

**INFLUENCE OF CONTRACTORS' CAPACITY ON
IMPLEMENTATION OF ROAD INFRASTRUCTURE
PROJECTS IN MERU COUNTY, KENYA.**

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**A Research Project Submitted in Partial Fulfillment for the requirements for the Award of
the Master of Arts in Project Planning and Management of the University of Nairobi.**

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DECLARATION

I, the undersigned, declare that this research thesis is my original work and has not been submitted to any other institution or university for academic credit.

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This research thesis has been submitted for examination with approval as the appointed University Supervisor.

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DEDICATION

I dedicate this research project to my loving parents and siblings for their encouragement throughout this research study.

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ABBREVIATIONS AND ACRONYMS

CDF	Constituency Development Fund
ERB	Engineers Registration Board
EU	European Union
GoK	Government of Kenya
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KRB	Kenya Roads Board
KURA	Kenya Urban Roads Authority
QA	Quality Assurance
UK	United Kingdom

ABSTRACT

Reliable road infrastructure is key for any nation's development, but the inability to achieve suitable standards in road infrastructure is a major problem worldwide. Contractors play a central role and the success in implementation of road infrastructure projects depends majorly on the performance of the contractor. This study sought to establish the influence of contractor's capacity on the implementation of road infrastructure projects in Meru County. This was guided by the following objectives; To determine the influence of contractors' technical capacity on the implementation of road infrastructure construction projects in Meru County, Kenya; To establish the influence of contractors' financial capacity on the successful implementation of road infrastructure construction projects in Meru County, Kenya; To investigate the influence of contractors' quality management on the implementation of road infrastructure construction projects in Meru County, Kenya; To determine the influence of contractors' management structure on the implementation of road infrastructure construction projects in Meru County, Kenya. The study was anchored on the institutional and resource dependency theories. A correlational research design was used to determine the strength and direction of relationship between the independent variables and the dependent variable. The target population for the study was all the 140 road infrastructure contractors in Meru County, 1 county roads engineer, 1 county accountant, 1 KURA roads engineer, and 40 subcounty projects committee members. The sample size for the study was 126 which was arrived at using Alameda's formula. The contractors were stratified based on the sub-counties in Meru County, then simple random sampling was used to get the contractors from each sub-county whose number had been proportionately allocated, while purposive sampling was used for the County Roads Engineer, County Accountant and KURA Roads Engineer. Data was collected using semi-structured questionnaires and interview guides. A pilot study was carried out in Tharaka Nithi County with a sample of 10 contractors. The validity of the research instrument was checked by an expert in the field and reliability was done using the Cronbach Alpha. Quantitative data collected was coded into SPSS v23, then cleaned and analyzed for descriptive statistics, that is, mean, standard deviation, frequencies and percentages. A Pearson correlation coefficient was computed to check the strength of relationship between the variables and a regression model was developed then testing on the hypothesis will be done using ANOVA, then presented in tables. Qualitative data was grouped then analyzed thematically after which the outcome was combined with the quantitative output. The results showed that contractor's technical capacity has an influence of 0.364 on implementation of road projects, contractor's financial capacity has an influence of 0.812 on implementation of road projects, contractor's quality management has an influence of 0.574 on implementation of road projects, and contractor's management structure has an influence of 0.133 on implementation of road projects. It was also found that contractor's capacity which was made up of technical, financial, quality management and management structure capacities accounted for a change of 86% in implementation of road infrastructure projects in Meru County. The findings will be useful to the road infrastructure contractors, the ministry in charge of roads and the world of academia. The research recommends that a study be done on other factors influencing the implementation of road construction projects as well as the gender perspective in road construction projects.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Road construction is an important part of the economical backbone in many countries. This is because it interacts with nearly all fields of human endeavour. The productivity, welfare, and security of both rural and urban people are greatly influenced by the level of road infrastructure development in their communities and the infrastructural links to district, provincial, and national centres of administration and commerce. Infrastructural services are social overhead capital facilities and activities that share techno economic features which enhance productive capacities of firms and households. However, all over the world, road construction has attracted criticism for inefficiencies in outcomes such as time and cost overruns, low productivity, poor quality and inadequate customer satisfaction (Chan et.al., 2003).

Globally, implementation of road infrastructure projects commences with the sourcing of funds due to the capital-intensive nature of the projects. In most cases, funding comes from international organizations or the governments within which the road is to be constructed. Prior to implementation of the road projects, a standard guide for executing the projects is set out by the stakeholders. Different continental regions have varying approaches from which standards used for construction are pre-determined. For instance, the European Norms are widely used in setting out standards for design of highways and bridges, Indian Standards form a benchmark for construction in India, and American Standards are used in the United States (Schoon, 2000). International practise on implementation of infrastructure projects require that different road elements be designed based on the specific standards as a basis of uniformity and guide to practising engineers. The standards used in a prevailing region will form the special conditions used to develop contracts and agreement with contractors executing the road projects (Great Britain Department of Transport, 2004).

In Africa, infrastructure development is seen as the key to bridging the existing economic gap in the continent. According to a report by Ernest & Young on implementation of road infrastructure projects stakeholders from the private sector invested \$12.8 billion into infrastructure projects (Ernest & Young, 2014). Implementation of road infrastructure projects varies depending on the regions in Africa. Unlike, the global scenario, implementation of road projects in Africa is guided

by the financing entities. Owing to the capital-intensive nature of the projects and the need to develop infrastructure, funding comes from different avenues including African governments, multilateral and bilateral agencies, or through Official Development Assistance (Ernest & Young, 2014). The funding agencies often dictate the mode of execution and implementation of the infrastructure projects. For instance, the National Transport Authority will dictate the design methodology if the funding comes from the government. For instance, Tunisia borrowed € 300 million meant for upgrading of its highways and motorways from the European Investment Bank (World Bank, 2015).

The implementation of road infrastructure projects and keeping them within estimated cost and prescribed schedules depend on the methodology that requires sound engineering judgment. Contrary to the well of owners, contractors, and consultants many projects experience extensive delays and thereby exceed initial time and cost estimates (Hughes, 2004). This problem is more evident in the traditional or adversarial type of contracts in which the contract is awarded to the lowest bidder-the awarding strategy of the majority of public projects in developing countries including Gaza Strip. Pheng (2006) defined project success as the completion of a project within acceptable time, cost and quality and achieving client's satisfaction. Project success can be achieved through the good performance of indicators of the project. Chan (2002) stated that a construction project is considered successful when it is completed on time, within budget, and of acceptable quality regardless of the complexity, size, and the environment within which it is constructed. However, construction performance is subject to many variables and unpredictable factors. The performance of parties, resource availability, environmental conditions, and contractual relations contribute to construction performance (Alaloul, Liew, and Zawawi, 2016).

Contractors' qualification is one of the widely published topics in construction industry research. However, the relationship between contractors' capability and achievement of project success remains largely unanswered and is an important topic for investigation (Mbachu, 2008). Every construction project is unique and comprises of unique complexities and risks across many issues throughout the construction process. Increasing complexity in design and involvement of multitude of stakeholders in modern construction projects, add further challenges for both clients and contractors in matching the required skills and capabilities to deliver the project successfully. Contractors' ability to succeed on a project depends on diverse inherent attributes ranging from

project complexity, technical expertise to organisational capability and risk management practices. Thus, a robust prequalification process for selecting the right contractor is an important first step for ensuring success in candidate projects (Arslan et al., 2008).

According to the National Construction Authority (2017) the construction industry in Kenya is expected to grow and have a capacity and capability to efficiently execute the large scale projects anticipated in the Vision 2030 National Development plan and other projects within the regional economic blocks such as the standard gauge railway project and the Lapset project. The construction industry in Kenya has crucial role to play in the realization of vision 2030, the development blueprint for the period 2008-2030, which envisages an efficient infrastructure base to drive all the other sectors for sustainable development. Despite the importance, economic and social value of reliable and efficient infrastructure, many infrastructure constructions projects in Kenya have experienced delays in timely completion. Nyika (2012) noted that only 20.8 per cent of the projects in Kenya were implemented on time and budget, while 79.2 per cent exhibited some form of failure. According to the study the major causes of failures were related to the capacity of the contractors, that is, insufficient implementing capacity, poor project management, weak project design and political interference. In order to sustainably implement infrastructure projects, it is necessary that the contractor's in construction industry build sufficient capacity to undertake the projects to ensure timely, quality and cost-effective implementation of these development projects.

In Meru many road projects fail to be completed in time causing cost overruns. This can be seen in the various number of road projects which have not been completed on time. Even more are those road projects that are in the end finished but at an inflated budget and at a date later than agreed in the road project schedule. According to Kenya Urban Road Authority, (2013) reported there were many projects which were not completed due to obstacles by client, non-availability of materials, poor infrastructure, lack of funds and lack of contractors' competency. According to Kimathi (2016), Kinoru stadium in Meru county that was expected to be completed in 2015 was not completed due to slow progress on the work by contractors. Meru government was forced to stop the construction inconveniencing the ministry of sports. The contractors were accused of violating the terms and conditions of the tender. Failure of the contractors to meet the deadline lead to increase in cost since the county officials increased the funding for renovating the stadium to speed up its completion. Besides, some road projects are completed but with very poor-quality

workmanship (Kenya Engineer Magazine, 2015). This research study therefore, seeks to investigate the various factors related to the contractor that influence implementation of road construction projects in Meru County.

1.2. Statement of the problem

Successful road construction is an impetus to economic development for Kenya as enumerated in the Kenya Vision 2030 (GoK, 2007). Consequently, the government invested heavily in the road construction. For example, in financial year 2016/2017 KeNHA planned to construct 13,138.72 KMs of roads at a projected cost of KSh. 20,459,228,001 whereas KeRRA had a budget of KSh. 10,893,617,021 to maintain 28,243 KM of roads. On the other hand, KURA had a forecast of maintaining 2,338KMs of roads at a cost of 5,106,382,979 (KRB, 2016). Despite the significant investment that the government continues to make towards road construction, Macharia (2016) laments that around 55 percent of all road construction projects in the country suffer a myriad of challenges hindering their completion within schedule, experiencing cost overruns or fail to meet the requisite quality standards. Additionally, Gathoni and Karanja, (2016) lament that most of the construction projects undertaken in the counties using the Constituency Development Funds (CDF) were either poorly completed (30%) or not completed at all (50%) and only 20 percent were complete and performing. Hoge and Muturi (2014) also reported few road infrastructure projects in Kenya meet the success criteria due to a myriad of challenges, which included poor planning, lack of working capital and lack of stakeholders' involvement. A study by Seboru (2015) noted that the factors causing delays in the successful implementation of road projects in Kenya ranged from project funding, project monitoring and evaluation, poor planning, contractor capacity and slow decision making.

The responsibility of achieving success in the implementation of infrastructure construction project largely depends on the contractors' capacity. However, it has become a global trend that contractors are not performing to expectations of the clients that they serve and indeed many road contractors have failed in performance. Delays in project completion and poor performance in the construction industry have been experienced and led to failure in achieving effective time and cost performance (Aftab, 2012). Tawil (2013) observed that in Malaysia delay is a common occurrence particularly where the government projects are concerned. Three of the most critical factors noted

in Malaysia were fluctuation in cost of materials, cash flow and financial difficulties faced by contractors, poor site management and supervision (Rahman, 2013).

In Kenya, roads construction projects are seldom completed within the stipulated timeframe, may not be within the allocated budget and sometimes do not meet the specified quality standards. According to Nyika (2012), 79.2% of the projects implemented in Kenya experience some failure that are attributable to the capacity of the contractor. In Nairobi County, projects financed by the national government through the help of international partners have faced the same fate of not being completed successfully. An example is the Enterprise road stretch project, a critical artery for Nairobi's Industrial Area, which was eventually cancelled by the Ministry of Infrastructure due to the contractor not being capable of finishing the work in time (GoK, 2019)

1.3. Purpose of the study

The purpose of this study was to determine the influence of contractors' capacity on the successful implementation of roads infrastructure construction projects in Meru County, Kenya.

1.4. Objectives of the Study

This research study was guided by the following objectives:

- i. To determine the influence of contractors' technical capacity on implementation of road infrastructure projects in Meru County, Kenya.
- ii. To establish the influence of contractors' financial capacity on implementation of road infrastructure projects in Meru County, Kenya.
- iii. To investigate the influence of contractors' quality management capacity on implementation of road infrastructure projects in Meru County, Kenya.
- iv. To determine the influence of contractors' organization structure on implementation of road infrastructure projects in Meru County, Kenya.

1.5 Research Question

This study seeks to answer the following research questions:

- i. To what extent does contractors' technical capacity influence implementation of road infrastructure projects in Meru County, Kenya?
- ii. To what extent does contractors' financial capacity influence implementation of road infrastructure projects in Meru County, Kenya?

- iii. To what extent does contractors' quality management capacity influence implementation of road infrastructure projects in Meru County, Kenya?
- iv. To what extent does contractors' management structure influence implementation of road infrastructure projects in Meru County, Kenya?

1.6 Research Hypothesis

This research study sought to test the following hypothesis:

- i. H_{01} : Contractors' technical capacity has no significant influence on implementation of road infrastructure projects in Meru County, Kenya.
- ii. H_{02} : Contractors' financial capacity has no significant influence on implementation of road infrastructure projects in Meru County, Kenya.
- iii. H_{03} : Contractors' quality management capacity has no significant influence on implementation of road infrastructure projects in Meru County, Kenya.
- iv. H_{04} : Contractors' organization structure has no significant influence on implementation of road infrastructure projects in Meru County, Kenya.

1.7 Significance of the study

It is hoped that the findings and recommendations of this study will be helpful to all stakeholders in the construction industry. To academicians and researchers, this research will enrich the existing researches on road construction projects through provision of theoretical references that may assist in establishing a set of effective mechanisms and methods for enhancing successful execution of roads construction projects by contractors. To the Kenya Urban Roads Authority (KURA), Kenya National Highways Authority (KENHA), Kenya Roads Board (KRB), Kenya Rural Roads Authority (KERRA), Ministry of Roads Transport and infrastructure, Engineers Registration Board (ERB), Roads construction consultancy firms and upcoming contractors among others, the findings of this research will be important in understanding the pros and cons as far as Roads construction in Kenya is concerned. The knowledge of project success criteria will be relevant to project managers as well to avoid common problems that could befall them in the course of project implementation. The findings will also be useful to construction professionals in the region on key factors that may lead to successful project implementation as they will gain a better understanding of key areas to focus on that may influence success of any road's projects.

1.8 Delimitations of the Study

This study focused on the contractors' factors influencing implementation of roads infrastructure projects in Meru County, Kenya. The target population was road infrastructure contractors in Meru County, the county roads engineers, county accountant, subcounty projects committee representatives, and KURA roads engineer. The study only looked at the technical capacity, financial capacity, quality management capacity and management structure of the contractors involved in the construction of road infrastructure projects in Meru County.

1.9 Limitations of the Study

The study encountered respondents who were not willing to take part in answering the questions in the questionnaire. Additionally, some contractors were not willing to disclose sufficient information for the study. The researcher took time and explained the purpose of the study to the respondents and the importance of the information they provided to the success of the study. They were assured of their anonymity as well.

1.10 Assumptions of the study

The study assumed that technical, financial, quality management and organization structure of the contractors will influence the implementation of roads infrastructure projects in one way or the other. It also assumed that at least more than 50% of the respondents identified from the target population will be available for the data collection and that their responses will be honest, genuine and free of bias.

1.11 Definitions of significant terms used in the Study

Contractor: An independent entity that agrees to furnish certain number or quantity of goods, material, equipment, personnel, and/or services that meet or exceed stated requirements or specifications, at a mutually agreed upon price and within a specified timeframe to another independent entity called contractee, principal, or project owner.

Financial Capacity: refers to the capability of a contractor to finance road construction project in terms of purchase of construction equipment, payment of employees and have adequate credit lines to ensure smooth implementation of the road construction project from own resources.

Implementation of projects: refers to the activities carried out from the initial stage of project conception up to the final completion stage of construction according to the agreed standards, within a specified budget and to the satisfaction of the stakeholders.

Management Structure: refers to the contractor's chain of command, information sharing, decision making and feedback sharing.

Project: This refers to the scope of work contracted to a contractor by a developer with a well-defined scope of work to be done, the contract sum and the period within which the work is expected to be completed.

Quality Management Capacity: refers to contractor's capacity to ensure the quality standards are adhered to during the implementation of road infrastructure projects.

Technical Capacity: refers to the contractor's expertise in road infrastructure in terms of having the necessary knowledge and skills, having technical staff and equipment for implementation of road infrastructure projects.

1.12 Organization of the study

The research project is categorized into five chapters:

Chapter 1 basically deals with the introduction of what the study is all about. It comprises of the background of the study, the statement of the problem, purpose of the research study, the research objectives, the research questions, significance of the study, limitations of the study, delimitations of the study, basic assumptions made in the study, definitions of significant terms to be used in the study and the organization structure.

Chapter 2 covers the literature about the area of study giving past evidence of past studies done on the subject matter, the theories on which the study is based and the conceptual framework which attempts to explain the relationships between the variables: gives reviews about the study objectives.

Chapter 3 outlines the methodology used in the research study.it also discusses the research design, target population of the study, the sample sizes, sampling techniques used, data collection procedures used in the study and the data analysis techniques used in the analysis of the collected data to draw meaningful conclusions.

Chapter 4 represents the findings from the research study, the presentation of data collected and their subsequent discussions. The data was interpreted according to the stated objectives and the research questions. Appropriate data analysis and presentation techniques were used.

Chapter 5 contains a summary of the findings and discussion of the results from the data analyzed. Conclusions is drawn from the study as well as recommendations based on the study findings. This chapter also presents suggestions for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter focuses on the review of related literature. It presents literature on implementation of road infrastructure projects and contractor capability. It further presents a theoretical framework where the theories of institution and resource dependency are discussed, a conceptual framework upon which this study is anchored is presented, the summarized literature is provided and lastly the knowledge gaps are also presented.

2.2. Concept of Implementation of Road Infrastructure Projects

In the early 1990s, successful project implementation was strictly tied to project performance measures, which were in turn connected to the project objectives. Success measurement at the project level was in terms of duration, quality and cost. Atkinson (1999) referred to cost, quality and project quality as the iron triangle. However, he argued that using the Iron Triangle of project management, time, cost, and quality as the criteria of success may have resulted in biased measurement of project management success. He, rather, proposed to shift the focus of measurement for project management from the exclusive process driven criteria to the Square Route, which has four major categories for success criteria: The Iron Triangle, the Information System, Stakeholder Community Benefits, and Organisational Benefits.

According to (Shenhar & Wideman, 2000), there are no approved definitions for success of a project and project management, also based on Dvir et al.'s (2006) observation, he concluded that the different projects have different project success factors therefore no specific universal project success factors to all projects. Lim and Mohamed (1999) suggest that a project is only successful, when achieving its objectives. Typically, project success is perceived as a single measure, either the project was a success or it failed (Kam and Muller, 2005). Lim and Mohamed (1999) introduced the micro and macro perspective that looks at project success from a different perspective. The micro view focuses and assesses project management success at project completion, whereas the macro view incorporates the operational aspect of projects and concentrates on long-range customer satisfaction. Such a concept is an analogue to De Wit's (1988) distinction between project success and project management success. De Wit (1988)

highlights that project success is measured against the overall project objectives following project completion.

Moreover, other researchers considered that the measure of success shall be done from the perspectives of the individual contractor, employer, developer, end-user as well as the general public. Thus, it is broadly accepted that different projects may have individual success factors (Dvir et.al., 1998). Liu (1999) highlights that every project may even have its unique set of success measures. Apparently, this complicates deriving an agreed definition of project success. Interestingly, stakeholder satisfaction is commonly agreed to be a valuable addition to the iron triangle whereas a successful project shall also satisfy its stakeholders Baccarini (1999). Kam and Müller (2005) argue that if the end product of the project does not perform to customer satisfaction, although the project is delivered within the time, cost and quality constraints, the project appears successful from the project management perspective, but the product could result in a failure. They further highlight this contradiction with their statement “The operation was a success, but the patient died”. Therefore, in simplistic terms, project success comprises of two main ingredients, project management success as well as product success.

The successful implementation definitions reviewed in this research articulate the concept in achieving and accomplishing the planned targets. For instance, BNQP (2009) defines successful implementation as outputs and outcomes from processes, products and services that allow assessment and comparison relative to set goals, standards, past results, and other specifications. Various concepts and measures have been experimented to assess and measure the successful implementation of projects. Alarcon (1994) observed that most of these measures inhibit their assessment to preferred standards such as, time, cost or output.

2.3. Contractor’s Technical Capacity and Implementation of Road Infrastructure Projects.

Among the most essential factors in project implementation are the technical capacity or experience criteria of a given contractor. In some instances, the successful bidder lacks the skills and experience required to manage the challenges and complexities of the particular infrastructure project, hence failing to achieve success of the project. Lack of experience and capacity in all of the required areas of the contract cycle by the bidder can also result in project failure. A report by (EU, 2004) indicated that, there is a high risk of failure if the successful bidder is an experienced

contractor but has neither the experience nor the appetite to run the business of managing the asset through its life and/or act as a long-term investor. In order for contractors to successfully deliver their project, they need to provide qualified, skilled, trained staff that has project management responsibilities and execution capabilities during construction. According to Hartman et al. (2009), understanding technical knowledge enables use of correct working methods to competently handle machinery and equipment. In addition, constant training of the staff is necessary to improve their technical skills and ensure knowledge transfer is achieved effectively for the success of the project.

Goodwin (2012) defined technical skills as an important and useful skill of project management, as well as explained the worthiness of examining the extent to which technical skill is an essential requirement for the contractor. Kent (2011) asserted that based on informed contractors or consultancy firms' opinion, a range of estimates for the minimum required skill mix and the number of required staff with requisite skills per unit can be established as points of reference. To translate a project's staff skills and expertise into effective action, staff members must have the motivation and willingness to discharge their responsibilities and perform mandated functions according to norms of professional behavior. Staff motivation and will to act is not directly observable, but it is linked to incentives and rewards for good performance within a project team. The relative attractiveness of the agency's compensation package and prospects for professional growth and promotion can motivate staff and serve as incentives for good performance. Norms of professional behavior set standards and expectations on how staff members ought to conduct themselves in the course of their work. The degree to which these standards are adhered to also provide some indication of quality of staff performance and how effectively an agency is managed (Kent, 2011).

The expertise and experience of the contractor is another frontier of establishing technical capability of construction firms. Fukuda (2018) found that inadequacy in technical management of staff led to poor workmanship accounted for poor roads in Nigeria, inefficiency of contractors, accidents on roads and lack of organizational stability. Worsely (2009) concurred with these findings and found those contractors who were recruiting managers without technical skills and experience faced challenges in project implementation in Kenya. Al-Momani (2010) in Jordan, found the decision-making capability of the management team as affecting projects. Kaming et al. (2012) observed that lack of knowledge as well as inadequacy of competent and experienced

contractors in most of the less developed countries necessitated outsourcing of external experts mainly from China, Israel and Japan in more than 85 percent of the road construction projects. Mastery of experience in project management is therefore critical for a contractor to successfully implement the project. Experienced contractors according to Fapohunda and Stephenson (2010) are able to foresee possible challenges that might be encountered in a project and thereby undertake necessary plans to proactively deal with such. This is critical to ensure that there are no delays in the course of the project implementation resulting to disputes that could occur owing to some aspects that might not have been ironed out. Moreover, the more experienced a contractor, the more likely that realistic cost estimates will be provided for the project.

Medugu, Rafee Majid, Bustani, Bala, Abdullahi, and Mbamali, (2011) in the Nigerian construction industry observed that in cases where skilled manpower in the construction sector is very visible in its final outcome, qualified workforce and trained personnel in most cases had been utilized. The use of skilled manpower brings about active engagement in the early stages of realization of construction projects completion since they handle the technical phase of such contracts. The extent of influence of technical capacity on performance of contractor was reported widely that over 50 percent of World Bank projects were not successful in the year 2010 due to technical incompetence of contractors especially on managerial and technical areas by Chauvet, Collier, and Duponchel, 2010 in their studies in Washington. Gunduz et. al. (2012) investigating the construction projects in Turkey, through interview and questionnaire survey with 64 highly experienced construction professionals which include project managers, site managers, technical office managers, technical office engineers, procurement managers, and technical consultants identified 83 factors of time overrun. Among these, inadequate experience of the contractor, ineffective project planning and scheduling, poor management of the site and supervision, design changes by owner or agent during construction, late delivery of materials, unreliable subcontractors, delay in performing inspection and testing, unqualified/inexperienced workers, change orders, delay in site delivery, approval of design documents being delayed, delayed payments, slow decision making process and poor communication and coordination were found as major factors of time overrun.

Gardner (2003) also found that skilled personnel staff entrusted with project execution should have the required technical expertise in the particular area assigned. Where necessary, skill levels should

be augmented to meet the needs and with ongoing investments in developing such capacity within the office as necessary. In a study conducted by Assaf et al. (2014) it was found that difficulty in coordination between the parties is one of the factors that contribute to project completion delay. That is, incompetency of project manager led to coordination problems which may in turn cause project delays. In a road construction project, there are many parties involved such as contractor, consultant, sub-contractor and client. Often, it may be difficult for these various separate parties to coordinate well in order to complete the project. Further, Ali et al. (2008) found that that lack of coordination between contractors and subcontractors will lead to delay, for example in the situation that newly revised contractions drawings of a project may be issued later by the contractors to the subcontractors. This leads to construction mistakes and the work requiring to be repeated and effective tests conducted to ensure it meets the specified standards. Reconstruction work consumes a lot of time, therefore impacting upon the completion time of the project.

Singh and Tiong (2006) studied a total of 102 industry-based contractors' selection criteria and their perceived importance among the practitioners in the Singaporean construction industry. A total of 128 questionnaire responses were collected from quantity surveyors, developers, contractors and public and private clients. Based on the observed degree of importance of the criteria, their research reported that a contractor's experience in similar projects is one of the most important factors for ensuring a contractor's success in projects. Qualification and experience level of contractors and other management staff and their records of accomplishments working in similar projects over the last three years and working capital were reported to be significant in assessing the capabilities of the candidate contractors. However, the findings were found to be unconstructive in the contexts of identifying the most critical factors and quantifying a meaningful link associated with the project success criteria.

Doloi (2009) used multiple regression analysis to study 43 influencing technical attributes in contractor selection and their links to project success objectives. The research revealed that past project success, time of the contractor in business, technical expertise of the contractor, work methods and working capital significantly impact on contractor performance across cost of successfully completing the project, the time and quality of the deliverables. Doloi (2010) further used the structural equation modelling technique to study 29 contractors' qualification criteria and their links to contractors' performance on a project based on the survey data collected across

medium size construction projects in Australia. The results of the model showed that technical planning and controlling expertise of a contractor is key in achieving project success.

El-Sabaa (2001) argues that successful contractors should have relevant competencies and knowledge of the technology required by the projects they implement. Such technical skills usually involve specialized and domain specific knowledge, and analytical abilities in using the tools and techniques of the specific discipline such as engineering, information systems, and construction. In addition, contractors should also master communication skills both in writing and oral to manage various project processes (Zavadskas, 2008; Skulmoski and Hartman, 2009; Bogdan, 2011). In 2019, Ngaira and Malenya, did a study in Busia County on the influence of technical capacity on the performance of county road construction projects, they picked a random sample of 123 technical officers, using a descriptive survey design they found out that technical capacity has a significant influence on the performance of county projects.

While a contractor must possess good technical skills and be intimately familiar with the technical field to which the project belongs, his/her emphasis must be on project management and not just on technical details (Avots, 1969) because the role of a contractor evolves from being the technique-based administrator towards a more managerial position. According to Sambasivan and Yau (2007), In the Malaysian construction industry most unskilled laborers used in the construction industry are foreign laborers. These foreign laborers have little formal education (Santos et al., 2003). Thus, coordination is very important to guide and instruct these laborers to perform their work correctly. Without proper coordination, the project will be delayed due to rectifying defective works and low productivity of laborers. Juliet and Ruth (2014) did an evaluation of factors affecting performance of construction projects in Niger state. The variables used in this study focused on experience and qualification of personnel, quality of equipment and raw materials as well as conformance to specifications.

Barry, Tracey and James (2014) did a study of the significance of technical competence on the performance of projects, they had a sample of 149 respondents and used a descriptive survey research design, their findings showed that there existed a weak positive correlation between technical competence and performance of aeronautical projects. Enshassi, Mohamed and Abushan (2009) also did a study on factors affecting the performance of construction projects in the Gaza strip, they picked a sample of 120 respondents and used a descriptive design, their findings

indicated that projects delayed due to unavailability of highly experienced and qualified personnel; and poor quality of available equipment and raw materials. Koushki, Al-Rashid and Katam (2007) did a study on delays and cost increases in the construction of private residential projects in Kuwait, they used a sample of 450 project owners and found out that the main causes of delays in project completion were lack of experience in the construction business and material related problems.

2.4. Contractor's Financial Capacity and Implementation of Road Infrastructure Projects.

Financial or economic capacity criteria are intended to guarantee that the company or group of companies (consortium) that are candidates for the project have a healthy financial situation. The criteria provide evidence that they will be capable of meeting the financial needs of the project, which may be summarized as having funds available to meet equity needs as well as capacity to raise third party funds in the form of long-term debt. Typical indicators include financial ratios such as debt to equity/leverage, liquidity ratios, specific ratios for the project such as equity to project Capex, and others, as well as magnitudes, such as the average revenues of "last three years", level of profits of "last three years" (or evidence of being in profit), and so on. These indicators/benchmarks are calculated on the basis of balance sheet and profit and loss accounts of the previous year (or a number of recent years, normally no more than three) (EU, 2004).

A study by Thwala and Mvubu (2015) aimed at examining inhibiting factors that influence performance of SMCs in terms of "quality of work," "tender estimation," "tender preparation," and "timely completion of construction projects" in Malawi. A survey questionnaire was administered to 370 players in the construction industry which included public sector clients, contractors, consultants, and construction resource trainers in order to elicit data from 118 variables that were identified through a careful literature review. The inhibiting factors were generally dominated by economic issues, which was an emerging trend to what has been previously reported in the sub-Saharan region. The first highest ranked inhibiting factors were high lending interest regimes offered by financial institutions; stringent conditions to access capital; fluctuation of currency; stringent requirements for obtaining bonds; and high taxes.

Financial resources show a company's credibility and reputation among clients and suppliers. It also indicates the strength of a company in the market in terms of its capacity to carry out projects

(Isik et al., 2009). Profitability and turn over are the two most important indicators of the financial strength of a company. Poor cash estimation and poor risk assessment are two of the major factors responsible for the failure of construction contractors (Varun et al., 2011). Ibukun (2010) reported that inadequate attention to cash flow forecasting causes the construction industry to be the largest sector of the economy facing bankruptcies. Hence, cash flow forecasting and control are essential for the survival of any contractor during all stages of the work.

Adequate working capital is essential to ensure successful project execution. Rahman (2013) observed that financial capacity of contractors and sufficient cash flow is critical in keeping construction progress as planned. Ameh (2011) also observed that inadequate funds lead to time overrun and sufficient funding guarantees reasonable cash flow. Kenyatta et al (2015) carried out a study on influence of payment default to contractors in the Kenyan construction industry and found that late payment, underpayment or paying intermittently and non-payment have led to cash flow hardships to contractors. This has led to late completion of projects, disputes in construction and even bankruptcy. The study recommended industry players to consider legislating on a payment specific regime just like it has happened in other countries. Other factors noted by many other studies which have been eroding working capital during construction include; access to credits, diversion of contract funds for other use as opposed to the project, poor project planning and control, foreign exchange fluctuations, and high cost of finance.

Kaliba et al. (2009) concluded from their study that one of the major causes of delay in road construction projects in Zambia were delayed payments, financial deficiencies on the part of the client or contractor, contract modification, economic problems, material procurement, changes in design drawing, staffing problems, lack of equipment, poor supervision skills, construction mistakes, poor communication skills on site, changes in specifications, labour disputes and strikes. According to Russell et al (1992) study on the industry evaluation of the perceived impacts of 20 decision factors and 67 sub-factors for contractor prequalification across 78 public owners, 72 private owners and 42 construction managers, by Using Spearman Rank Correlation analysis, it was found that the three major criteria for making decisions across the owners in all three categories were: experience, financial stability and past performance in similar projects.

Alzahrani and Emsley (2013) studied the impact of contractors' attributes on project success from a post construction evaluation perspective and identified what critical success factors (CSFs) have

greatly impact to the success of project. They selected 35 CSFs, which were categorized into nine groups: safety and quality; past performance; environment; management and technical aspects; resource; organization; experience; size/type of previous projects; finance. Factors such as turnover history, quality policy and adequacy of labour and plant resources, waste disposal and size of past projects completed, and company image are the most significant factors affecting projects implementation.

Sacks and Harel (2006) investigated the behaviour of allocation of resources by the subcontractors across multiple projects undertaken simultaneously and its impacts on achieving project success. By developing a theoretical predictive model for investigating subcontractor resource allocation scenarios and its impacts on work flow stability using gaming theory, the research ascertained that poor and unrealistic planning and over commitments of subcontractors in multiple projects jeopardise the relationships between the project managers and the subcontractors thereby hindering success on projects. The research also recommended subcontractors' behaviours across social, organisational and technical aspects to take into consideration as prequalification criteria for determining potential success on a project.

In road construction projects in Zambia, a study by (Muya, Kaliba, Sichombo and Shakanta, 2013) identified the most significant causal factors for performance of projects as inadequate and inconsistent release of funds by clients, poor financial management by contractors or lack of capacity by contractors. The factors that influence construction quality implementation at the execution phase in Indian construction industry include financial limitation (Ashakkumar, 2014). Erdogan et.al. (2017) in their studies in London found that constrained working capital was the main challenge in the daily operations of contractors. In China as well Chen (2007) suggested that contractors should plan and allocate funds for the entire project to avoid stoppages on account of lack of funds. His research further suggested that well developed institutions both legal and financial, firms will have equal chances to access finance and have better prospects of growth. Scarpetta et.al. (2007) presents arguments to emphasize ability to access finance by small firms as being important to give them equal footing to compete with large firms. Scarpetta et al (2007) suggested that provision should be made for cheaper credit to contractors who have established themselves in the industry.

Therefore, financial capacity of the contractor which involves planning, sourcing and controlling the use of the available finances by the contractors to avoid misappropriation of funds is very important as this can weaken productivity as well as result in incurring of losses.

2.5. Contractor's Quality Management and Implementation of Road Infrastructure Projects.

Quality is defined as “the totality of features required by a product or service to satisfy a given need Hatush and Skitmore (1997). Quality Management Systems, (2013) stated that, quality control as the process of evaluating whether construction projects adhere to specific standards for which it was designed. The main objective of quality control is achievement of expected standards. Additionally, quality control is also meant to ensure that roads are reliable and sustainable. Attalla et al. (2003) argue that quality and safety are the two specific issues that need to be prioritized in a 21st century construction site. Construction quality cannot be so easily quantified and measured compared to cost and time. Its assessment is rather subjective (Chan and Chan, 2004). The largest impact on quality occurs during the design and construction stage and the current quality assurance schemes emphasize these two phases (CIRIA, 1988).

Toakley and Marosszeky (2003) stressed that for the construction industry, the focus on quality management should not only be at the construction stage but for total quality to exist throughout the project life cycle. Rosenfeld's (2009) research shows that investing in quality is a worthy strategy and leads to several benefits. He concludes that the ratio of direct benefits to the investment in terms of saving on internal and external failures that might occur in the absence of quality procedures is 2:1 or more. Clients should ensure that the work performed conforms to the specifications established for the project. Indeed, low cost and speedy construction should not be achieved at the expense of the quality of the project.

Harris and McCaffer, (2001) defined quality control as a set of activities or techniques whose purpose is to ensure that all quality requirements are being met. In order to achieve this purpose, processes are monitored and performance problem are solved. Scatterfield, (2005) in other words said quality control is critically important to implementation of construction project and should be adhered to throughout a project from conception and design to construction and installation. Inspection during construction will prevent costly repairs after the project is completed. The

inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies.

In recent years, increasing concern has been expressed at the standards of performance and quality achieved in road construction works. The need for structured and formal systems of construction management to address the aspect of performance, workmanship and quality has arisen as a direct result of deficiencies and problems in design, construction, materials and components. Many of the problems experienced in road construction appear as a range of inadequacies from minor technical and aesthetic aspects to major road defects. Irrespective of their degree of severity, such problems are known to cost the industry so much annually, yet, many difficulties might be alleviated through greater care and attention to standards of performance and quality at the briefing, design and construction stages of the road construction process (Griffith, 1990). If roads are to be trouble-free, more attention needs to be given to applying quality assurance principles to design and site-work, including project selection and specification, and to supervision of the handling and protection on site (Atkinson, 2005).

Harris and McCaffer, (2001) defined quality assurance as a set of activities whose purpose is to demonstrate that an entity meets all quality requirements. Quality Assurance activities are carried out in order to inspire the confidence of both customers and managers, confidence that all quality requirements are being met. According to EuroRoad (2006), the main objective of quality assurance measures in information processes is to fulfil a required quality level. By using described probabilistic model, cause and effect diagram, one is able to analyze existing processes and to detect existing quality gaps within these processes. Reference to Hendrickson (1999) cited in Khan et al, (2008), quality requirements should be clear and verifiable so that all parties in the project can understand them for conformance. Harris and McCaffer, (2001) continued that Quality assurance (QA) emphasizes defect prevention, unlike quality control that focuses on defect detection once the item is produced or constructed. It was further established that quality assurance concentrates on the production or construction management methods and procedural approaches to ensure that quality is built into the production system.

With inefficient or non-existent quality management procedures, significant expenditures of time, money, and resources are wasted on construction projects (Rounds and Chi, 1985) cited in (Battikha, 2002). In addition, the lack of quality due to deficient construction quality management

is detected through non-conformance to established requirements. In construction, non-conformance occurs when the finished state of a project and its components deviates from the established requirements. Quality-related problems during construction can be projected on the operating life of the finished project. To a contractor, non-conformance can yield penalties as well as cost time burdens for re-work, which can convert into productivity loss (Battikha, 2000a). Contractors play an important role in the formation of the quality of a project. The standard of workmanship and conformance to specifications determine a contractor's main contribution to the quality of a project.

2.6. Contractor's Management Structure and Implementation of Road Infrastructure Projects.

Managerial skills include the ability, talent, knowledge, and willingness of managers to lead the company, managing their operations, making decisions, planning objectives, and selecting and implementing strategies (Aragon and Rubio, 2005). According to Robbins (2004) companies create structures to facilitate the coordination of activities and to control the action of their members and that every structure is made up of three components namely complexity, formalization and centralization. Complexity of a company refers to the degree to which activities within the company are differentiated or broken up, formalization refers to the degree to which the rules and procedures are utilized and centralization looks at where decision-making lies. Further, Robbins (1990) explains that company's management structure is set up to define how tasks are allocated, who reports to whom, the formal coordinating mechanisms and the interaction patterns that are followed within a management as a system. This means that if the management structure is poorly designed then the goals and objectives of the project are most likely not to be achieved.

Aje et.al. (2009) looked at the impact of contractor's management structure on the time and cost performance of construction projects in Nigeria, they collected data relating to 77 completed building projects executed between 2004 and 2007 using questionnaires and archival data then analysed using one-way analysis of variance and multiple regression. The results reveal that contractors' management structure has significant impact on cost and time performance of building projects as evidenced by p-values of 0.042 and 0.039, respectively. In a research work by Sarfo (2007) and citing others the study reported that the organisational structure adopted for management of building projects is an important area to consider for the success of projects.

Weaknesses in this area of project management lead to poor project performance regardless of organisational facilitators such as senior management commitment and leadership style (Cooper, 1998). Loo (2003), also grouped project management activities that facilitate project success under two main areas, which require the establishment of organisations structure for their effectiveness. The areas cover technical (e.g. planning, controlling, and procedures) and people (e.g. leadership, communication, and conflict management).

Griffith, et al (2004) portends that for efficient and effective management of a project there must be clear business aims, objectives and policies commensurate with the core activities of the organisation. The project management must therefore establish a strong, recognised and acceptable structure to translate these key elements into workable procedures through the corporate/parent and project management structures which should be linked with the project management systems. This calls for strong and effective leadership with authority to direct the activities of both the parent and project organisations. Assaf and Al-Hejji (2005) investigated time performance of different types of construction projects in Saudi Arabia to determine the causes of delay and their important according to each of the project participants, owner, consultant and contractor. The investigation included a field survey of 23 construction contractors, 19 consultants and 15 owners. They concluded, based on the owner's specification, that the main delays are related to contractors and labours. Owners and contractors both indicated that ineffective planning and scheduling by contractor is one of the delays to the project; poor communication, poor site management and supervision by contractor.

According to Gruenfeld and Tiedens, (2010), companies that have a rank or ordering of individuals and the communication flows from the top authority to the lower sections of the company, follow a hierarchical structure. While analysing, the effects of hierarchical structure on company functioning, Shaw (1960) brought in the concept of steepness of hierarchy. Shaw reviewed the results of studies done by Bavelas (1950), Leavitt (1951), Christie, Luce and Macy (1952) on the effects of hierarchical steepness on the company's performance and found that better performance is positively correlated with more centralized communication. According to Anderson and Brown (2010), a hierarchical organization can lead to better functioning if, the right individuals have been given authority, how power modifies the leaders' psychology, whether hierarchy facilitates or

hampers intra-group coordination; and whether the hierarchy affects functioning of the group members.

Organizations with a non-hierarchical structure have more flexibility in terms of decision making. These kinds of organization have a flat structure where there are lesser management layers and more lateral channels that are actively involved in the decision-making process (Yinan Qi et al, 2014). According to Yinan Qi, in his study relating to manufacturing organisations, keeping a flexible organization is important for mass customization capability, but flexibility may not necessarily guarantee the former. Results of this study show that the effect of organizational flatness on organisation capability is mediated by the coordination practices. It is the supply chain planning and corporate coordination that directly improve the mass customization capability. If the plant only keeps a flexible structure but not put efforts on the external coordination, the plant cannot improve its capability on customizing with low cost and short lead-time because they cannot gain necessary resources and knowledge from external partners.

Robertson (2007) mentioned about a new tier of management structure which is about living and working together in the best possible way by replacing hierarchy with a fractal “holarchy” of self-organizing teams or circles. His paper suggests that an organisation is a semi-autonomous halon, just like all the sub-halons within the company that include the departments, project teams, etc. For a holarchy to be effective, all halons need clear autonomy as a whole, and clear responsibilities as a part or member of something larger. Holacracy energizes the roles of employees and their sense of opportunities and helps them to be more familiar with the changing environment.

A study done by Hao, Kasper and Muehlbacher (2012) tried to understand the relationship between organizational structure and performance based on certain evidences through organizational learning and innovation. Their study led to three major findings. Firstly, organizational structure impacts organizational learning more than innovation. Organizational learning indirectly affects performance through innovation. Secondly, knowledge intensive or technologically inclined organisations are majorly influenced by innovation and organizational learning, whereas the labour-intensive or capital- intensive organisations, affects organizational performance mainly through innovation. Thirdly, for younger or new organisations, more than innovation, learning and understanding the management structure is more important.

2.7. Theoretical Framework

According to Lucia and Lepsigner (2009), theoretical review involves identifying a set of statements or principles devised to provide an explanation regarding a group of facts or phenomena that has been tested repeatedly or is widely accepted. This section offers an insight into the various theories relevant to the study. The theories that were reviewed in this study are; institutional theory and resource dependency.

2.7.1. Institutional Theory

The institutional theory was developed by William Richard Scott in 1995 and stresses the need for project to have processes and procedures that guide the achievement of set project goals. Researchers who support this theory such as Choge and Muturi (2014) underscore the importance of organizations to act ethically and in observance of its norms, routines and rules. Adoption of fair practices in achievement of the project goals will for instance ensure minimal friction with the stakeholders such as the construction workers or the society. However, Brammer, Jackson and Matten (2012) criticize this theory arguing that following the recommendation of the theory does not guarantee success in an activity or project. Therefore, it is imperative not only to have processes and procedures in place, but also to ensure that such processes are geared towards successful completion of tasks. The theory could be applied by contractors who should use their experience to come up with appropriate procedures for undertaking a project in a manner that will ensure smooth implementation and guarantee success. On the other hand, there is need to understand the processes and procedures that the Government employs in management of road construction projects such as during the award of tenders, monitoring and evaluation of projects and in payment of contractors so as to ensure that the projects are delivered successfully. Whereas such processes and procedures are useful, it is important to ensure that they do not create unnecessary bureaucracy and red tape.

2.7.2. Resource Dependency Theory

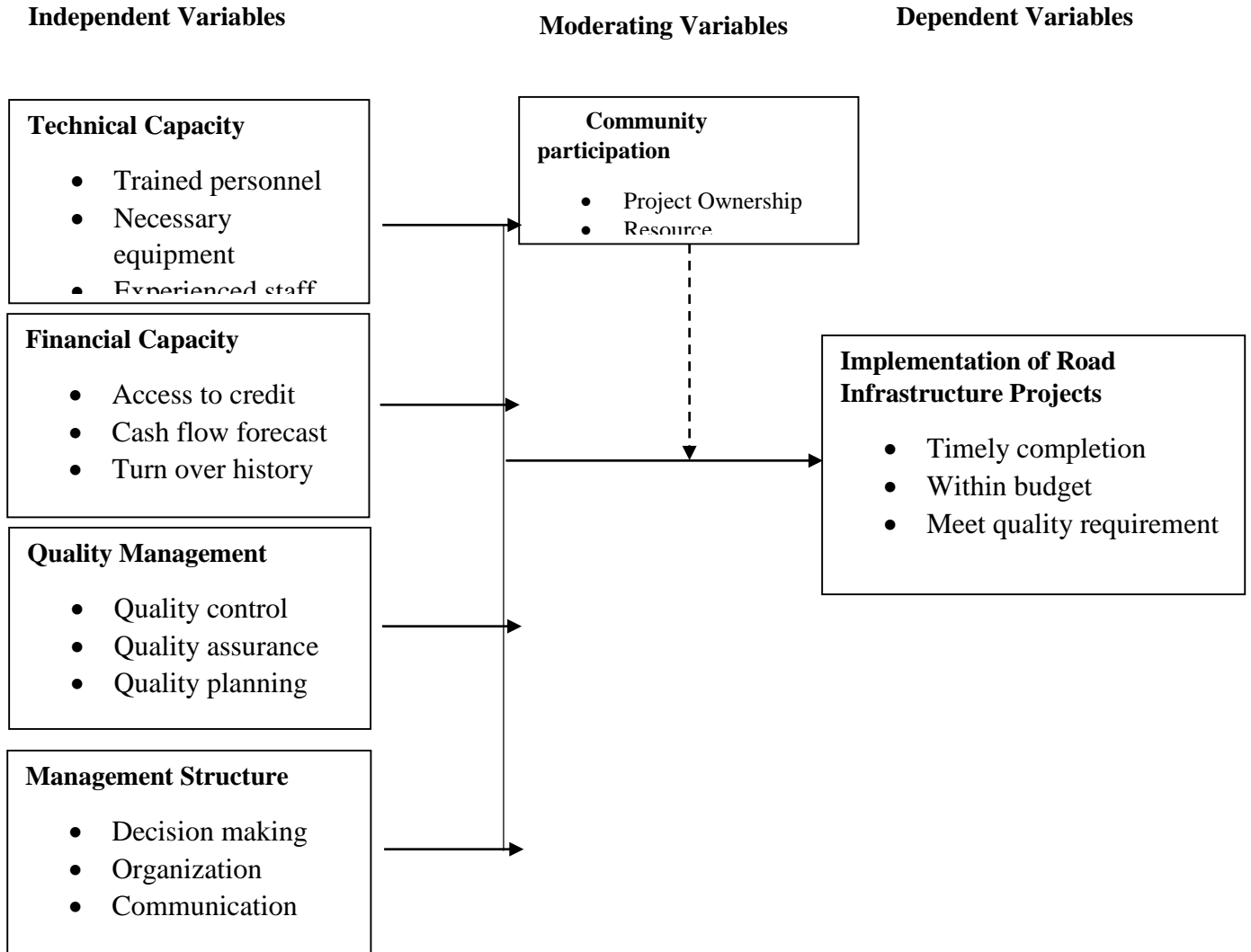
Resource dependency theory was developed by Pfeffer and Salancik in 1978, and its main proposition was that the success of projects is dependent on availability of external resources (Fapohunda & Stephenson, 2010). The theory posits that, the capacity of a project in terms of resources is a critical determinant of successful implementation of projects. Proponents of the theory such as Mohammed (2012) argue that it is imperative for project management to have

adequate resources that are necessary for implementation of a project or achievement of set objectives. The researcher identifies some of the capacities related to the contractor that are pivotal to achievement of project objectives, they include; finances, technical, quality management and management structure. There are however those who criticize the theory such as Fapohunda and Stephenson (2010) who argue that there are construction projects that have succeeded even without resources indicating the need to consider other factors such as effectiveness of management, organizational culture and implementation of appropriate strategies. However, even though such critiques are justifiable given the broad propositions of the theory, it is imperative to note that the having requisite resources need to be coupled with other enablers such as having a supportive working environment and an effective strategy. The resource dependency theory is very relevant to this study as it provides the theoretical understanding that the ability of a contractor to execute a project, in this case road construction projects, is influenced by the availability of resources. Some of the identified critical resources that determine successful implementation of road construction projects include finances, competence of human resources and availability of materials and equipment. The experience of a contractor is also considered as an indicator of capacity in handling road construction projects. Experienced contractors are expected to have critical resources that would help reduce turnaround time for implementation of road construction projects, effective planning and evaluation of projects as well as having competent staff. Similarly, where the government has the requisite resources in terms of manpower and technical capacity to undertake effective and efficient monitoring and evaluation of road construction projects, this will contribute to successful implementation of such projects.

2.8. Conceptual Framework

The conceptual framework gives a diagrammatic relationship between the variables under study. The dependent variable is Successful Implementation of Road Infrastructure Projects, the independent variable is Contractor's capacity which has Technical Capacity, Financial Capacity, Quality Management and Management Structures as indicators.

Figure 1: Conceptual Framework



2.9. Knowledge Gaps

The knowledge gaps of a research study are the gaps that have been observed as a result of a comprehensive literature review. The knowledge gaps in this study are presented in Table 2.1.

Table 2.1: Knowledge Gaps

Author	Study Title	Findings	Knowledge Gap	Focus of Study
Fukuda (2018)	CEDAC: A tool for continuous systematic improvement	Found that inadequacy in technical management of staff led to poor workmanship accounted for poor roads in Nigeria	The study did not focus on the technical competence of the contractor.	This study looked at the influence of contractor's capacities on the implementation of road infrastructure projects.
Matata and Wafula (2015)	Effects of quality management systems on performance of Kenya Ports Authority	Found that contractors who were recruiting managers without technical skills and experience faced challenges in project implementation in Kenya	The study did not focus on road infrastructure projects	This study looked at the influence of contractor's capacities on the implementation of road infrastructure projects.
Singh and Tiong (2006)	Contractor selection criteria: investigation of opinions of Singapore construction practitioners	Found that contractor's experience in construction projects is one of the most important factors for ensuring a contractor's success in projects	The study was on building construction projects but not road infrastructure projects	This study looked at the influence of contractor's technical capacity on the implementation of road infrastructure projects.
Hassan and Guyo (2017)	Determinant of completion of government funded projects in Nairobi City County	The study indicated that project cost, procurement procedures, design specifications and contractor experience affect completion of road projects	Apart from experience the study did not assess other aspects of contractor capacity	This study sought to fill in the gaps by assessing the technical, financial and quality management capacities

Author	Study Title	Findings	Knowledge Gap	Focus of Study
Atibu (2015)	An investigation into factors causing delays in road construction projects in Kenya	The study found that contractors administrative procedures, finances, design and technology affect construction of projects	The study failed to consider the contractors' capacity. It only assessed factors from the environment to the exclusion of contractor specific factors.	This study aimed at filling the gap by going away from procedures to actual capacities of the contractors as guided by variables
Macharia (2016)	Factor influencing completion of road projects in Embakasi, Nairobi	The study found that availability of resources, competency of staff, contractor experience and knowledge affected completion of roads significantly.	The study assessed the capacity of the contractors in a nimble manner with few indicators of competence of contractors in various capacities. The study used Likert scale items with adequate questions for all the variable to come up with the bigger picture of contractor capacities.	This study filled the gap by considering quality management and management structure in addition to the capacities already considered

2.10. Summary of Literature Review

There is an apparent shortage of studies on actual contractor capacity in the road construction segment though we have a growing body of literature on contractor roles. From the empirical literature done, most of the studies on contractor capacity emphasized on financial capacity. For instance, Olusanya (2018) in his studies in the Nigerian construction industry confirmed that indigenous construction companies have challenges of under-capitalization. Chen (2007) suggested that contractors should plan and allocate funds for the entire projects to avoid stoppages on account of lack of funds. Scarpetta et al. (2007) suggested that provision should be made for cheaper credit to contractors who have established themselves in the industry. Nwude (2010) observed that it requires a determined positive effort by the contractor as mismanagement can weaken productivity and profit level. In addition, it was observed that other studies on contractor capacity were carried outside Kenya and emphasized on technical capacity. For instance, Fukuda (2018) found that inadequacy in technical management of staff led to poor workmanship accounted for poor roads in Nigeria, inefficiency of contractors, accidents on roads and lack of organizational stability. Al-Momani (2010) found the decision-making capability of the management team influences the performance of construction projects. Kaya and Patton (2011) found that management of knowledge and innovations affected contractors in Turkey. Rafee (2012) reported that lack of skilled manpower affected contractors, hence affecting the implementation of projects.

Further, from the empirical review it was noted that several studies on contractor capacity dwelled on organizational capacity of contractors. For instance, Wolf (2013) observed that efficient organization structure has a positive effect in the firm's implementation culture, it guides the firm's productivity, including performance process. Clemmer (2003) reported that management structure should be in place to regulate the undertaking of tasks and have provisions for planning, directing, organizing and controlling tasks. Javed, Zhan, and Pan (2018) found that co-ordination of all the departments was critical. Bredin and Soderlund (2011) found that most of the factors are people based, team selection, team experience and team commitment. Winfred (2011) reports that an appropriate managerial structure could support teams in management in attaining enhanced performance in the project by increasing in productivity.

Moreover, from the empirical review studies on contractor capacity involved regulatory compliance among contractors. For instance, Gelderman, Semeijn, and Vluggen, (2017) reported that detailed provisions on compliance should be made to players in environments of weak regulations like Kenya. It was noted that the only sector with growing enforcement is procurement to the exclusion of others facing contractors (Minjire, 2015).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction.

This chapter represents the methodology used in the study. It describes the target population, sample size and sampling techniques, research instruments, validity and reliability of the instruments, data collection procedures, ethical considerations and data presentation and analysis techniques.

3.2. Research design

This study adopted a correlational research design, which is a non-experimental research design where the researcher seeks to find out the strength of relationship between two or more variables without controlling for any extraneous variables. Research design is the scheme, outline or plan that is used to generate answers to research problems. According to Fraenkel and Wallen (2009), correlational research is a research whose purpose is to find out the relationship between two or more variables and their cause and effect. In addition, Creswell (2012) states that a correlation is a statistical test to determine the tendency or pattern for two (or more) variables or two sets of data to vary consistently. In line with Creswell, Ary, et. al (2010) also argue that correlational research looks for the relationship or correlation between variables in positive correlation or negative correlation, and the level of correlation is determined by the coefficient of correlation. It can be said that the detection of correlation among variables is based on its correlation coefficient.

3.3. Target population

The target population for the study was all contractors in Meru County involved in road infrastructure construction projects within the period (2018-2020) and in addition there will be KURA Roads Engineer, County Roads Engineer, County Accountant and Subcounty Project Committee Representatives. According to Borg and Gall (2009) target population is a universal set of research of all members of actual or imaginary set of people, events or objects to which an investigator wishes to generalize the result. The target population is presented in Table 3.1.

Table 3.1: Target Population

Category	Frequency
County Roads Engineer	1
County Accountant	1
KURA Roads Engineer	1
Contractors	140
Subcounty Project Committee Representatives	40
Total	183

Source: www.meru.go.ke

3.4. Sample size and Sampling procedure

In this section the sample size and the sampling design to be used in the study are discussed. Kothari (2010) explains that a sample size refers to the number of items to be selected from the universe to constitute a sample while sampling procedure is the technique used in selecting the items of the sample.

3.4.1. Sample size

The sample size for the study was 126 respondents spread across Meru County which was arrived at using the Alemeda et.al., (2010) formula:

$$n = \frac{N}{1 + Ne^2} = \frac{183}{1 + 183 * 0.05^2} \cong 126$$

- Where:
- n is the sample size.
 - N is the accessible population size.
 - e is margin of error (0.05)

this sample was distributed among the respondents as shown in Table 3.2.

Table 3.2: Sample Size

Category	Population	Sample
County Roads Engineer	1	1
County Accountant	1	1
KURA Roads Engineer	1	1
Contractors	140	96
Subcounty Project Committee Representatives	40	27
Total	183	126

3.4.2. Sampling procedure

The study selected contractors and subcounty project committee representatives by simple random sampling after proportional allocation to the respective sub counties. Purposive sampling was used to select County Roads Engineer, County Accountant, and KURA Roads Engineer, this is because their population is small. The sampling procedure involves selecting a number of individuals for study in such a way that the individuals selected will represent the large group from which they were selected (Ogula 2015). The probability of getting a representation of the target population is of great significance in any given study (Orodho, 2009), since it's not possible to do a study involving the whole entire population involved in the topic of study. Such a sampling technique or procedure selected should then be such that a proper representation of the whole population is achieved from the sample selected for study.

3.5. Data collection instruments

The study used semi-structured questionnaires to collect data from the road infrastructure contractors and the subcounty project committee representatives, since they were many in number. A questionnaire is a research instrument that consists of a set of questions that aim at collecting information from respondents.

The questions used in the questionnaire were both closed and open-ended questions. The closed ended questions are questions whereby the respondent is restricted by the kind of responses that he/she is allowed to give, e.g. just give a yes or no answer for the questions asked, while for open ended questions, the respondents are allowed to choose their responses from a variety of selection provided by the researcher. Those two types of questions incorporated in the questionnaires are

expected, with proper responses from the respondents and effective data analysis techniques, to draw conclusions for the topic of study and make proper recommendations.

The questionnaires had six sections. Section One collected background information of the contractors, which includes the gender, age, education level and years of experience. Section Two, was on the dependent variable which is implementation of road infrastructure projects. Section Three was on the Technical capacity of the contractor, Section Four was on the Financial capacity of the contractor, Section Five was on the Contractor's Quality Management, and finally Section Six was on the Management Structure of the contractor.

An interview guide was also used to collect data from the County Roads Engineer, County Accountant and KURA Roads Engineer. The interview guide contained information on the financial, technical, quality management and management structure of the contractor.

3.5.1. Pilot testing of the Instrument

A pilot study refers to a small scale, preliminary studies carried out with an aim to investigate whether crucial components of the main study will be feasible. The researcher conducted a pilot study in Tharaka Nithi County on 13 respondents, who included; the 1 County Roads Engineer, 1 KURA Roads Engineer, 1 County Accountant, 3 Chuka Subcounty Project Committee Representatives, and 7 Roads Infrastructure Contractors so as to improve various aspects of the study design. The pilot study was to ensure that the researcher gets to understand the key steps to be taken during the actual study to avoid wastage of resources and time for the study. It also helped the researcher adjust aspects of the research instruments that seemed problematic to the respondents.

3.5.2. Validity of the research instrument

Validity refers to the degree to which a research instrument is able to accurately measure what it intends to measure. That is the ability of the research instrument to be correct, accurate, true and meaningful. The research used content validity which is a measure of the degree to which the data that is collected using the chosen research instrument will represent the objectives of the study. The validity of the questionnaire was established by the help of the supervisor.

3.5.3. Reliability of the research instruments

The reliability of an instrument refers to its ability to produce consistent and stable measurements when a research is repeated. Kent (2010) explains that reliability can be seen from two sides: reliability (the extent of accuracy) and unreliability (the extent of inaccuracy). The most common reliability coefficient is the Cronbach's alpha which estimates internal consistency by determining how all items on a test relate to all other items and to the total test - internal coherence of data. The reliability is expressed as a coefficient between 0 and 1. The higher the coefficient, the more reliable is the test.

In this study to ensure the reliability of the instrument Cronbach's Alpha was used. Cronbach Alpha value is widely used to verify the reliability of the construct. Therefore, Cronbach Alpha was used to test the reliability of the proposed constructs. The findings indicated that Technical Capacity had a coefficient of 0.902, Financial Capacity had a coefficient of 0.901, Quality Management a coefficient of 0.887, and Management Structure a coefficient of 0.876. All the constructs depicted Cronbach's Alpha value above 0.5 thus the study was reliable (Kent, 2010). On the basis of reliability test it was supposed that the scales used in this study are reliable to capture the constructs. The reliability test summary is shown in Table 3.3.

Table 3.3: Reliability Test

Variable	Cronbach Alpha Coefficient	Comment
Technical Capacity	0.902	Accepted
Financial Capacity	0.901	Accepted
Quality Management	0.887	Accepted
Management Structure	0.854	Accepted

3.6. Data collection procedure

The data collection procedure involved the preparation of the questionnaires having in mind the objectives of the study. A permit to allow collection of data was then obtained from the relevant ministry to facilitate smooth data collection is achieved. Having the permit at hand, the population was approached individually by the researcher for those within the vicinity and for those far away, research assistants were employed to get the questionnaires to them. The questionnaires were filled within the period of the study and send them back to the researcher for data analysis to take place.

An appointment was made in advance with the County Roads Engineer, KURA Roads Engineer and County Accountant so that they were available for data collection through interviews.

3.7. Data Analysis Technique

Analysis of data includes sorting, cleaning and organization of data from the questionnaires. The study generated both qualitative and quantitative data. The quantitative data was coded and entered into a spreadsheet and analysed at 5% level of significance using Statistical Packages for Social Sciences (SPSS) Version 23. Descriptive statistics and inferential statistics were both generated from the quantitative data and presented in tables. Qualitative data was thematically analyzed and the findings corroborated with the quantitative data. In addition, the researcher will use regression analysis to establish the strength of the relationship between dependent and independent variables.

3.8. Ethical consideration

All the representatives for the sample groups for the study expected as respondents were informed in advance to ensure that no resistance is encountered during the actual research study. The respondents were also assured of their confidentiality. Their privacy as well as privacy of the information given was guaranteed during the study. As such, no respondents' names were exposed.

Participation by respondents in the study was also on the basis of voluntary participation; as such the participants are at liberty to withdraw from the research study whenever they feel to do so. No respondents were forced to participate if they didn't want to take part.

3.9. Operationalization of variables

This section analyses the operational definition of variables on Influence of Contractors' Capability on Implementation of Road Infrastructure Projects. Variable are given in Table 3.3

Table 3.4: Operationalization of Variables

OBJECTIVE	VARIABLE	INDICATORS	MEASUREMENT SCALE	TYPE OF ANALYSIS
To determine how contractors' technical capacity influence implementation of road infrastructure projects in Meru County, Kenya.	Technical Capacity	Trained personnel Necessary equipment IT knowledge	Ordinal scale	Descriptive statistics Correlation Regression
To establish how contractors' financial capacity influence implementation of road infrastructure projects in Meru County, Kenya.	Financial Capacity	Access to credit Turn over history Cash flow forecast	Ordinal scale	Descriptive statistics Correlation Regression
To determine how contractors' quality management capacity influence implementation of road infrastructure projects in Meru County, Kenya.	Quality Management	Quality assurance Quality control Quality planning	Ordinal scale	Descriptive statistics Correlation Regression
To determine how contractors' management structure influence implementation of road infrastructure projects in Meru County, Kenya.	Management Structure	Decision making Organizations Communication	Ordinal scale	Descriptive statistics Correlation Regression

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, AND INTERPRETATION

4.1. Introduction

This chapter presents an analysis of data collected on contractor's capacity and implementation of road infrastructure projects, a case of Meru County. The chapter has five sections. The first section looks at the demographic characteristics of the respondents. The second section examines influence of contractors' technical capacity on the implementation of road infrastructure projects; third section assess influence of contractors' financial capacity on the implementation of road infrastructure projects; fourth section determines the influence of contractors' quality management on the implementation of road infrastructure projects; and the last section looks at the influence of contractors' management structure on the implementation of road infrastructure projects.

4.2. Questionnaire Return Rate

Out of the intended 126 respondents, only 86 returned fully completed questionnaires giving a response return rate of 68.25%. Mugenda and Mugenda (2012) observed that a 50% response rate is adequate, 60% good and above 70% rated very good. This collaborates with Amyx (2013) assertion that a response rate of 50% is adequate, while a response rate greater than 70% is very good. This implies that based on this assertion, the response rate in this case of 68.25% is therefore good and therefore, analysis of data continued. The return rates are broken down in Table 4.1

Table 4.1: Questionnaire Return Rate

Category	Sample Size	Returned	Percentage (%)
County Roads Engineer	1	1	100
County Accountant	1	1	100
KURA Roads Engineer	1	1	100
Contractors	96	68	70.83
Subcounty Project Committee Representatives	27	15	55.56
Total	126	86	68.25

4.3. Background Information

The study sought to establish the background information of the respondents in Meru County under the following; age of the respondent, education level of the respondents, and duration in the current job. The findings are presented in the following sub-sections.

4.3.1. Gender of Respondents

The respondents were asked to state their gender. The findings are presented in Table 4.2.

Table 4.2: Gender of Respondents

Gender	Frequency	Percentage
Male	58	67.4
Female	28	32.6
Total	86	100

The findings indicate that 67.4% of the respondents were male while 32.6% were female. This indicates that the majority of road infrastructure contractors in Meru County are male. This is a characteristic of most contracting firms in Kenya.

4.3.2. Age of Respondents

In the survey, the respondents were asked to state the age category they were in. The results are presented in Table 4.3.

Table 4.3: Age of Respondents

Age Group	Frequency	Percentage
18 – 30 years	22	25.6
30 – 40 years	54	62.8
Over 40 years	10	11.6
Total	86	100

Out of the 86 respondents, 22 (25.6%) of the respondents were in the 18 – 30 age group, 54 (62.8%) of the respondents were between 30 – 40 years of age, and 10 (11.6%) of the respondents were aged over 40 years. This result shows that the respondents are generally active between the ages of 18 – 40. The results agree with the findings of Price (2010) who found that there are two natural age peaks correlated to contractors, namely the late twenties and mid-forties. The study findings

are almost similar to a study done in America by Muijanack et al. (2011) who determined that the optimum age for contractors was 25 – 35.

4.3.3. Education Level of the Respondents

The study sought to establish the education level of the respondents. It is important to consider the level of education of the respondents because it has an effect on the way the respondents interpret the questions. The results are presented in Table 4.4.

Table 4.4: Education Level of Respondents

Education level	Frequency	Percentage
Diploma	30	34.9
Degree	44	51.1
Masters	10	11.6
PHD	0	0.0
Other	2	2.4
Total	86	100

Table 4.4 shows that the number of respondents with diploma level of education were 30 (34.9%), those with degree certificate were 44 (51.1%), those with masters certificate was 10 (11.6%), those with PHD were 0 (0.0%) and those who did not specify, just indicated others were 2 (2.4%). These results show that most of the respondents had some good education level which enabled them read and understand the questions well and provide the best possible responses.

4.3.4. Duration in Current Job

The survey also sought to establish the period of time the respondents has been in the current job. This was deemed important since an individual who has need in a field for long would know the strengths and weakness of the trade they are in, in this case being involved in road infrastructure implementation. It is expected that the longer one has been involved in road infrastructure implementation the better they understand operations of the business, and hence the higher the ability to articulate issues related to road infrastructure implementation. The results are shown in Table 4.5.

Table 4.5: Duration in Current Job

Duration	Frequency	Percentage
Less than 5 years	42	48.8
5 – 10 years	21	24.4
10 – 15 years	15	17.4
15 – 20 years	7	8.1
More than 20 years	1	1.1
Total	86	100

Table 4.5 shows that the number of respondents who have been in road infrastructure implementation projects for less than 5 years were 42 (48.8%), 5 – 10 years were 21 (24.4%), 10 – 15 years were 15 (17.4%), 15 – 20 years 7 (8.1%) and more than 20 years was only 1 (1.1%). This result indicates that the majority of the respondents involved in implementation of road infrastructure projects in Meru County (73.2%) have operated for less than ten years.

4.4. Presentation and Interpretation of the Study Findings

This section gives a presentation and interpretation of the findings based on the research objectives.

4.4.1. Implementation of Road Construction Projects.

The study sought to collect information on the implementation of road construction projects. The respondents were given statements on implementation to indicate their level of agreement. They were to choose one of the five alternatives which were 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. The results are shown in Table 4.6.

Table 4.6: Implementation of Road Infrastructure Projects

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
We finish our projects on time schedule	12	20	60	8	0	3.4	0.883
We finish our projects within allocated budget	0	18	41	40	1	2.7	0.914
Our projects meet the required quality	5	16	41	33	5	2.9	0.691
We are satisfied with our work	2	10	59	37	2	3.2	0.759
Time allocated for the project is enough	14	28	56	2	0	3.7	0.662
The project budget is ok	2	22	49	22	5	3.1	0.886
Composite						3.17	0.366

Table 4.6 shows that 12% of the respondents strongly agreed with the statement we finish our projects on time schedule, 20% agreed, 60% were not sure, while 8% disagreed with the statement. The mean was 3.4 with a standard deviation of 0.883 showing that respondents were not sure. This result shows that respondents were not sure if they finished the projects within the specified time. The second line item was, we finish our projects within allocated budget, 18% agree with the statement, 41% were not sure, 40% disagreed, while 1% strongly disagreed, the line item mean was 2.7 with a standard deviation of 0.914 showing that the respondents disagreed with the statement, hence they did not finish the projects within the allocated budget. The third line item was, our projects meet the required quality, 5% of the respondents strongly agreed, 16% agreed, 41% were not sure, 33% disagreed, while 5% strongly disagreed, the line item mean was 2.9 with a standard deviation of 0.691 indicating that the respondents were not sure of the statement. The fourth line item was, we are satisfied with our work, 2% of the respondents strongly agreed with the statement, 10% agreed, 59% were not sure, 37% disagreed, while 2% strongly disagreed, the line item mean was 3.2 with a standard deviation of 0.759, indicating that respondents were not sure. The fifth line item was, time allocated for the project is enough, 14% strongly agree, 28% agreed, 56% were not sure, and 2% disagreed, the line item mean was 3.7 with a standard deviation of 0.662, hence the respondents agreed partly with the statement. The last line item was, the project budget is ok, 2% strongly agreed, 22% agreed, 49% were not sure, 22% disagreed, and 5% strongly

disagreed. The line item mean was 3.17 with a standard deviation 0.356 therefore, the respondents were not sure. The composite mean was 3.05 with a standard deviation of 0.269, the mean indicates that the respondents were not sure with regard to the statement. The small standard deviation relative to the composite mean shows that there was little variation in the responses.

4.4.2. Contractor’s Technical Capacity and Implementation of Road Infrastructure Projects

The study sought to establish whether contractor’s technical capacity has an influence on the implementation of road infrastructure projects in Meru County. The respondents were given statements regarding contractors’ technical capacity to indicate their level of agreement. They were to choose one of the five alternatives which were 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. The results are shown in Table 4.7.

Table 4.7: Contractor’s Technical Capacity

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
We have the most qualified personnel on site	52	36	0	0	12	4.2	0.805
We have enough machinery and equipment	60	28	4	8	0	3.4	0.763
We have knowledge of IT and use of advanced technology	64	36	0	0	0	4.8	0.846
We have knowledge of better construction methods	44	48	0	8	0	4.1	0.766
Our personnel have past experience in similar projects	56	28	4	8	4	3.9	0.679
Experience is key for contractors	23	37	20	18	2	3.3	0.717
Composite						3.95	0.554

Table 4.7 shows that majority of the respondents (52%) strongly agreed with the statement that they have the most qualified personnel on site, it was further established that 36% of the respondents agreed with the statement, while 12% strongly disagreed with the statement. The mean response for the statement was 4.2 with a standard deviation of 0.805, this mean shows that respondents generally agreed with the statement. The second statement was, we have enough machinery and equipment, majority of the respondents (60%) strongly agreed with the statement,

28% agreed, 4% were not sure, while 8% disagreed with the statement. The line item mean was 3.4 with a standard deviation of 0.763, this shows that respondents agree with the statement but with diverse views due to the large standard deviation relative to the mean. The third line item was, we have knowledge of IT and use of advanced technology, 64% of the respondents strongly agreed with the statement and 36% agreed. The line item mean was 4.8 with a standard deviation of 0.846, this shows that respondents strongly agreed with the line item. The fourth line item was, we have knowledge of better construction methods, 44% strongly agreed with the statement, 48% agreed, and 8% disagreed. The statement mean was 4.1 with a standard deviation of 0.766, this indicates that the respondents strongly agreed with the statement in general. The fifth line item was, our personnel have past experience in similar projects, 56% of the respondents strongly agreed with the statement, 28% agreed, 4% were not sure, 8% disagreed, while 4% strongly disagreed. The line item mean was 3.9 with a standard deviation of 0.679 showing that respondents agreed with the statement. The last line item was, experience is key for contractors, 23% of the respondents strongly agreed, 37% agreed, 20% were not sure, 18% disagreed, while 2% strongly disagreed. The line item mean was 3.3 with a standard deviation of 0.717, showing that the respondents were not sure. In conclusion, the composite mean was found to be 3.95 with a standard deviation of 0.554, this indicates that the respondents agreed with the statements on contractors' technical capacity, it can therefore, be inferred that contractors' technical capacity has an influence on the implementation of road infrastructure projects.

One of the interviewees said the following:

"I don't feel the contractor working on this road are technically capable of doing the job to the required specifications, but since they were the best, we hope they will do the job well"

4.4.3. Contractor's Financial Capacity and Implementation of Road Infrastructure Projects.

The study sought to establish whether contractor's financial capacity influences the implementation of road infrastructure projects in Meru County. The respondents were given statements relating to contractors' financial capacity so as to indicate their level of agreement. They were to choose one of the five alternatives which were 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. The results are shown in Table 4.8.

Table 4.8: Contractor’s Financial Capacity

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
We have enough finances to finish this project	48	44	4	4	0	4.0	0.791
We have easy access credit facilities	41	33	6	17	3	3.1	0.817
We have a good credit history	70	27	3	0	0	4.6	0.684
We have good cash flows	20	27	11	30	12	2.8	0.621
We have enough assets that can guarantee a loan in case there’s need	77	23	0	0	0	4.8	0.648
Our turnover history is good	63	30	7	0	0	4.5	0.513
Composite						3.97	0.836

Table 4.8 shows that regarding line item one, we have enough finances to finish this project, 48% of the respondents strongly agreed with the statement, 44% agreed, 4% were not sure, while 4% disagreed with the statement, the mean was 4.0 with a standard deviation of 0.791 showing that the respondents agreed with the statement. Line item two, we have easy access to credit facilities, had 41% of the respondents strongly agreeing, 33% agreed, 6% were not sure, 17% disagreed, while 3% strongly disagreed with the statement. The line item mean was 3.1 with a standard deviation of 0.817, this shows that the respondents were not sure. The third statement was, we have a good credit history, 70% of the respondents strongly agreed, 27% agreed, while only 3% were not sure, the mean was 4.6 with a standard deviation of 0.684, indicating the respondents strongly agreed with the statement. The fourth statement was, we have good cash flows, 20% of the respondents strongly agreed, 27% agreed, 11% were not sure, 30% disagreed, while 12% strongly disagreed with the statement. The mean was 2.8 with a standard deviation of 0.621, this shows that the respondents disagreed with the statement, hence they did not consider the time taken for the disbursement of the loans to be lengthy. The fifth line item was, we have enough assets to guarantee a loan in case there is need, the results show that 77% of the respondents strongly agreed, while 23% agreed. The line item mean was 4.8 with a standard deviation of 0.648 indicating that the respondents strongly agreed with the statement. The last line item was, our turn over history is

good, 63% of the respondents strongly agreed, 30% agreed, and 7% were not sure. The line item mean was 4.5 with a standard deviation of 0.513, showing that the respondents strongly agreed with the statement. The composite mean was 3.97 and a standard deviation of 0.836 showing that the respondents agreed with statements on financial capacity. It is therefore, inferred that financial capacity of the contractor has an influence on the implementation of road infrastructure projects in Meru County.

With regard to the interview one respondent said the following:

“The financial capacity of the contractor is a key component when getting a contractor to do a job. The contractor that we have on site has the financial muscle to execute this job perfectly”

4.4.4. Contractor’s Quality Management and Implementation of Road Infrastructure Projects.

The study sought to determine if contractor’s quality management influences the implementation of road infrastructure projects in Meru County. The respondents were given statements on contractor’s quality management so as to indicate their level of agreement. They were to choose one of the five alternatives which were 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. The results are shown in Table 4.9.

Table 4.9: Contractor’s Quality Management

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
We always set quality objectives for our projects	28	24	46	2	0	3.1	0.911
We specify necessary operational procedures to achieve goals	11	17	10	47	15	2.4	0.769
We have quality control inspectors and technicians	66	30	4	0	0	4.4	0.787
We follow the specified standards during implementation	71	22	7	0	0	4.8	0.821
We have established quality metrics	16	33	30	14	7	3.6	0.761
We do process analysis during project implementation	33	41	20	2	4	4.1	0.619
Composite						3.73	0.885

The results in Table 4.9 shows that, with regard to line item one, we always set quality objectives for our projects, 28% of the respondents strongly agreed, 24% agreed, 46% were not sure, while 2% disagreed, the line item mean was 3.1 with a standard deviation of 0.911, this indicates that most of the respondents were not good at planning their businesses. The second line item was, we specify necessary operational procedures to achieve our goals, 11% of the respondents strongly agreed, 17% agreed, 10% were not sure, 47% disagreed while 15% strongly disagreed, the line item mean was 2.4 with a standard deviation of 0.769, indicating that the respondents did not have adequate book keeping skills. The third line item was, we have quality control inspectors and technicians, 66% of the respondents strongly disagreed, 30% agreed, while 4% were not sure, the line item mean was 4.4 with a standard deviation of 0.787, this indicates that respondents strongly agreed with the statement, hence the women entrepreneurs had good marketing skills. The fourth line item was, we follow the specified standards during implementation, 71% of the respondents strongly agreed, 22% agreed, and 7% were not sure, the line item mean was 4.8 with a standard deviation of 0.821, hence the respondents strongly agreed with the statement. This shows that respondents are very sure that they follow the specified standards during the implementation of road infrastructure projects. The fifth statement was, we have established quality metrics, 16% strongly agreed, 33% agreed, 30% were neutral, 14% disagreed, and 7% strongly disagreed. The mean was 3.6 with a standard deviation of 0.761, showing that the respondents were not sure with the statement. The last statement was, we do process analysis during implementation, 33% of the respondents strongly agreed, 40% agreed, 20% were not sure, 2% disagreed, and 4% strongly disagreed. The line item mean was 4.1 with a standard deviation of 0.619, this shows that the respondents were in agreement with the statement. The composite mean for contractor's construction quality management was 3.73 with a standard deviation of 0.885, this shows that respondents agreed with statements making up contractor's construction quality management though the responses were varied as shown by the big standard deviation in relation to the composite mean. It can be concluded that contractor's construction quality management has an influence on the implementation of roads infrastructure projects in Meru County.

4.4.5. Contractor's Management Structure and Implementation of Road Infrastructure Projects.

The study sought to determine whether contractor's management structure influences the implementation of road infrastructure projects. The respondents were given statements on

contractor’s management structure to indicate their level of agreement. They were to choose one of the five alternatives which were 5 = Strongly Agree, 4 = Agree, 3 = Not Sure, 2 = Disagree, and 1 = Strongly Disagree. The results are shown in Table 4.10.

Table 4.10: Contractor’s Management Structure

Statement	Percentage					Descriptive	
	5	4	3	2	1	Mean	Std. Dev
We have a clear chain of command	78	22	0	0	0	4.7	0.615
Decision making is by the top management	71	28	1	0	0	4.5	0.691
Communication is done using proper channels	55	31	11	3	0	3.9	0.719
There is proper division of labour, specialization and quality supervision of the project	81	10	9	0	0	4.8	0.532
Organization structure of the company is clear	67	30	3	0	0	4.3	0.650
We receive support from the management	22	31	44	20	3	3.1	0.811
Total						4.2	0.669

The results in Table 4.10 with regard to line item one, we have a clear chain of command, show that 78% of the respondents strongly agree while 22% agree with the line item. The mean is 4.7 with a standard deviation of 0.615, this shows that the respondents strongly agreed with the statement and hence the contractors have a clear chain of command. The second line item was, decision making is by the top management, 71% of the respondents strongly agreed, 28% agreed with only 1% were not sure, the line item mean was 4.5 with a standard deviation of 0.691, this indicates that the respondents strongly agreed with the statement. The third statement was, communication is done using proper channels, 55% of the respondents strongly agreed with the statement, 31% agreed, 11% were not sure, while 3% disagreed with the statement, the mean was 3.9 with a standard deviation of 0.719. This shows that the respondents agreed with the statement, hence communication channels are proper. The fourth line item was, there is proper division of labour, specialization and quality supervision of the project, 81% of the respondents strongly agreed, 10% agreed, while 9% were not sure, the line item mean was 4.8, with a standard deviation of 0.532 showing that the respondents were not sure with the statement. The fifth line item was,

organization structure of the company is clear, 67% strongly agreed, 30% agreed, and 3% were not sure, the mean was 4.3 with a standard deviation of 0.650, hence the respondents strongly agreed with the statement. The last line item was, we receive support from the management, 22% strongly agreed, 31% agreed, 44% were not sure, 20% strongly disagreed, while 3% strongly disagreed. The composite mean was 4.2 with a standard deviation 0.669 showing the respondents strongly agreed with the statements on contractor’s management structure and it is assumed that it has an influence on the implementation of road infrastructure projects.

4.5. Regression Analysis

Multiple regression analysis was used to model, examine, and explore the relationship between contractor’s capacity and implementation of road construction projects, this was deemed important in measuring the extent to which changes in one or more variables jointly affected the dependent variable. Each independent variable is associated with a regression coefficient describing the strength and nature of the variable’s relationship with the dependent variable.

Table 4.11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.934	0.872	0.860	0.633

Table 4.11 shows that the independent variables put together explain 86% of the variation in the dependent variable (implementation of road infrastructure projects) as indicated by the adjusted R square value, the remaining 14% is explained by factors not considered in the research study.

Table 4.12: ANOVA Test

Model	Sum of Squares	df	Mean Square	F	Sig	
1	Regression	123.121	4	30.78	71.745	0.000
	Residual	18.019	82	0.429		
	Total	141.14	86			

Table 4.12 gives a p-value of 0.000 which is less than 0.05 indicates that the regression model is statistically significant in determining how technical capacity, financial capacity, construction quality management, and management structure influence the implementation of road infrastructure projects.

The research further sought to establish the contribution of each variable to the dependent variable, and that was done via computation of regression coefficients. The findings are shown in Table 4.13.

Table 4.13: Regression Coefficients

Variable	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	0.284	0.182		12.885	.000
Contractor's Technical Capacity	0.364	0.106	0.284	3.388	.002
Contractor's Financial Capacity	0.812	0.208	0.739	2.462	.018
Contractor's Quality Management	0.574	0.119	0.462	3.721	.000
Contractor's Management Structure	0.133	0.092	0.072	2.349	.023

Table 4.13 gives the coefficient that are used to generate the regression model that follows.

$$Y = 0.284 + 0.364X_1 + 0.812X_2 + 0.574X_3 + 0.133X_4 + \epsilon$$

Where

- Y is implementation of road infrastructure
- X_1 is contractor's technical capacity
- X_2 is contractor's financial capacity

- X_3 is contractor's construction quality management
- X_4 is contractor's management structure
- ϵ is the error term

The results on table 4.13 show that if all the variables are assumed to be not significant, then the implementation of road infrastructure projects will change by 0.284. It is further shown that a unit increase in contractor's technical capacity will result in a change of 0.364 in implementation of road infrastructure projects which is significant since 0.002 is less than 0.05. A change of one unit in contractor's financial capacity results in a positive change of 0.812 in implementation of road infrastructure projects and it is significant since 0.018 is less than 0.05. It is also observed that a unit change in contractor's quality management leads to a change of 0.574 in implementation of road infrastructure projects in Meru county and the coefficient is significant since 0.000 is less than 0.05. Lastly, a change in contractor's management structure by one unit leads to a change of 0.133 in implementation of road construction projects and the coefficient is significant since 0.023 is less than 0.05.

Overall, contractor's financial capacity has the highest influence on implementation of road infrastructure projects in Meru county followed by contractor's quality management, then contractor's technical capacity and lastly contractor's management structure.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents summary of the findings, conclusions as well as the recommendations of the research study based on the objectives. The study focused on the relationship between contractor's capacity and implementation of road infrastructure projects in Meru County, Kenya.

5.2. Summary of Findings

The study found that contractor's technical capacity influences the implementation of road infrastructure projects. In particular, it was found that contractor's technical capacity has a weak positive influence on the implementation of road infrastructure projects in Meru County, this is shown by a beta coefficient of 0.364 indicating that a change in one unit on the technical capacity of the contractor results in a change of 0.364 units in the implementation of road infrastructure projects. Based on the composite mean of 3.95 and a standard deviation of 0.554, the findings indicate that respondents agree that the technical capacity of a contractor influences implementation of road infrastructure projects in Meru County.

The study also found that contractor's financial capacity influences the implementation of road infrastructure projects. It was shown by a beta coefficient of 0.812, this indicates that a unit change in the financial capacity of a contractor leads to a change of 0.812 in the implementation of road infrastructure projects. Hence there was a strong positive relationship between financial capacity of the contractor and implementation of building construction projects. The composite mean of 3.97 and a standard deviation of 0.836 shows that the respondents agreed that financial capacity of a contractor has influence on the implementation of road infrastructure projects in Meru County though the responses were varied.

The study further revealed that contractor's quality management had a moderate positive influence on the implementation of road infrastructure projects. The beta coefficient of 0.574 shows that a unit change in contractor's quality management leads to a change of 0.574 in the implementation of road infrastructure projects in Meru County. It was also observed that majority of the respondents agreed that construction quality management affects the implementation of road

infrastructure projects in Meru County by returning a composite mean of 3.73 and a standard deviation of 0.885 which shows greater variation in the responses.

The study also established that contractor's management structure has a weak positive contribution to the implementation of building construction projects as shown by a beta coefficient of 0.133. This coefficient shows that a unit change in the management structure of the contractor leads to a change of 0.133 in the implementation of road infrastructure projects. The composite mean of 4.2 and a standard deviation of 0.669 show that the respondents strongly agreed that management structure of the contractor influences implementation of road infrastructure projects in Meru County.

Finally, it was shown that when technical capacity, financial capacity, quality management, and management structure of a contractor are all put together, they explain 86% of the variations in the implementation of road infrastructure projects.

5.3. Discussion of the Findings

5.3.1. Contractor's Technical Capacity and Implementation of Road Infrastructure Projects.

The study revealed that majority of the respondents agreed that contractor's technical capacity have an influence on the implementation of road infrastructure projects. The findings are in tandem with the study of Hartman et al. (2009), who claims that understanding technical knowledge enables use of correct working methods to competently handle machinery and equipment. In addition, constant training of the staff is necessary to improve their technical skills and ensure knowledge transfer is achieved effectively for the success of the project.

The study also agrees with Fukuda (2018) who found that inadequacy in technical management of staff led to poor workmanship accounted for poor roads in Nigeria, inefficiency of contractors, accidents on roads and lack of organizational stability. Worsely (2009) concurred with these findings and found those contractors who were recruiting managers without technical skills and experience faced challenges in project implementation in Kenya.

5.3.2. Contractor's Financial Capacity and Implementation of Road Infrastructure Projects.

The study has shown that majority of the respondents agreed contractor's financial capacity has the highest influence on the implementation of building construction projects. The findings agree with Ameh (2011) also observed that inadequate funds lead to time overrun and sufficient funding guarantees reasonable cash flow. Kenyatta et al (2015) also carried out a study on influence of payment default to contractors in the Kenyan construction industry and found that late payment, underpayment or paying intermittently and non-payment have led to cash flow hardships to contractors. This has led to late completion of projects, disputes in construction and even bankruptcy.

The study further agrees with studies by Erdogan et.al. (2017) who in their studies in London found that constrained working capital was the main challenge in the daily operations of contractors in the implementation of infrastructure projects. In China as well Chen (2007) suggested that contractors should plan and allocate funds for the entire project to avoid stoppages on account of lack of funds.

5.3.3. Contractor's Quality Management and Implementation of Road Infrastructure Projects.

The study also revealed that majority of the respondents agreed that construction quality management by the contractor has an influence on the implementation of road infrastructure projects in Meru County. This is in line with a number of studies such as a study by Toakley and Marosszeky (2003) who stressed that for the construction industry, the focus on quality management should not only be at the construction stage but for total quality to exist throughout the project life cycle. Scatterfield, (2005) in other words said quality control is critically important to implementation of construction project and should be adhered to throughout a project from conception and design to construction and installation. Inspection during construction will prevent costly repairs after the project is completed. The inspector, engineer, contractor, funding agency, permit agency, and system personnel must work together to inspect, document, and correct deficiencies.

The findings agree with Battikha (2002) who argues that with inefficient or non-existent quality management procedures, significant expenditures of time, money, and resources are wasted on the

implementation of infrastructure projects. In addition, the lack of quality due to deficient construction quality management is detected through non-conformance to established requirements. In construction, non-conformance occurs when the finished state of a project and its components deviates from the established requirements. Quality-related problems during construction can be projected on the operating life of the finished project. To a contractor, non-conformance can yield penalties as well as cost time burdens for re-work, which can convert into productivity loss.

5.3.4. Contractor's Management Structure and Implementation of Road Infrastructure Projects

Finally, the study revealed that majority of the respondents agreed that contractor's management structure influences the implementation of road infrastructure projects in Meru County. The results are in tandem with the results of a study by Sarfo (2007) and citing others who reported that the organizational structure adopted for management of building projects is an important area to consider for the success of projects. Weaknesses in this area of project management lead to poor project performance regardless of organizational facilitators such as senior management commitment and leadership style. It further agrees with Christie, Luce and Macy (1952) who did a study on the effects of hierarchical steepness on the company's performance and found that better performance is positively correlated with more centralized communication.

5.4. Conclusion

It is concluded that contractor's technical capacity has a moderate positive influence on the implementation of road infrastructure projects. Having qualified personnel, enough machinery and equipment, knowledge of IT and use of advanced technology, and knowledge of better construction methods positively influence the implementation of road infrastructure projects.

Secondly, the financial capacity of the contractor has a strong positive influence on the implementation of road infrastructure projects. Having enough finances, being in a position to easily access credit in time of need, having a good credit history, having a good cash flow as well as having enough assets which either be liquidated or used as collateral when finances are needs are seen as very important components that are required for a road infrastructure project to be implemented successfully.

It is also concluded that construction quality management is a key component in the implementation of road infrastructure projects. The aspects of setting quality objectives for the project, specifying the necessary operational procedures to achieve the set goals, having quality control inspectors and technicians, as well as following the specified standards during implementation are key contributors to successful implementation of road infrastructure projects.

Also, the management structure of the contractor has a weak positive influence on the implementation of road infrastructure projects in Meru County. The constructs of management structure that have a weak influence were seen to be, having a clear chain of command, decision making being done by the top project management, communicating through proper channels, and having division of labour, specialization and quality supervision of projects.

In conclusion the contractors' technical capacity, financial capacity, quality management capacity as well as contractors' management structure, all influence the implementation of road infrastructure projects in Meru County, Kenya.

5.5. Recommendations

The study makes the following recommendation:

The technical capacity of a contractor should be clearly scrutinized before they are given jobs, this is because the technical capacity has a positive influence on the implementation of the road infrastructure projects. The County Government should come up with a policy document that stipulates the required technical expertise for a contractor before they are allowed to execute any road infrastructure job in the Meru County.

Since the financial capacity of a contractor is a key influencer of implementation of road infrastructure projects, the contractors should provide evidence that they can execute the job well without having financial hitches before they are allowed to proceed with the execution of the job. The contractors should be obligated to provide a guarantor equal to the sum of the job they intend to execute so that when they fail to complete the job as agreed the guarantor will be held responsible. Additionally, the County Government should pay the contractors in time during the execution so as to allow the implementation of projects run smoothly.

Quality management aspects in construction are important for achievement of quality output. It is there recommended that the contractors should demonstrate their quality capabilities before being given the implementation job. The County Government should have quality inspectors who

monitor the quality of the job being done by the contractor at every stage of the project implementation. A policy document should be developed to give the consequences of not doing the project to the expected quality.

Finally, the study recommends that road contractors should have proper management structures so as to avoid hitches in communications and feedback mechanisms between the different levels of employees during implementation.

5.6. Suggestions for Further Research

The study identifies the following areas as meriting further studies by academicians and researchers interested in the area of performance in road construction and contractor capacity:

1. Working capital management practices of contractors in the road construction sector in Kenya.
2. A comparative study on capacities and performance of both local and international contractors in the road construction industry in Kenya.
3. Organizational factors and efficiency of road construction firms in Kenya.
4. Role of supervision capacity on the operational effectiveness of road construction firms in Kenya.

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APPENDICES

Appendix I: Letter of Request of Transmittal of Data



UNIVERSITY OF NAIROBI
OPEN DISTANCE AND E-LEARNING
SCHOOL OF OPEN AND DISTANCE LEARNING
DEPARTMENT OF OPEN LEARNING PROGRAMMES

TO WHOM IT MAY CONCERN

Date: 11th August , 2020

Uon/ODEL/MeLC/3/5

SUBJECT: NANCY OPRONG - ADM. NO. L50/13516/2018

This is to confirm that the above named person is a student at the University of Nairobi, School Of Open and Distance Learning, Department of Open Learning Programmes, Meru Learning Centre.

He/She is pursuing a Masters course in *Project Planning and Management* and would like to be assisted with information from your organization to finalize his/Her research proposal.

Any assistance accorded to him/Her will be highly appreciated.


DR. R. M. MUSA
CENTRE CO-ORDINATOR
MERU LEARNING CENTRE

Appendix II: Questionnaire for Contractors and Sub County Committee Representatives

Introduction

This questionnaire is designed to collect information about INFLUENCE OF CONTRACTOR'S CAPACITY ON IMPLEMENTATION OF ROAD INFRASTRUCTURE PROJECTS IN MERU COUNTY, KENYA. It contains 5 sections. The information will be used for academic purpose only, I therefore request you to spare about 10 minutes and respond to all the items as truthful as possible. You may use a tick or as directed in each item

Section I: Background Information

1. What is your gender?

- a. Male
- b. Female

2. Which age bracket do you belong?

- a. 18 – 30years
- b. 30 – 40years
- c. 40 – 50 years
- d. Above 50years

3. What is your highest level of education?

- a. Diploma
- b. Degree
- c. Masters
- d. PHD
- e. Others

4. How long have you been in your current Job?

- a. Less than 5 years
- b. 5 – 10 years
- c. 10 – 15 years
- d. 15 – 20 years
- e. Not applicable

Section II: Implementation of Road Infrastructure Projects

This section seeks to get information on the implementation of road infrastructure projects. To achieve this, you are required to give your opinion on the extent to which you agree with the statement below, based on the following scale; 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree, 1 = strongly disagree.

Statement	5	4	3	2	1
We finish our projects on time schedule					
We finish our projects within allocated budget					
Our projects meet the required quality					
We are satisfied with the quality of our work					
Time allocated for the project is enough					
The project budget is ok					

Do you think your implementation of this project will is successful? Kindly give reasons for your answer.

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Section III: Technical Capacity

This section seeks to get information on technical capacity. To achieve this, you are required to give your opinion on the extent to which you agree with the statement below, based on the following scale; 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree, 1 = strongly disagree.

Statement	5	4	3	2	1
We have qualified personnel on site					
We have enough machinery and equipment					
We have knowledge of IT and use of advanced technology					
We have knowledge of better construction methods					
Our personnel have knowledge of past experience in similar projects					
Experience is key for contractors					

Kindly explain any other contractor’s technical factors that you think have an influence on the implementation of road infrastructure projects.

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Section IV: Financial Capacity

This section seeks to get information on financial capacity. To achieve this, you are required to give your opinion on the extent to which you agree with the statement below, based on the following scale; 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree, 1 = strongly disagree.

Statement	5	4	3	2	1
We have enough finances to finish this project					
We have easy access credit facilities					
We have a good credit history					
We have good cash flows					
We have enough assets that can guarantee a loan in case there is need					
Our turnover history is good					

Kindly explain any other contractor’s financial factors that you think have an influence on the implementation of road infrastructure projects.

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Section V: Construction Quality Management

This section seeks to get information on construction quality management. To achieve this, you are required to give your opinion on the extent to which you agree with the statements below, based on the following scale; 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree, 1 = strongly disagree.

Statement	5	4	3	2	1
We always set quality objectives for our projects					
We specify necessary operational procedures to achieve goals					
We have quality control inspectors and technicians					
We follow the specified standards during implementation					
We have established quality metrics					
We do process analysis in during project implementation					

Kindly explain any other construction quality management factors that you think have an influence on the implementation of road infrastructure projects.

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Section VI: Management Structure

This section seeks to get information on management structure. To achieve this, you are required to give your opinion on the extent to which you agree with the statement below, based on the following scale; 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree, 1 = strongly disagree.

Statement	5	4	3	2	1
We have a clear chain of command					
Decision making is by the top management					
Communication is done using proper channels					
We have clear job specifications					
The organization structure of the company is clear					
We receive support from the management					

Kindly explain any other managerial structure factors that you think have an influence on the implementation of road infrastructure projects.

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Appendix III: Interview Guide for Consultant and Client

INTRODUCTION

This interview is designed to obtain information for academic purposes only. The accuracy of the responses you provide will be very important to the success of this research thesis. The findings of the study are hoped to make a significant contribution towards contractor's capacity and successful implementation of road infrastructure projects in Meru County, Kenya. The interview will take approximately 25 minutes. You are therefore requested to assist with the interview.

Thank you.

SECTION A: Demographic information

1. What is your gender?
2. How old are you?
3. What is your highest education level?
4. How long have you worked in the road infrastructure industry?

SECTION B: Information on specific variables of study

5. Briefly describe the contractor's technical capacity, and do you think based on your assessment they are capable of implementing the project successfully?
6. Briefly describe the contractor's financial capacity, and do you think based on your assessment they are capable of implementing the project successfully?
7. Briefly describe the contractor's construction quality management, and do you think based on your assessment they are capable of implementing the project successfully?
8. Briefly describe the contractor's management structure, and do you think based on your assessment they are capable of implementing the project successfully?
9. Kindly explain the implementation of road infrastructure projects in terms of completion within schedule? Probe on completion within cost and quality, probe on reworks, variations, compliments and complains, client satisfaction and project team satisfaction)
10. Is there any other comment that you would like to share with me?