeholder involved. This study intends to research on the influence exposure to technology on contractors have on quality of road construction projects.

2.5 Contractors' duties as stakeholders and Quality of Road construction projects

Contractors are one of the major stakeholders in infrastructure projects. They form the technical team of the construction project such as construction management foreman, network consultant, electrician, carpenter or an architect among others. In cases where organizations do not have the expertise or resources to undertake the technical bit of the project, the services of contractors and subcontractors are accorded.

A study by Kasau M. (2017) confirms that the road surface condition is a key consideration in RTA occurrence at black spots. The surface of the road plays a key role during movement and maneuvering of a vehicle and quality roads requires the right traction with the wheel depending on the climatic condition of the area or the physical gradient of the land. This information is put into consideration by the contractors during the construction process. A contractor with the

necessary skills and knowledge will be able to determine the type of surface course, base course, and sub base the road requires and thus knows the right materials to acquire and in what quantity. The involvement of contractors in the early stage of the project assists in financial plans and project planning. Absence of contractors early into the project planning may lead to subsequent cost and time overruns.

Wondimu et al (2016) opines the importance of project owners to involve contractors early into the project. It is important that there is some level of trust between the client and the contractor which happens to be a major success factor of the project. Managing contractors or suppliers is one of the major duties of the project managers during the life cycle of the project. Contractors may lead to the success or failure of a project; thus it is crucial for the clients to involve the contractors in some decision making process (Watt 2012). They may affect the project in various ways such as the time overruns, costs overruns, and the quality of the work in general. In this regard, it is key to involve contractors as stakeholders throughout the project process. The project manager manages all the stakeholders and ensures that there is proper communication among the teams. Their key role is to ensure contractor-supplier relationship is running smoothly and there is an understanding in terms of the time delivery of goods, costs of the supplied goods among others.

Ethics is a mandatory subject wherever there is a collective group of individuals who have gathered to perform a specific task. Individuals who have gathered from different walks of life, different regions and different age groups are bound to have some disagreements sometimes. Given one scenario, different people would make different choices thus, this brings up the topic about ethics. It is important for every stakeholder to have some good ethical behavior in their daily duties. A single unethical choice may jeopardize the quality of the projects grievously.

A group of researchers (Adnan et al, 2012) conducted a study on the ethical issues in the construction industry: contractor's perspective. Their main objectives were to find out the common unethical practices by contractors. The study found out that the highest ranked practice by contractors are over pricing followed by bid cutting then late and short payments of subcontractors. Other malpractices that arose included, lack of safety ethics, unfair contractor's treatment in tender negotiations, overstating qualifications, capabilities and experience to secure jobs, fraud, bribery among others. The study provided some solutions to these malpractices and categorizes them in terms of long term, medium term and short term according to the length of the project. These malpractices evidently affected the quality of the projects directly thus good ethical practices by the contractors and other key stakeholders are highly applauded to ensure

quality projects are achieved.

The study focused on finding out the common unethical practices by contractors and did not research on how ethical practices by contractors affected quality of projects. This coerced the study on how good ethical behaviors by contractors influences quality of road construction projects. A good policy should advocate for effectiveness which entails the project to be as cost effective as possible, fair dealing, where the stakeholders should be treated equally without discrimination or prejudice including protection of confidentialities of the project where necessary. Contractors are major stakeholders in projects and they play a key role in the project. It is crucial to give contractors minimal interruptions as they perform their duties. Communication is key during the project activities and this smoothens the activities undertaken by the stakeholders. Studies have been undertaken to determine at what stage the contractors should be involved in a project process and there has been no consensus exactly at what stage there is improved project quality.

Wondimu et al (2016), conducted a study on the success factors for early contractor involvement in public infrastructure projects. The study found out that the success factors identified included, proper timing of early contractor involvement application, the distribution of manageable risks to contractors, owner's high level of competence, proper compensation of the contractors' duties, proper qualification of contractors and creation of trust between contractors and owners of the project. The study focused on how early contractor involvement in projects proved to be a success factor and did not look at the extent to which the contractor involvement influenced quality of road construction projects. This compelled the research on the influence of contractors' duties on quality of road construction projects.

2.6 Contractor's Financial Resource and Quality of Road construction projects

Studies have viewed resources such as human resources, finances, technology and organizational leadership as the basic building blocks of an organization responsible for production of goods and services (Kamau, 2013). Resources come in different forms such as infrastructural, human, financial among others and they form the basis of the success or failure of the project. The right amount of financial resource, the right type of skilled personnel and with the necessary infrastructural support, a project is sure to be deemed of high quality. Every project manager should ensure that all the necessary resources are collected and ready for the project commencement so as to minimize the odds of having a low quality project. The study will consider the importance of contractor's financial resources in reference to delayed, on time

payments, insufficient financial resources and the effect these have on the quality of road construction projects. According to Simmons, (2012), local organizations faced a lot of challenges in acquiring credit facilities from financial institutions since they are viewed to lack sufficient security to act as collateral.

Onana J. (2018) conducted a study on factors affecting the performance of contractors on road projects supervised by the national agency of public works in Gabon. One of the key objectives was to establish the effect of financial support on contractor's performance. The study found out that financial support and fueled timely delivery of the project. This study focused on the timely effect the finances had on the contractors and did not research on the influence of the finances on the quality of the project. This warranted, the research on the influence of contractor's financial resources on quality of road construction projects.

Analysis of the research results indicated that two end project goals of meeting financial requirements and meeting functional requirements as the most sensitive and are basically influenced by performance of most design sub-process of design stage. Financial resource to a contractor is an important factor to be considered in a project since it can directly affect quality of road construction projects.

A study by Majanja (2012) on the financing constraints of infrastructure projects in Kenya concluded that financial constraints of a project was a hindrance to achieving quality projects. Fostering public-private partnership was one of the recommendations by the researcher in order to ensure some uninterrupted project activities due to insufficient funds. This conclusion was as a result of the researcher assuming a direct relationship between financial resources and the success of a project. The study mainly focused on the different sources of funding Infrastructural projects and did not discuss how financial resource influence quality of the infrastructure projects. This coerced the research on the influence of contractor's financial resource on infrastructure projects.

2.7 Theoretical Framework

Various theories may apply in regard to quality of road construction projects. Wrecker's financial distress theory and Sustainability Theory will be used in this study and are discussed below.

2.7.1 Wreckers Financial Distress Theory

According to Brigham and Ehrhardt (2013), the financial distress theory seeks to look at the different factors that lead to a decline in a project performance. Beaver, Correia, & McNichols (2011), describe financial distress as the inability of an organization to pay its financial obligations as they mature. It is important to consider the finance of the organization because it determines the cost benefits associated within any project investment. An organizations investment decision and financing are separable and independent. However, not most organizations recognize this hence holding their balance sheets on debts and equity claims as one, which then reduces their leverage on costs (Finnerty, 2013). Beaver, Correia, & McNichols (2011) posits that financial distress is manifested when an organization encounters consistent lack of finances. Generally, a financial distress prediction tool seeks to establish whether a company is likely to lack finances based on its current and publicly available financial information. The financial distress theory hence shows the relationship between an organizations financial cash flow and the ability to finance its projects. Each organization aiming at undertaking projects should ensure that its financial capability has been well planned for as well as project funding opportunities well planned, communicated and prepared for before making a decision on whether to carry out a project or not.

Delay in the completion of infrastructural facilities is a critical challenge with a global dimension, often leading to increased construction costs, loss of productivity, disruption of work, loss of revenue as a result of tedious lawsuits filed between the project owners and the stakeholders (Owolabi, 2014). It is crucial for organizations to incorporate the length and time required for the release of funds during the project pre-planning stage. This prevents project delays when the project commences thus saves unnecessary costs overrun.

2.7.2 Resource Based View Theory

The main idea of the resource-based view is that resources and capacities of an organization can differ considerably across organizations, and that these variances can be constant (Kiprono, P. and Daniel, W, 2016). Organizations with upper competitive edge seem to develop a sense of confidence in participants and that their support, be it financial or otherwise, will be appreciated and put into use.

According to Müller & Jugdev (2012) the resource-based view in subcontracting firms form a

suggestion that a firm without important, unique, uncommon and organized resources and competences, should seek for an external source to overcome the shortcoming. Participants will want to participate in initiatives that have proper management of the resources available. Outsourcing resources leads to reduced overall cost of the project. Therefore, participants can be persuaded that the program managers are working towards the attainment of the program at reduced costs for maximum benefit as well as utility.

In the perspective of the present study, the County Government - financed initiatives, in line with project management, go through change. In this case, the initiatives' inputs take the form of finances they obtain from the County Government Ministry of Finance and Planning. A study by Crawford (2010) revealed that project managers do not essentially have the needed capacity to carry out the full undertakings needed to encourage and implement the transformations that they are in the lead as part of their initiatives. The resources are expected to be implemented so as to successfully finish the initiatives. The outputs as explained by the project management theory are demonstrated by the finished County Administration programs. The performance of the above-mentioned program is evaluated by successful completion of the initiatives.

2.8 Conceptual Framework

The conceptual framework outlines the dependent and independent variables as discussed in the literature review and elaborated in the Figure 1 below. It assists in understanding the relationship between the independent and dependent variables of the study. This relationship is affected by the government regulatory framework which is a moderating variable and will not be measured in this study.

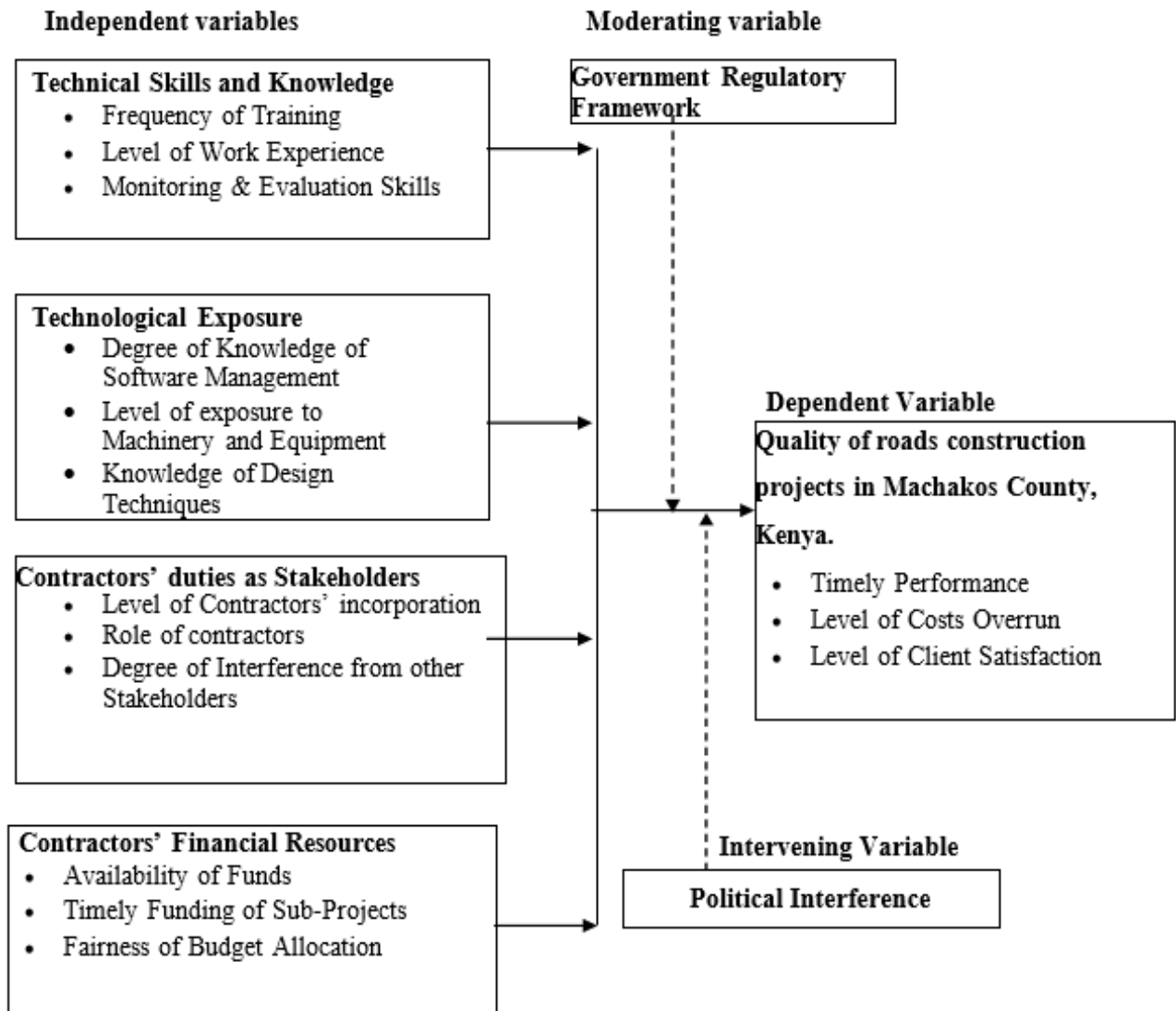


Figure 1: Conceptual Framework

2.9 Summary of Literature Review

Numerous scholars have undertaken researches revolving around road construction projects. Some have researched on causes of road construction project failures; some have researched on ways to improve quality of road construction projects while others have focused the factors surrounding project delays. Every study conducted has proven to contain some knowledge gap therefore leading to subsequent studies by different researchers in the same area. This study has reviewed works done by scholars such as; Wafula (2017), Minde R. (2018), Biruta et al (2015), Mahamid (2011), Graham et al (2012), Stephene (2013), Adnan et al (2012), Wondimu et al (2016), Onana J. (2018) and Majanja (2012). Their works have been of great addition to this research study, however, they pose some various gaps which has necessitated this research study.

This study aims to look at influence of contractor related factors on quality of road construction projects. Most researchers generalized the stakeholders and discussed on the factors affecting the projects in general and did not focus on specific stakeholders and how the factors affecting them had an impact on quality of road construction projects. The researchers also focused on the negative factors surrounding road construction projects and did not major on the positive influences of these factors to improve quality of road construction projects.

The study has the dependent variable, quality of road construction projects which is determined by level of costs overrun, timely performance of the project and level of client satisfaction. All these factors are dependent on the contractor related factors which form the independent variables of the study. It will adopt Wreckers financial distress theory which will be applied on the contractor's financial resource factor and the resource based view theory which will be used on the other independent factors.

Table 2.1 Summary of Knowledge gaps

Variable	Author & year of Study	Title of the study	Findings	Knowledge Gap
Quality of road construction projects	Wafula, E. (2017)	Contractor related factors influencing Road Project Performance in Kenya	He found out that capital availability, organizational culture and technical skills had the greatest influence on the performance of road construction projects. However, several challenges such as poor weather conditions, unskilled laborers among others were experienced affecting the performance of road construction projects.	The study focused on determining the key factors that affected the contractors and had an influence on the performance of road construction projects and did not determine how these factors and to what degree they influenced the quality of the road construction projects as this study intends to.
Quality of road construction projects	Minde, Rahul (2018).	Analyzing the factors influencing quality throughout the lifecycle of a road project	The study revealed that the owner's policy and effective quality management system was a highly significant factor at conceptual stage. In the design stage, quality, the nature and type of subgrade soil and design errors were extremely important factors. The quality of raw materials	This study focused on the factors influencing quality of the project at different stages caused by different stakeholders and did not categorize these factors based on a specific stakeholder separately as this study intends to.

Contractors' Skills and Knowledge	Mahamid (2011)	Risk Matrix for Factors Affecting Time Delay in Road Construction Projects: Consultants' Perspective	<p>and method of construction were also of prime importance</p> <p>The biggest causes of cost overruns were poor communication between construction parties; poor resource management; delay in commencement; insufficient inspectors; rework from poor material quality; rework from poor workmanship; and payments delays..</p>	<p>The study confirmed that poor workmanship has a financial strain to projects, however, it did not confirm how the skills and knowledge or lack of thereof, affects the quality of the project as this study intends to.</p>
Contractors' Skills and Knowledge	Biruta, Sloka & Kantane, Inara & Tora, Ginta & Buligina, Ilze & Dzelme, Juri.(2015)	Expectations by Employers on Skills, Knowledge and Attitudes of Employees	<p>The study found out that 92% of the work experience, 76% of the skills and knowledge and 62% of attitude of employees are important to the employers.</p>	<p>The study focused on expectations by employers on skills, knowledge and attitudes of employees. It however, did not research on how the skills and knowledge of employees affected the job quality. This compelled the study to find out to what extent the skills and knowledge influenced quality of</p>

				road construction projects.
Contractor's Exposure to technology	Graham,S., Mohammed, R., Christopple, N. & Chan, B. (2012).	Why Project Teams?	The study found out that agricultural projects in Europe were characterized by technology that was appropriate, high level technology and adequate institutional capacity to utilize modern technological skills. The study further asserted that use of modern technology in road infrastructure projects would result in mass high quality projects and also reduce time and cost overruns.	The study focused on establishing the level of awareness of technology in agricultural projects and did not research on how the uses of technology influences quality of agricultural projects.
Contractor's Exposure to technology	Stephene, N. (2013)	Effects of Application of Technology in the Performance of Infrastructure Projects in Switzerland.	The study revealed that no projects can succeed by applying ancient techniques. The study further advocated for the development of efficient and reliable information systems in managing road construction projects after they carried out a study on application of technology in project	The study focused on the effects of applying Technology in Infrastructure Projects in general and did not look at how contractor's exposure to technology influences the quality of road construction projects

			management.	as this study intent to.
Contractors' duties as stakeholders	Adnan, H. Hashim, N. Yusuan N. Ahmad N. (2012)	Ethical Issues in the Construction Industry: Contractor's Perspective	The study revealed that there are various unethical malpractices that greatly affect the quality of construction projects negatively. It concluded that full elimination of these vices from contractor's perspective can lead to quality construction projects.	The study focused on finding out the common unethical practices by contractors and did not research on how ethical practices by contractors affected quality of projects as this study intends to.
Contractors' duties as stakeholders	Wondimu, P. Hailemichaelc, E. Hosseinia, A. Lohne, J. Torpa, O. Lædrea, O. (2016)	Success factors for early contractor involvement in public infrastructure projects	The study found out that the success factors identified included, proper timing of early contractor involvement application, the distribution of manageable risks to contractors, owner's high level of competence, proper compensation of the contractors' duties, proper qualification of contractors and creation of trust between contractors and owners of the project.	The study focused mainly on the success factors as a result of involving the contractors early into the project and did not look at the success factors as a result of involving contractors into the project.

Contractor's Financial Resource	Onana, J. (2018)	Factors affecting the performance of contractors on road projects supervised by the national agency of public works in Gabon	The study found out that financial support and organization structure had the greatest influence on the timely performance of contractors.	This study focused on the timely effect finances had on the contractors and did not research on the influence of the finances on the quality of the project. This warranted, the research on the influence of contractor's financial resources on quality of road construction projects.
Contractor's Financial Resource	Majanja, T (2012)	Sources of Funding Infrastructural Projects	The study results found out that financing constraints were a major obstacle faced by construction firms. The local construction companies faced a lot of financial constraints in their project life cycle. He suggested that, Public-Private Partnerships will be most suitable for the government to raise adequate funds for the major infrastructure projects.	The study mainly focused on the different sources of funding Infrastructural projects and did not discuss how financial resource influence quality of road construction projects as this study aims to.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

This section outlines the methodology that will be used in carrying out the study, which consists of an introduction, research design, target population, sample size, research instruments, data collection procedure, validity and reliability of the research instruments and ethical considerations, Operationalization of the variables and methods of data analysis techniques.

3.2 Research Design

This study will employ descriptive survey which is used when the problem is well defined and the researcher knows something about the problem. A survey can be described as the process whereby a situation is studied with the sole aim of explaining why it is that way. This design will allow for accounting and adequate descriptions of activities, objects and persons. The design type will not only offer descriptions and explanations but also identify and predict relationships in and between the variables of the study.

A Cross-Sectional approach will be used to collect quantitative data from the respondents. The approach is relatively fast and inexpensive because it provides self-reported facts about respondents, their feelings, attitudes, opinions and habits. Descriptive survey design ensures that the researcher understands the existing status of an area of study (Zells, 2011). Survey design will enable the researcher to make accurate assessment, inferences and relationships of phenomenon, events and issues.

3.3 Target Population

The population of interest in this study will be the road contractors, Supervising Engineers and Project Managers at Machakos Town Sub-county. This study will target 16 Supervising Engineers, 199 Project Managers at the department of roads and public works Machakos Town Sub-county and 199 road contractors in Machakos Town Sub-county. This makes a target population of 414 respondents grouped into three categories.

Table 3.1: Target Population

Category	Total population	Percentage%
Supervising Engineers	16	3.8
Project managers	199	48.1
Contractors	199	48.1
Total	414	100

Source: Department of Roads and Public Works Machakos Town Sub-county (2018)

3.4 Sample Size and Sampling Procedure

A sample is a group in the research study on which information is obtained while sampling is the process of selecting these individuals. It is the selection of respondents that are chosen in a manner that they characterize the total population.

3.4.1 Sample Size

A sample is a small section of the population representing an entire population. Sampling means choosing several units from a population as a representative.

The sample size is determined by using Krejcie & Morgan formula:

$$s = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$$

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size

P = the population proportion (assumed to be .50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

Since our target population is 414

$$s = \frac{3.841 \times 414 \times 0.5 (1-0.5)}{0.05^2(414-1) + 3.841 \times 0.5 (1- 0.5)}$$

$$s = 397.5435 \div 1.99275 = 199.4949$$

s = 199 respondents

Since the sample size has been calculated, and found to be 199 respondents, the specific sample size for each category of the groups involved can be calculated as shown below;

$$\frac{16}{414} \times 100\% = 3.8\% \text{ of the Supervising Engineers}$$

$$\frac{199}{414} \times 100\% = 48.1\% \text{ of the project managers}$$

$$\frac{199}{414} \times 100\% = 48.1\% \text{ of the contractors}$$

Table 3.2: Sample Size

Category	Target population	Sample size	Percentage(%)
Supervising Engineers	16	7	3.8
Project managers	199	96	48.1
Contractors	199	96	48.1
Total	414	199	100

Source: Researcher (2019)

3.4.2 Sampling Procedure

A stratified random sampling approach will be applied to classify all the Supervising Engineers, Project managers and road contractors in Machakos Town Sub-county. This will be guided by the traffic volume to achieve a reasonable representation of a sample. Stratification can be defined as a process of grouping the whole population into homogenous subgroups before sampling. The strata will be mutually exclusive and each element in the population will be assigned to a single stratum. The study will use a sample of 48% of the target population. Thus, 48% of the accessible population will be enough for the sample size. The target population and the sample size are illustrated in Table 3.2 above.

3.5 Research Instruments

Collection of data is the process of gathering information that is used for the analysis of a study.

These data collection process is dependent on the research design that will be used. Primary data sources will be collected by administering semi-structured close-ended questionnaires.

Closed-ended questions consisted of predetermined answers; these questions will collect quantitative data. The responses to these questions will be rated using a five-points Likert Scale as follows: 1-Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree. Likert scale is a psychometric scale that is applied to assess attitudes and opinions of the respondents. The advantage of using questionnaires is that the responses will be obtained in a uniform way.

3.5.1 Piloting of instruments

Before the research instrument is finally administered to respondents, pre-testing (also known as piloting) will be carried out to ensure that the questions are relevant and clearly understandable. The pre-testing aim will be to assess the clarity of the questionnaire and ease of use and may include the wording, structure and sequence of the questions. Pilot testing reveals vague questions and deficiencies in the questionnaire or the validity, which is the degree to which empirical measures of the concept is accurately measured. The questionnaires will be pilot tested to determine their suitability to supervising engineers, project managers and contractors. Pilot testing will be carried out by purposively selecting 2 projects in Malava sub-county, Kakamega County and target similar categories of respondents as will be done in the main research. The information obtained will be used to revise the questionnaire by modifying questions that are sensitive, confusing or biased. The data will also be analyzed and used to develop dummy tables that will eventually appear in the report once the actual data is collected and analyzed.

3.5.2 Validity of the Instrument

Validity can be defined as the degree of strength of one's conclusions or inferences. It is the degree to which the results obtained from the analysis of the data represent the phenomenon under study. Content validity is applied in order to obtain the validity of the research instrument. The researcher will select representative sample of indicators from the domain of indicators of the concept, then seek expert opinion from the supervisor and another university lecturer to establish the validity of the research instrument. This will enhance the validity of the instruments

3.5.3 Reliability of Instruments

Reliability refers to the consistency of the measurements or the degree to which an instrument gives similar results each time it is used under the same condition with the same subjects. Reliability is estimated but not measured and reliability does not, however, imply validity because while a scale may be measuring something consistently, it may not necessarily be what it is supposed to be measuring. The study will use the split-half technique to assess reliability because it has the advantage of eliminating chance errors due to different test conditions. Eisinga & Pelzer (2012) defines split half technique as a procedure of dividing test subjects into two halves and the results of each half compared with each other. The data will be analyzed by the use of Pearson's product moment correlation procedure method. A coefficient of 0.80 or more will be considered an indication of high reliability. The questionnaire will be considered to be reliable if a coefficient of 0.80 or more will be achieved.

3.6 Data Collection Procedure

Primary data will be used. The questionnaires will be administered by dropping and picking them later through agreeing on a certain time with the researcher. The semi-structured questionnaire will be used for closed-ended questions.

A five-point (1-5) Likert scale will be utilized to measure the strength of these responses. This kind of scale will be useful for closed questions only. Some of the respondents that might be difficult to reach due to time constraints researcher will send questionnaires through emails. Follow-up will be made using phone calls. A cover letter will be obtained from the University of Nairobi as a proof of permission to collect data for academic purposes only. A letter of authorization to collect data in Machakos Town Sub-county will be obtained from National Commission for Science, Technology and Innovation.

3.7 Data Analysis Techniques

After the data is collected, the researcher will examine all questionnaires for completeness, accuracy as well as the conformity. The next step will be coding of the information and categorizing of the responses into meaningful groups to elicit the essential pattern. A codebook containing all the variables derived from the research objectives and research questions of the study as presented in the questionnaire will be developed. The coding will give values representative of the subject's

responses and these will then be entered into a computer. The tool for use in analyzing data will be the statistical package for Social Science (SPSS version 22) computer package. The analysis will then be done by the use of both descriptive and then inferential statistical methods. The former will include tables, percentages and other measures of central tendency such as mode, mean, median, frequency and standard deviation. To determine the correlation between the dependent and independent variables, we will use the Pearson's Product – Moment Correlation procedure analysis method. This will indicate the level of significance of each variable and how it influences the quality of the road construction projects.

3.8 Ethical Considerations

Ethics can be defined as the moral principles that governs someone's behavior when undertaking an activity. The researcher will seek authority to collect data from the National Council for Science and Technology (NACOSTI) and from the Machakos Town Sub-county ministry of roads and transport offices in order to gather the required data from the respondents. The researcher will conduct this research with utmost care considering the nature of the information obtained. Firstly, consent will be obtained by engaging and interacting with the contractors in the respective project areas, this will be helpful in commissioning the course, to win their trust, support and permission to investigate road construction projects. The researcher will take time to explain to the respondents the significance of this research and the set goals that he intended to achieve.

The nature of this research will also be acknowledged to them including the questions, privacy will be achieved by assuring the respondents that their identities and all the information that they will give will be kept confidential. This will highly motivate them to participate in taking part in this research.

Then, pre-practice will be done to all the respondents that the researcher had communicated to prior the administration of questionnaires. This will help in improving their willingness to take part in the research by giving accurate and reliable information and thus improve the quality of the research findings.

3.9 Operationalization of Variables

The table 3.3 describes the operationalization of variables on contractor related factors influencing quality of road construction projects in Machakos Town Sub-county, Kenya.

Table 3.3: Operationalization of variables

Research Objectives	Variable	Indicator	Measurement Scale	Data collection Method	Tools Of Analysis	Types of Statistical Analysis
To determine the influence of Contractors' Skills and Knowledge on quality of road construction projects Machakos Town Sub-county, K	Independent Contractors' Skills and Knowledge	Frequency of training Level of work experience Effective monitoring and evaluation	Ordinal Scale Nominal	Questionnaires	Mean, Frequencies, Percentages Pearson's Correlation	Descriptive and Inferential
To establish influence of contractor's exposure to technology on quality of road construction projects in Machakos Town Sub-county, Kenya.	Independent Existing Technology	Knowledge of Software management Availability of Machinery and equipment Knowledge of Design Techniques	Ordinal Scale Nominal	Questionnaires	Mean, Frequencies, Percentages Pearson's Correlation	Descriptive and Inferential
To examine influence of contractors' duties as stakeholders on quality of road construction projects in Machakos	Independent Contractors' duties as stakeholders	Effectiveness of Contractual agreements Transparency of Tendering reports Degree of Government interference	Ordinal Scale Nominal	Questionnaires	Mean, Frequencies, Percentages Pearson's Correlation	Descriptive and Inferential

To investigate influence of contractor's financial resources on quality of road construction projects.	Independent financial resource	Availability of Funds Timely Funding of sub-projects Fairness of Budget allocation	Ordinal Scale Nominal	Questionnaires	Mean, Frequencies, Percentages Pearson's Correlation	Descriptive and Inferential
	Quality of road construction projects in Machakos Town Sub-county, Kenya	Timely Performance level of Cost overruns Level of Client satisfaction	Ordinal Scale Nominal	Questionnaires	Mean, Frequencies, Percentages And Pearson's Correlation	Descriptive and Inferential

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APPENDICES

Appendix I: Transmittal Letter

CAROLINE MURIITHI,
P.O. Box 23-50100
Kakamega
0717 690 032

Dear Respondents,

**RE: CONTRACTOR RELATED FACTORS INFLUENCING QUALITY OF ROAD
CONSTRUCTION PROJECTS IN MACHAKOS TOWN SUB-COUNTY, KENYA**

I am a postgraduate student at the University of Nairobi pursuing a Masters of Arts in Project Planning and Management. I am carrying out research on the contractor related factors influencing quality of road construction projects in Machakos Town Sub-county, Kenya as part of requirements for the Award of this Degree. Your organization has been selected and consequently, you have been sampled as part of the respondents.

I therefore humbly request you to respond to the questions as asked in the questionnaires.

I assure you that the information provided will be solely used for the academic purpose of this study and treated with the highest confidentiality standards.

Thank you in advance

Yours faithfully,

Caroline Muriithi

Appendix II: Research Questionnaire

This questionnaire is used to collect data purely for academic purposes. The study seeks to investigate the contractor related factors influencing quality of road construction projects in Machakos Town Sub-county, Kenya.

All information will be treated with strict confidence. Do not put any name or identification on this questionnaire.

Answer all questions as indicated by either filling in the blank or ticking the option that applies.

SECTION A: GENERAL INFORMATION

Please tick (√) appropriate answer

GENDER: Male [] Female []

1. Please indicate your area of work (**Tick where applicable**)

- Project Manager []
- Supervising Engineer..... []
- Contractor..... []

2. What is your highest education level? (**Tick where applicable**)

- Secondary certificate..... []
- Diploma/certificate.....[]
- Bachelors’ degree.....[]
- Postgraduate degree..... []
- Others (specify).....

3. Please indicate your age bracket (**Tick where applicable**)

- 20-30 years..... []
- 31-40 years..... []
- 41-50 years..... []
- 51–60 years.....[]
- Over 60 years..... []

SECTION B: CONTRACTORS' SKILLS AND KNOWLEDGE AND QUALITY OF ROAD CONSTRUCTION PROJECTS

4. What is your feeling towards the following statements regarding Contractors' Skills and Knowledge in road construction projects?

(Tick where applicable where, 5= Strongly Agree, 4= Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree)

SN	Statements	5	4	3	2	1
1	All road contractors have work experience in their field.					
2	Road contractors communicate effectively with other stakeholders and coordinate efforts.					
3	Project owners select contractors with the right skills and knowledge					
4	Road contractors are efficient in their work.					
5	Contractors without the necessary skills and knowledge perform well in their projects.					

5. How often do you attend training programs?

Monthly.....[]

Quarterly.....[]

Semi-annually.....[]

Annually.....[]

Never[]

6. For how long have you worked in road construction projects?

Less than five years.....[]

Between 5-10 years.....[]

Between 11-15 years.....[]

Over 15 years.....[]

SECTION C: CONTRACTOR’S EXPOSURE TO TECHNOLOGY AND QUALITY OF ROAD CONSTRUCTION PROJECTS

7. What is your feeling towards the following statements regarding contractor’s exposure to technology on the quality of road construction projects?

(Tick where applicable where, 5= Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree)

SN	Statements	5	4	3	2	1
1	Contractors use new modern software management programs during construction process					
2	Contractors are well equipped with modern machinery and equipment					
3	The designs and techniques which contractors use are effective with no variations					
4	Contractors and supervising Engineers are well conversant with the technology used on the ground					
5	The workers have received training on the latest technology used worldwide on road construction projects					

8. Do you think that technology used influences the quality of the road project in Machakos Town Sub-county ?

Yes []

No.....[]

SECTION D: CONTRACTORS' DUTIES AS STAKEHOLDERS AND QUALITY OF ROAD CONSTRUCTION PROJECTS

9. What is your feeling towards the following statements regarding the Contractors' duties as stakeholders on the quality of road construction projects?

(Tick where applicable where, 5= Strongly Agree, 4= Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree)

SN	Statement	5	4	3	2	1
1	Contractors should be involved early into the project activities.					
2	Contractors' duties are more important than all the other stakeholders in the project.					
3	Contractors receive a lot of unforeseen interruptions while performing their daily duties.					
4	Contractors have the highest influence on the quality of road construction projects.					
5	Government policies on road construction projects discourage many individuals from forming contracting firms .					

10. Do you think contractor's unethical behaviors affect the work quality of the road construction projects?

Yes []

No.....[]

SECTION E: CONTRACTOR’S FINANCIAL RESOURCE AND QUALITY OF ROAD CONSTRUCTION PROJECTS

11. What is your feeling towards the following statements regarding the Financial Resources on the quality of road construction projects?

(Tick where applicable where, 5= Strongly Agree, 4= Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree)

SN	Statement	5	4	3	2	1
1	Road contractors have unlimited access to the financial resources.					
2	Road contractors usually have laid budget before implementation process.					
3	Road contractors liaise with project managers to practice financial management.					
4	Road contractors can openly account for the utilization of project fund.					
5	Financial support for the projects is in most cases given on time.					

12. Do you think contractors should be given absolute financial independence?

Yes []

No.....[]

SECTION F: QUALITY OF ROAD CONSTRUCTION PROJECTS

13. What is your feeling towards the following statements regarding the quality of road construction projects?

(Tick where applicable where, 5= Strongly Agree, 4= Agree, 3 = Neutral, 2= Disagree, 1= Strongly Disagree)

SN	Statements	5	4	3	2	1
1	The road construction projects are completed within set schedules.					
2	The road construction projects are completed within set budget.					
3	Beneficiaries are in most cases satisfied with the project quality.					
4	Road construction projects being government sponsored have an assurance of being high quality.					
5	Road construction projects are similar to any other government projects.					

14. Do you think contractor related factors influence the quality of road construction projects?

Yes []

No.....[]

THANK YOU FOR YOUR ASSISTANCE

Appendix III: Research Work Plan

Activity	November 2019	December 2019	January 2020	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020
Identification Of research topic									
Carrying out of literature review									
Proposal Draft									
Proposal Defense									
Data collection and Analysis									
Writing Chapter 4 and 5									
Research Defense									
Graduation									

Appendix IV: Research Budget

ITEM/ACTIVITY	Cost
Typing and printing	5,000
Spiral binding	2,000
Stationary	1,000
Transport	25,000
Accomodation (APPRX. 5 DAYS)	15,000
Internet and telephone expenses	5,000
Research Assistant allowances	20,000
Miscellaneous	10,950
TOTAL	83,950

Appendix V: Krejcie & Morgan Table

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970