

**FACTORS INFLUENCING PERFORMANCE OF CONSTRUCTION OF POWER  
GENERATION INFRASTRUCTURE PROJECTS IN KENYA: A CASE OF KENYA  
ELECTRICITY GENERATING COMPANY, OLKARIA, NAIVASHA**

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**Research Project Report submitted in partial fulfilment of the requirements for the award  
of the Degree of Master of Arts in Project Planning and Management of The University of  
Nairobi**

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**DECLARATION**

This research project report is my original work and has not been submitted or presented for award in any other institution.

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## **DEDICATION**

I dedicate this work to my beloved children Emmanuel Jones and Sherlyn Hope. I hope this report shall inspire them to pursue their education with zeal, become worthy members of the society and lead successful lives.

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## **ABBREVIATIONS AND ACRONYMS**

<b>GDC</b>	Geothermal Development Company Limited
<b>GDP</b>	Gross Domestic Product
<b>GNP</b>	Gross National Product
<b>IPPs</b>	Independent Power Producers
<b>KenGen PLC</b>	Kenya Electricity Generating Company Public Limited Company
<b>KETRACO</b>	Kenya Electricity Transmission Company Limited
<b>KNBS</b>	Kenya National Bureau of Statistics
<b>KPIs</b>	Key Performance Indicators
<b>KPLC</b>	Kenya Power and Lighting Company Limited
<b>KPMG</b>	Klynveld Peat Marwick Goerdeler
<b>LAPSSET</b>	Lamu Port and New Transport Corridor Development to Southern Sudan and Ethiopia
<b>NCA</b>	National Construction Authority
<b>NCTIP</b>	Northern Corridor Transport Improvement Project
<b>PAP</b>	Project Affected Persons
<b>PLC</b>	Public Limited Company
<b>RAP</b>	Resettlement Action Plan
<b>SGR</b>	Standard Gauge Railway
<b>SPSS Ver. 20</b>	Statistical Package for Social Scientists version 20
<b>UN</b>	United Nations
<b>USA</b>	United States of America

## ABSTRACT

The Kenyan Government has identified development of key physical infrastructure in the power sector as one of the key enablers to transform the country into an industrialized nation by 2030. The need to increase generation and installed electricity capacity in Kenya has called upon key industry players to initiate mega projects in the power sector towards the realization of this goal. However, construction projects are complex and challenging in nature. Clients, consultants, contractors, project managers and other stakeholders consider a project delivered within time, to budget, to scope and quality as being successfully implemented. However, performance issues such as delays, cost overruns, lack of funds, poor quality, poor safety culture, poor planning and design among other factors have variously contributed to poor performance of construction projects in the power generation sector. This study examined factors influencing performance of construction of power generation infrastructure projects in Kenya with a focus on Kenya Electricity Generating Company, Olkaria, Naivasha, Nakuru County. The study was guided by the following objectives: to determine the extent to which regulatory framework influence performance of construction of power generation infrastructure projects; to assess the influence of project funding on performance of construction of power generation infrastructure projects; to assess the degree to which construction inputs influences performance of construction of power generation infrastructure projects, and to determine the influence of stakeholder's involvement on performance of construction of power generation infrastructure projects. The study was informed by Zero Defect Theory and Sigma Six Theory. The study adopted a descriptive research survey design targeting project implementation teams at Kenya Electricity Generating Company PLC (KenGen), their consultants and contractors. 75 respondents were selected for the study. Self-administered questionnaires were used as the primary data collection instrument. Data collected was analyzed quantitatively, using descriptive statistics including frequency distributions, percentages and Karl Pearson correlation. The analysis aided by Statistical Package for Social Scientists version 20 (SPSS ver. 20). The findings showed that 80.4% of respondents agreed that there was very high influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company; 77.8% of the respondent agreed that project funding very highly influenced performance of construction of power generation infrastructure projects; 73.8% of respondents agreed that construction input had very high influence on performance of construction of power generation infrastructure projects; and 72.4% of the respondents agreed that stakeholder involvement had very high influence on performance of construction of power generation infrastructure projects. Therefore, in conclusion, the study noted there exists a positive correlation between performance of construction projects and factors influencing performance of construction of power generation infrastructure projects at KenGen PLC, Olkaria. The study also concluded that disregard of these factors would often lead to performance challenges such as delays, cost overruns and poor quality of projects among other undesirable project outcomes. The study, therefore, recommended careful consideration and determination of these factors during project initiation and implementation. Such include ensuring availability and enforcement of laws, ensuring adequate funding and cash flows, ensuring only competent labour is employed, quality materials are used in construction works, relevant and quality equipment are used in projects and involvement of stakeholders at every level of project formulation, implementation and operations.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

The construction industry plays a major role in economic development and growth of a nation as it contributes significantly to both gross national product and employment of its people (Betts, Robinson, Burton, Leonard, & Sharda, 2013). It occupies a pivotal position in a nation's development plan and agenda for a sustainable future. It is through the construction industry that a nation realizes its core infrastructural goals. It also plays a key role in satisfying a wide range of physical, economic, and social needs and contributes significantly to the fulfillment of key national goals (GOK, 2007). The role of the construction industry in the socio-economic development of a country cannot be overemphasized (Nyangwara & Datche, 2015).

Construction is one of the largest industrial sectors in the world that will most likely account for over 13.5% of world output by 2025 (Betts, Robinson, Burton, Leonard, & Sharda, 2013). Globally, the construction industry has grown at an unprecedented rate (Robinson, 2015). Betts, Robinson, Burton, Leonard, & Sharda (2013) noted that the construction industry globally will rise by \$6.3 trillion or over 70% to \$15 trillion by 2025 compared to \$8.7 trillion in 2012. They also noted that about seven nations will account for 72% of the expected growth. These are China, the US, India, Indonesia, Russia, Canada and Mexico. They further indicated that China alone will account for about 36% of all growth in the construction industry by 2025 and that the Chinese construction market is expected to be twice the size of that in the United States by 2025.

The Sub-Saharan Africa is expected to record high construction growth rates, driven primarily by rising populations, rapid urbanization and much needed development of infrastructure (The Big 5, 2017). The number of construction projects in East Africa have gone up by 65.1% between 2016 and 2017 while the increase in the total value of projects has risen by 20.7% (Andiva, 2018).

Kenya is largely an infrastructure deficient country and therefore, presents a large potential in terms of infrastructural development. Kenya's construction sector is amongst the most rapidly

growing in the region, experiencing an average growth rate of 14.2% for the period 2006 – 2011 (Nyangwara & Datche, 2015). The country is currently facing a construction boom aided by its flagship project Kenya Vision 2030 (Momade, 2017). Infrastructure construction projects in Kenya grew by 13.6 percent in 2015 due to implementation of mega-infrastructure and energy flagship projects such as Northern Corridor Transport Improvement Project (NCTIP), 280 MW Geothermal Power Plants, Standard Gauge Railway Project (SGR), the Thika Super Highway among other projects (Turner & Townsend, 2017).

The National Construction Authority of Kenya, (NCA) recognized that the construction sector contributed 5.5% growth to Kenya Gross Domestic Product in 2013 due to increased spending on infrastructural development by the Kenyan Government (NCA, 2014). The report also noted that the private sector improved in construction initiatives and activities over the past years (NCA, 2014). The statistics clearly states the growth of the construction industry since the launch of the Kenyan Vision 2030 Strategy.

The Kenyan Government identified development of key physical infrastructure in the power sector as one of the key enablers to transform the country into an industrialized nation by 2030 (GOK, 2007). Power Africa (2016), a U.S led government partnership with African Governments in the area of development of the power sector noted in their report, *Development of Kenya's power sector 2015-2020* that Kenya has an opportunity to take its power sector from good to great by delivering 2,700 MW of new generation capacity by 2020, through new financing and partnership models and construction and development of efficient power plants that will ensure availability of electrical power (Power Africa, 2016). The Government of Kenya therefore committed resources for both research and development of key electricity infrastructure developments in Kenya.

Power Africa (2016) also noted that Kenya has made considerable strides in the development of the Electricity Power Sector. These include the construction of the largest geothermal power plant in Africa, the 280 MW Geothermal Power Plants at Olkaria, Naivasha. Government owned KenGen contributes up to 70% of installed generation capacity of power in Kenya (Power Africa, 2016). Independent Power Producers (IPPs) are also playing a major role in the development of the power sector in Kenya (KenGen, 2016). Around 30% of Kenya's installed electricity capacity

is owned and operated by these Independent Power Producers across 15 electricity generating stations (KenGen, 2016).

The Kenyan Government hopes to continue investing heavily in the development of power sector in Kenya. It is estimated that Kenya could have 5,040 MW of installed capacity by 2020, representing ~2,700 MW of new generation capacity coming online over the next 5 years (KenGen, 2016).

The need to increase generation and installed electricity capacity in Kenya has called upon key industry players to initiate mega projects in the power sector towards the realization of this goal. KenGen, as government parastatal was tasked with a great responsibility of increasing its generating capacity through construction of additional power generation. New generation power projects at Olkaria that have been constructed include 85MW Wellhead Projects, 280MW Olkaria I (Additional Units 4 and 5) and Olkaria IV. New power plants under construction include 156MW Olkaria V and 70MW Olkaria I (Additional Unit 6). Other power related projects include construction of new access road to Olkaria IV and V power plants and construction of relocation houses for Projects Affected Persons (PAP) (KenGen, 2016).

However, the construction industry in the development of key infrastructure projects in the power sector faces many challenges. The industry has recorded dismal performance when it comes to the underlying factors that contribute to successful completion of these projects some of which are very complex in nature (Kihoro & Waiganjo, 2015). Key Performance Indicators (KPIs), a measurement of performance in the industry therefore, are required to be developed to monitor performance of construction projects. The purpose of Key performance indicators (KPIs) is to ensure that projects are delivered as per scope, on time, on budget, free from defects, efficiently, effectively right first time, safely and to the satisfaction of customers (Nyangwara & Datche, 2015). Construction projects may fail in observing key performance indicators in the construction industry. Given the critical role the construction industry plays in implementation of power generation infrastructure projects and the poor level of performance in the industry, improving performance of the construction industry needs to be a priority action if the power sector is to realize its potential in delivering quality infrastructure for its power projects. As consultants and



contractors are some of the key players in the industry and the makers of the final product, any development and improvement initiatives in the construction industry should consider ways of improving their capacity and capabilities (Nyangwara & Datche, 2015).

There's an increased demand for project managers in the construction industry who are tasked with overseeing successful planning, designing, implementation and completion of construction projects and who can mitigate performance related issues during these the various stages of a project (Kihoro & Waiganjo, 2015). Clients therefore depend greatly on the exemplary skills of the project managers, consultants and contractor to be able to have their projects delivered as scheduled.

## **1.2 Statement of the problem**

It is estimated that Kenya could have 5,040 MW of installed electricity capacity by 2020, representing ~2,700 MW of new generation capacity coming online. Therefore, the Kenyan Government has continued to invest heavily in the development of electricity generation sector in Kenya. New power projects at Olkaria that have been constructed include 85MW Wellhead Power Projects, 280MW Olkaria I (Additional Units 4 and 5) and Olkaria IV. New power plants under construction include 156MW Olkaria V and 70MW Olkaria I (Additional Unit 6). Other power related projects include construction of a new 10KM access road to Olkaria IV and V power plants and construction of relocation houses for Projects Affected Persons (PAP) under Resettlement Action Plan (RAP) (KenGen, 2016). The construction of these power generation infrastructure projects is complex in nature and is affected and dependent on many factors for project's success. The complexity and fragmented nature of these projects contributes to their performance issues. Some of the performance problems the industry face includes cost overruns, delays, poor quality, poor safety culture, poor planning and design, inferior working conditions, lack of finances, abandonment or even termination, among other factors. These problems have variously contributed to poor performance of construction projects in the power generation sector (Nyangwara & Datche, 2015).

Studies conducted locally by Kangaroo (2014), Yarrow (2017), Laboso (2016), Langat (2015), Munyoki (2014) among other scholars have contributed to the knowledge of factors and challenges

influencing implementation and completion of construction projects. While they also mention performance of construction projects as one of the factors that affect implementation and completion of projects, factors influencing performance of construction projects are not adequately addressed. This study, therefore, seeks to examine factors influencing performance of construction of power generation infrastructure projects in Kenya with a focus on Kenya Electricity Generating Company, Olkaria, Naivasha, Nakuru County.

### **1.3 Purpose of Study**

The purpose of this study was to examine factors influencing performance of construction of power generation infrastructure projects in Kenya; using a case of Kenya Electricity Generating Company at Olkaria, Naivasha, Nakuru County.

### **1.4 Objectives of the Study**

The overall objective of the study was to investigate factors influencing performance of construction of power generation infrastructure projects in Kenya; a case of Kenya Electricity Generating company at Olkaria, Naivasha, Nakuru County. Specific objectives into these factors were: -

- i. To assess the influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company
- ii. To establish the influence of project funding on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company
- iii. To determine the influence of construction inputs on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company
- iv. To examine the influence of stakeholder's involvement on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company

### **1.5 Research Questions**

The study attempted to answer the following questions: -

- i. To what extent does regulatory framework influence performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company?
- ii. What is the influence of project funding on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company?
- iii. What is the influence of construction inputs on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company?
- iv. What is the influence of stakeholders' involvement on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company?

### **1.6 Significance of the Study**

It is hoped that the findings of this study will contribute to knowledge on factors influencing performance of construction projects in Kenya and be used as reference for better decision making by project developers and industry professionals on the various ways in which better performance can be incorporated into construction projects. Factors influencing performance will be studied and examined and recommendations on how to approach each of the factors regarding performance of construction projects elaborated. This study will also help in creating awareness on the need to ensure better performance of construction projects always.

### **1.7 Delimitation of the study**

The study considered recently completed construction projects or ongoing construction projects KenGen's Olkaria Geothermal Power Project. The sample population targeted included key stakeholders the client or project proponents, architects, engineers, construction project managers, quantity surveyors, land surveyors and developers. Other key stakeholders included the contractors, the consultants, and local community stakeholders.

### **1.8 Limitation of the study**

The study was applied to ongoing or completed projects at Kenya Electricity Generating Company Limited at its Olkaria Geothermal Field hence, the results of this finding may not be representative of the entire construction industry in Kenya, thus, generalization may not be applied. The study is likely to be affected by budget and financial constraints as the researcher is self-sponsored.

### **1.9 Assumptions of the study**

The study was based on the assumptions that respondents were available, and they were willing to provide required and necessary information with relation to this project; that they were knowledgeable in the areas of interest of this project, and that they would answer questions relating to this project faithfully and honestly.

## 1.10 Definition of significant terms used in the study

**Construction inputs:** Raw or processed materials, labour and equipment used during execution of a project

**Cost management:** the process of planning and controlling the budget of a project in order to predict impending expenditures to help reduce the chance of going over budget

**Key Performance Indicators:** These are specific measurement tools for indicating how well teams are achieving specific goals. Project management KPIs are generally agreed upon early in the project. They reflect the organization's central concept of the project and solidify project responsibility across administrative divisions.

**Performance of construction projects:** Performance of construction projects is the determination of how well a construction project has fared in terms of achieving its specific goals against set targets and objectives.

**Project Funding:** Raising of funds to finance an economically capital investment project in which the providers of funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project.

**Quality Standards:** Details of the requirements, specifications, guidelines and characteristics that a product must meet in order serve the purpose for which it was intended and meet customer satisfaction

**Regulatory Framework:** Pertains to applicable and relevant laws, regulations, rules, policies and regulatory bodies to govern in an effective and logical way, the day to day business of organizations, businesses and other endeavours.

**Stakeholder involvement:** the process involving people with connections to or affected by a construction project to assist on decision making, hence have an influence the implementation of the project. They may support or oppose the project endeavour and be influential in the administration of the project within the community.

**Time Management:** This is the process of organizing and planning how to divide time among specific activities to increase effectiveness, efficiency and productivity and meet set timeline targets

**Stakeholder management:** The systematic process for identification, analysis, planning and implementation of actions designed to engage with stakeholders to creates positive relationships with stakeholders through the appropriate management of their expectations and agreed objectives for the successful delivery of any project, programme or activity.

### **1.11 Organization of the Study**

This study was organized into five chapters. Chapter one covered the introduction where it introduces the concept and the context of the study. It also presents the statement of the problem, purpose of the study, research objectives and questions. It also contains significance of the study, scope, delimitations and definition of key terms and the organization of the study. Chapter two discusses literature review where past studies relevant to the study objectives. These encompasses literature review on the construction industry in Kenya, regulatory framework, construction inputs and stakeholder involvement in construction projects. The chapter also covers theoretical framework that guides the study objectives, conceptual framework for independent and dependent variables, and summary of the entire chapter. Chapter three presents research methodology which encompasses research design, target population, sample size and sampling procedures, data collection instruments, pilot testing the instruments, data collection procedures, data analysis techniques, ethical considerations and operationalization of variables. Chapter four presents data analysis, presentation and interpretation. Chapter five covers summary of findings, discussion of findings, conclusions, recommendations and suggestions for further study.

## CHAPTER TWO

### LITERATURE REVIEW

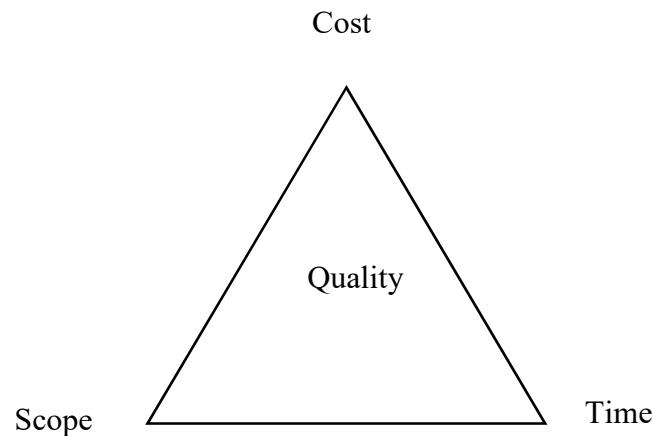
#### 2.1 Introduction

This chapter considers, and reviews available literature related to this study. Discussion were centered on the identified objectives of the study and as researched, reported and written about by other scholars. This chapter also discussed theories that attempt to explain the study objectives. Conceptual framework of the study was developed and demonstrated by a diagrammatic relationship between independent and dependent variables. A summary on the literature review was considered at the end of the chapter.

#### 2.2 Performance of construction projects

The construction industry is faced with challenges that influence performance of construction projects. Identifying factors that influence the performance of construction projects and ensuring that arising challenges are mitigated and quality of projects upon completion is guaranteed will ensure client and customer satisfaction at the completion of project (Oke, Aigbavboa, & Dlamini, 2017). Performance problems in the construction industry vary from one project to another based on a project's characteristics (Furst, 2015).

Construction projects are normally implemented under constraints of time, cost and scope, normally referred to as “the triple constraints” of a construction project with quality being the central theme (Haughey, 2011).



**Figure 1: The Triple Constraint of a construction project** (*Haughey, 2011*)

Haughey (2011) posits that projects must be delivered within approved budget, within time and to scope with acceptable high quality. Projects are therefore required to create a balance between time, cost and quality to ensure that these three important factors of construction are integrated optimally. High-quality delivery of projects may not be the primary objective for clients; however, it marks the hallmark of successful projects (Mallawaarachchi & Senaratne, 2015).

The success of a construction project hinges on the ability of the construction project managers to effectively and efficiently perform their job functions with the intended efficacy (Nyangwara & Datche, 2015). In recent times, there has been sustained criticisms aimed at the construction industry for generally poor performance and overall substandard product delivery (Sodangi, Khamidi, & Idrus, 2010). The final product, processes and parties involved are under high pressure to perform better. Therefore, a strong performance culture of construction projects is considered an important prerequisite to the achievement of sustained competitive advantage through the continuous delivery of projects as per scope, within time, budget and of high quality as well as to customers satisfaction (Sodangi, Khamidi, & Idrus, 2010).

Poor performance of construction projects is a source of concern to both public and private sector clients. Consequences of poor performance of construction project most often lead to loss in productivity and rise in project cost due to additional expenses incurred from rework, redo and



repair of part or whole of project condemned as not meeting quality standards (Jha & Iyer, 2006).

Performance problems in the construction industry be attributed due to problems of shortages or inadequacies in industry infrastructure (mainly supply of resources), problems caused by clients, consultants contractors and other stakeholders and, problems caused by incompetence/inadequacies on the part of the project implementation teams, contractors and consultants (Kaniaru, 2014). Other performance problems as elaborated by Kaniaru (2014) include poor budgetary planning, cost overruns, time control during execution and lack of proper scheduling of projects, incompetent of the project managers, designers and planners, incorrect estimation of costs and project quantities, social problems within the construction industry, technological challenges, improper techniques and tools, limited and poorly workforce, disregard of laws and policies governing, construction projects, project variations, among other performance related factors.

Planning, design and implementation for projects are the most important phases of a project's life cycle which affect performance of construction projects (Mallawaarachchi & Senaratne, 2015). Errors in projects occur mostly during planning, design and implementation phases with hefty cost implications. 6-15% of construction cost is found to be incurred due to rework of defective components occurring during implementation phase and 5% of construction cost is incurred due to rework of defective components occurring during operation and maintenance phase (Mallawaarachchi & Senaratne, 2015). The importance, therefore, of performing work within the requirements of scope, cost, time, and quality cannot be overemphasized as this ensures sustainability of the delivered projects (Jha & Iyer, 2006).

### **2.3 Regulatory framework and performance of construction projects**

The construction industry in Kenya is governed by laws and policies that specify standards and procedures to be adopted during planning, design, implementation, monitoring and evaluation of construction projects. These laws and policies have been formulated over time to standardize procedures to be adopted in the construction industry and to explicitly assign roles to relevant government bodies to be able to have oversight authority into the construction industry, to regulate, inspect and report on any matters relating to it among other mandate.

The construction industry the world over face various challenges various laws and policies seek to mitigate. (International Labour Organisation, 2001) recognizes the fact that scenes of devastation as buildings collapse due to inadequate designs, poor construction, inadequate supervision and inspection are the order of the day; reports of corruption involving contractors and government officials are evident; and “cowboy” builders, those with no technical knowhow, expertise and/or equipment to manage a construction project, operate around the periphery of the industry and generate considerable criticism of the sector as a whole. These problems contribute to the poor image of the construction industry.

(Stroika, 2012), posits that in developing countries like Kenya, the construction industry is facing a lot of challenges largely contributed by socio-economic stresses, chronic shortage of resources, institutional weaknesses and a general inability to deal with the key issues. (Stroika, 2012) also charges that the construction industry has poor record on innovation, when compared with manufacturing industries such as aerospace or electronics.

Institutional weaknesses exist where regulating authorities are unable to efficiently and effectively implement and maintain set regulations, a common challenge in the sector where incidence, incapacity and negligence of the parties concerned results in poor project management that effectively lead to poor performance of construction projects (Stroika, 2012).

Disregard of set laws, polies and regulations have left Kenya reeling in the wake of deaths occasioned due to collapsing buildings or poorly designed roads among other project initiatives by rouge contractors and consultants. In the case when a building collapses, the blame most often falls on either contractor’s negligence or failure of the regulating authorities to enforce the law in the failed project (Stroika, 2012).

Wairimu (2014) noted that physical planning is an important aspect for any building code in regulating and enhancing performance of projects. However, she stated that Kenya’s current building code has many flaws and has not been able to control planning of the built environments possibly because these laws are outmoded and lack enforcement of regulations. Other factors

include lack of qualified physical planners, lack of qualified professionals, cartels controlling the construction industry, corruption, negligence by the local authority among other factors. Wairimu (2014) further noted that negligence by the local authorities contributed to the collapse of buildings that have cost lives and material losses running into millions of shillings due to lack of enforcement of building safety, approval of poor designs and poor building construction processes and methods. Wairimu (2014) concluded that lack of reviewing and/or enforcement of existing laws, policies and regulations and the absence of a competent authority to enforce the laws could be reason behind all the problems in the construction industry resulting to poor performance of construction projects.

To standardize laws that regulate the construction industry and improve its performance, the Government of Kenya, following the promulgation of the New Constitution 2010 in August 2010, set to form Authorities as enshrined in the constitution to regulate the construction sector (Stroika, 2012). One of the authorities adopted, through the enactment of the National Construction Authority Act 2011, is the National Construction Authority. The National Construction Authority (NCA) was formed to rid the sector of rogue contractors and put in check poor performance of the construction sector through consolidation of tasks involved in the approval of the construction process (Kagai, 2012). It is also mandated to inspect and monitor construction process in Kenya as detailed in the Physical Planning Act. Other responsibilities of the NCA included to prescribe the qualifications or other attributes required for registration as a contractor, promote, stimulate and assist in the exportation of services connected to the construction industry, promote quality assurance in the construction industry, encourage standardization and improvement of construction techniques and materials, provide, promote, review and coordinate training programs organized by public and private accredited training centers for skilled construction workers and construction site supervisors, accredit and certify skilled construction workers and construction site supervisors.

The Government of Kenya, through the Parliament of Kenya also enacted the Built Environment Act 2012 which formed the Building Authority of Kenya. The Authority is mandated through the Act to bring sanity and order back to the construction industry. By establishing minimum construction standards and practices.

However, despite these good intentions as proscribed by these Acts of Parliament, serious challenges of implementation and enforcement of the Act's and their regulations and policies still abound impacting greatly on the performance of construction projects output.

Most developers, contractors and consultants will also normally disregard prescribed laws and policies, possibly due to underhand dealings and cost implications involved.

#### **2.4 Project funding and performance of construction projects**

A project's life cycle has no stage specifically labeled "funding," yet funding affects each stage of a construction project (Sullivan, 2017). Financial capacity is an important element in the construction industry since most of these projects are capital intensive and requires a great deal of financial strength to implement them (Asinza, Kanda, Muchelule, & Mbithi, 2016). Funding challenges affect the performance of a project's since, most projects are implemented within constraints of approved budget or approved costs to be incurred and are subject to availability of funds (Abdul-Rahman, Wang, Takim, & Wong, 2010).

Issues regarding availability of funds cuts across various phases of a project from planning, design, implementation, monitoring and evaluation of completed projects. Funding of projects play an important role in ensuring that projects are completed as per scope and within scheduled timeline. Availability of funds provides the much-needed impetus during implementation of a project. Like any other project resource, finances are limited and scarce resource. Yet, funding challenges and lack of adequate cash flow during execution of a project adversely affect the quality of a completed project. Abdul-Rahman, Wang, Takim, & Wong (2010) reported that financial issues in construction projects lead to consequences that retard the development of a project and influence the overall quality output of the product. They identified some of funding challenges to include a client's poor financial status and poor project financing skills, difficulties in obtaining project financing opportunities, contracting consultants and contractors based on low cost value of business but with poor financial background.

(Sullivan, 2017) posits that early consideration of project funding can accelerate project

development and ensure that it is completed within time, budget, scope and to desired quality. Some of the issues that affect a project performance such as delays, poor workmanship, among other factors can be attributed to lack of funds or a lowering of funding priority for the project.

Contractors need to have the financial capability to be able to implement projects they have been awarded (Asinza, Kanda, Muchelule, & Mbithi, 2016). They identified government projects in which, the government often delay in releasing funds for completed projects. In such cases, if a contractor is not prepared with other sources of funding for implementation of the project, delays and substandard works results. (Busolo & Ombuki, 2014) found that contractors in Mavoko Municipality in Kenya relied on clients to release payment for construction of houses and these led to compromising of project performance and causing delays.

Inadequate funding for a project hinders contractors from employing skilled labour and acquiring materials of the right quality and quantity, procuring good quality machinery, factors that contribute to performance problems in the construction industry (Asinza, Kanda, Muchelule, & Mbithi, 2016). Some contractors substitute high quality materials for cheap and substandard materials to save on costs of construction projects, while some employ cheap labour and unqualified staff to save on project costs but which ultimately affect project performance (Obuya, 2012).

## **2.5 Construction inputs and performance of construction projects**

Construction inputs such as materials, equipment and labour play a vital role determining overall performance of a construction project.

Materials represent a major expense in projects. A project utilizes variety of construction materials during execution of projects. Materials, in their various nature such as raw materials or processed materials, components or parts, play a significant role in determining performance of projects (Cao, 2010). The cost of construction material in a construction project may range from 30 – 80 % of total construction cost making it a prime uncertainty in a construction project (Ahmed, 2017).

The quality of the materials used in any building is very important, and a flaw in even just one of

them could have disastrous consequences (Wairimu, 2014). Poor quality materials affect performance of structures, compromises their structural integrity and shorten the lifespan of completed project, causing hefty economic losses to developers. Quality requirements are therefore becoming more stringent for construction materials (Cevallos, Ávila, & Aldaz, 2016).

Cevallos, Ávila, & Aldaz, (2016) further stated that construction materials must meet minimum quality standards to ensure proper mechanical behaviour and not reduce the lifespan of projects. They indicated that non-compliance with construction quality specifications of construction materials promotes rapid deterioration and considerable damage to civil works. In their study of construction materials in Chimborazo, Ecuador, they identified that 18% of pathological problems found in concrete and masonry buildings including moisture or leaks in walls or slabs, waste residue, poor strength capacity and premature failure of concrete elements, and other quality problems present during construction and/or service phase are attributed to the quality of building materials. There are no quality assurance and control standards adopted during selection and utilization of construction materials in construction projects nor laboratory reports that verify the quality of construction materials used and the final product (Lakshmi, 2015). Cost and availability of materials thus plays a major role in project delivery.

Materials management is another important element during execution of construction projects (Carnegie Mellon University, 2015). However, most projects lack an elaborate and proper materials management system. Poor materials management often result in increased costs during implementation of projects (Patel & Vyas, 2011). Without a proper functioning materials management system, issues such as unavailability of good quality construction materials with reasonable market prices, deterioration of materials during storage, theft of materials could arise, resulting in project implementation delays with the ultimate effect on overall project performance (Rustom & Amer, 2011). Ineffective material management cause inevitable loss for a construction project altogether (Ahmed, 2017).

The construction industry is one of the world's largest and most challenging industries in terms of management of its Human Resource. Labour have an important role toward improving performance of construction project. Highly experienced labor is among the main sub-factors

influencing quality (Rustom & Amer, 2011). Productivity, motivation, wages and job opportunities greatly impact the Labour Market (Aadal, Fard, Rad, Sabet, & Morshedi, 2014).

The construction industry is a key sector of the national economy for countries all around the world, as traditionally it took up a big portion in nation's total employment and its significant contribution to a nation's revenue as a whole (Attar, Gupta, & D.B.Desai). Most construction projects are adversely affected by the relationship managers have with their employees, who form the bulk of the human resource in any construction project. How the employees are treated, the salaries they get and any motivation for work available to them greatly influence their productivity at work, which in turn influence quality of work they perform, hence, performance of projects delivered. Therefore, it can be deduced that Human resource has a strategic role for productivity increase of any project. According to (Attar, Gupta, & D.B.Desai) construction industries are still facing number of problems regarding the low wages and salaries, low productivity, poor safety and insufficient quality of the workforce. Productivity of the entire workforce is the one of the most important factor that affect overall performance of any small or medium or large construction industry. (Attar, Gupta, & D.B.Desai) reckons that the workforce or labour is weakest link between planning and implementation of projects and that they are instrumental in steering a project to completion, assuming other factors such as cost are not an issue to the project proponents. They stated that it is important for Project Managers to study and identify those risk factors that are likely to influence employee relations and that can affect labour productivity. Where productivity is improved cost overruns are reduced, poor workmanship is mitigating, quality is guaranteed giving overall best performance of project. Effective use and proper management regarding labour is very important in construction operations without which those activities may not be possible (Attar, Gupta, & D.B.Desai).

It is important for Project Managers to effectively plan for construction project labour requirement. Labour is one of the most expensive components of a project that can greatly jeopardize project finances if not effectively planned. It amounts to about 30% of the project endeavor and if not planned, Project Managers may be hit with millions of shillings in construction claims because of inefficiency factors impacting labour (Intergraph, 2017). According to (Intergraph, 2017), good construction planning should consider and track labour factors in the original work scope to

accurately reflect all the conditions that are used to estimate and fund a project, as well as to eliminate or minimize the impact on productivity, which may directly affect construction costs.

Liang Shilian (2010) posits that construction equipment are essential facilities in the construction industry. Equipment reflect construction power of a construction company. Adequate availability of construction equipment for a project endeavor has direct bearing and impact on the project progress and performance of construction projects. Selection of the appropriate type, size, and purpose of construction equipment often affects the required amount of time and effort and job-site productivity of a project (Aadal, Fard, Rad, Sabet, & Morshedi, 2014). A construction equipment need be sound and serviceable and not prone to breakdowns that may lead to downtime. It is therefore prudent that project managers, construction planners and site managers are familiar with the major types of equipment most commonly used in a construction site. To increase job-site productivity and ensure quality for the construction work is achieved, it is beneficial to select equipment that is in good condition and with proper characteristics and a size most suitable for the work conditions at a construction site.

A project manager is required to be knowledgeable in selecting construction equipment in accordance to technological advancement, use and applicability, economic rationality, performance (reliability, efficiency, effectiveness), ease of utilization and safety (Kathomi, 2016).

## **2.6 Stakeholder involvement and performance of construction projects**

The construction industry is an intertwined web of various players including the clients, developers, contractors, consultants, the government and affiliated bodies, the public stakeholders and the various professionals within the construction sector (Wairimu, 2014). One of the most critical aspects of managing a project is doing what's necessary to develop and control relationships with all individuals and stakeholders that the project impacts (Kihoro & Waiganjo, 2015). Every project has stakeholders who form the "human element" of a project management paradigm (www.ITtoolkit.com, 2017). Stakeholders are categorized into internal and external stakeholders. Therefore, Stakeholder identification, analysis, engagement and management are critical to the success of a construction project (Khatera, 2014). By successfully managing stakeholders, project managers can mitigate issues that would otherwise affect the performance of a project and culture



a healthy project environment in which a project is implemented (Kihoro & Waiganjo, 2015).

A project is successful when it achieves its objectives and meets or exceeds the expectations of stakeholders (Bpayne & Watt, 2016). Stakeholders involvement is widely acknowledged as a key component in project management process (Nyabera, 2015). Stakeholder involvement is the process through which stakeholders influence and share control over development initiatives and the decision and resource which affect them (World Bank, 2006). Project managers need to enable a healthy stakeholder involvement during implementation of projects supported by an emphasis on quality relationships rooted in trust and structure and achievable expectations (Kihoro & Waiganjo, 2015).

It is very costly to ignore stakeholder's expectations, and this can hugely impact the project negatively in terms of delay in deliveries and in compromising a projects overall performance (www.ITtoolkit.com, 2017). A project manager is required to manage the influence of stakeholders in relation to project requirements by balancing the interests of the stakeholders and the requirements of the project (Chandana, 2017).

However, real challenges abound in stakeholder management and their involvement in project implementation (Ndunda, Paul, & Mbura, 2017). Ndunda, Paul, & Mbura (2017) noted that the challenge exists in that project proponents, clients, the government, consulting firms, contractors, people impacted by the change directly or indirectly such as local communities hold different views on success, failure and quality output of projects. Ndunda, Paul, & Mbura (2017) explain that this challenge is not just an issue between these various stakeholder groups, but also within the groups themselves and in their capacities have the power to influence the direction a project takes.

Considering a mega construction project, construction work can be allowed to proceed without people's involvement (Lau & Kong, 2015). Undesirable effects may arise from key project stakeholder; these may appear minor and insignificant but are very complicated to deal with giving rise to big problems for the project which will affect the progress of the project and performance output of the project (Lau & Kong, 2015). Warning signs that stakeholder management is suffering

include missed deadlines, scope creep, confusion, conflict during project execution. Often this is indicative of competing priorities, a lack of focus, or a lack of commitment and it requires a communication-based approach to resolve the underlying issues, manage expectations, manage the information that people get, their perceptions, clarify the kind of feedback that is needed and minimize surprises (Kihoro & Waiganjo, 2015).

The project manager's goal is to leverage stakeholder relationships and build coalitions that foster project success and ensure that stakeholders get what they need, can see business value in the results, and identify the project as an overall positive experience (Kihoro & Waiganjo, 2015).

## **2.7 Theoretical Framework**

Zero Defects concept theory and Six Sigma concept theory will be used in this study as they are relevant to enable the explanation of the literature according to the objectives.

### **2.7.1 Zero Defects Concept Theory**

This study was informed by the Zero Defects Concept Theory pioneered by Philip Crosby in 1962. In his definition of quality, Philip Crosby opens the discourse on quality by stating that quality may not be a gift it is free (Crosby P. B., *Quality Is Free*, 1979). What makes quality seem costly is all the “un-quality” things. The un-quality things being all the actions that involve not doing jobs right the first time (Crosby P. B., *Quality Is Free*, 1979). He goes further to say that whereas quality is free, in real life quality is not certain, it is something quite different (Crosby P. B., *Quality is free: the art of making quality certain.* , 1980). In his development of the Zero defects concept he emphasizes that to make quality certain in uncertain times, it is imperative that quality is quantified, and put back to work (Crosby P. B., *The Absolutes of Leadership.* , 1982). Crosby argues that to define quality as bad, good, low or high is meaningless. He argues that the true meaning of quality is conformance to a standard. He further argues that since quality is measured against a performance standard it indeed can be achieved, and as such reversing the unquestioning acceptance of human error as a normal by-product of personnel effort. Crosby argues that since the performance standard is known, quality can be arrived at through prevention of errors, hence Zero defects (Crosby P. B., *Quality Is Free*, 1979).

Zero defects, therefore, is an organized effort to eliminate defects attributable to human error, by setting a performance standard against which products can be checked for conformance and dedicating concerted effort to ensure personnel do their jobs right the first time every time thus prevention of errors. It is a quality management philosophy that appeals to the individual's pride of workmanship and Self-interest (Office of The Assistant Secretary of Defense, 1965).

Philip Crosby outlined the Zero defects quality management philosophy in fourteen steps: management commitment; quality improvement team; quality measurement; cost of quality evaluation; quality awareness; corrective action; establish an ad-hoc committee for the zero defects programme; supervisor training; having a zero defects day; setting goals; error cause removal; recognition of quality performance by personnel; setting up quality council; and undertaking the whole process of quality management all over again.

### **2.7.2 Six Sigma Concept Theory**

The study is also informed by Six Sigma Concept Theory developed by Bill Smith in 1986. Six Sigma is an ideal measurement of the quality, known as 3.4 defects per one million opportunities (DPMO); or a success rate of 99.999660% (Thakore, Dave, Parsana, & Solanki, 2014). A Six Sigma process is one in which 99.999660% of products manufactured are statistically expected to be free of defects or the 3.4 defective parts per Million opportunities. Hence, Six Sigma measures the capability of a process to produce defect-free outputs, or quality products (Verma, 2014). Six Sigma approach purposes to reduce variance-variability in processes, to provide products or services which are more reliable and with fewer errors (Thakore, Dave, Parsana, & Solanki, 2014).

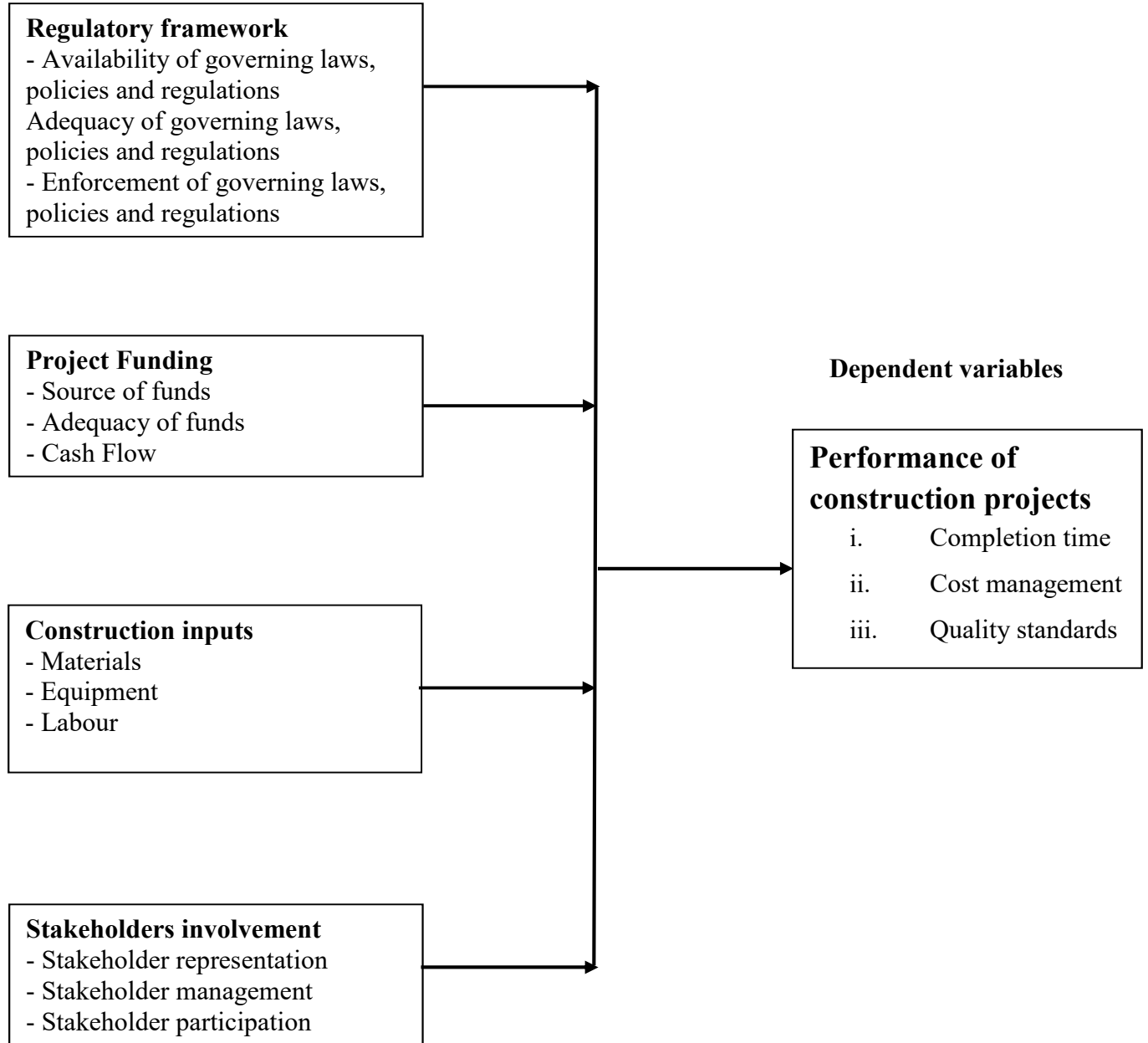
Six Sigma's aim is to eliminate waste and inefficiency, thereby increasing effectiveness and efficiency and thereby, performance. It is a business-driven, multi-dimensional structured approach for enhancing and improving process controls, reducing process variability, lowering defects, reducing costs and maximizing financial gains through increased profits, increasing quality output of products and /or services and ultimately, increasing customer satisfaction. The concept of quality performance of construction projects is vital for delivered projects.

Zero defects and Six Sigma concept theories contribute to the body of knowledge of quality

management and improvement in this study. Zero defects concept postulates that all waste existing in a project is eliminated in the very first go itself. Six Sigma generates sustained success, sets a performance goal for everyone, enhances process control, accelerates the rate of improvement, promotes a company's financial being by increasing its revenue due to improved performance, promotes learning and cross-pollination, executes strategic change and enhances value to customers. All these processes improve services and therefore, there is improvement in quality.

## 2.8 The Conceptual Framework

### Independent variables



**Figure 2: Conceptual Framework for factors influencing performance of construction of power generation infrastructure projects in Kenya**

A conceptual framework is an explanation of the relationships between the variables for the study. Figure 2 provides conceptual framework for this study indicating the relationship between the independent and dependent variables.

## 2.9 Research gaps

**Table 2. 1: Summary of findings and research gaps**

<b>Author</b>	<b>Findings</b>	<b>Research gaps</b>
Gichuki Isaac Kariuki, (2012)	Factors affecting project delivery were identified to include product maintenance, customer care, customer satisfaction and effect of product quality on delivery of projects	Research did not determine factors influencing performance of construction projects. The research was limited to Kenya Airports Parking service
Kaniaru Sammy (2014)	Factors affecting performance of construction projects were identified to be Project Manager's competence, competition during tendering stages, time allocation during construction, client demands	Research did not study factors influencing performance of construction projects
Kharey Ali Yarrow (2017)	Findings of the study found a strong relationship between financial resources, management support and community support in the successful implementation of Electricity Power Generation expansion projects in Kenya	The study focused mainly on financial resources, management support community support.
Shammah Kiteme Munyoki (2014)	Determined that projects completion is mainly influenced by contract duration, planning, supervision and the type of the project	Did not address how project performance during implementation of construction projects influence project completion

## **2.10 Summary of literature**

The construction industry is complex as it is challenging. Managing a construction project is equally very challenging in ensuring that the objectives of the endeavour are met. The construction industry plays an important role in the economy of a country, contributing significantly to the GDP of the country and contributing to employment, both directly and indirectly. It is through construction projects that a country builds its infrastructure, which most often, are long term capital investments projects. However, the sector is plagued by poor performance due to factors such as poor planning and design, lack of adequate funding, lack of management oversight, inspection and supervision of the construction projects, poor workmanship, use of substandard materials, corruption, negative influence from stakeholders, project delays, lack of adequate and committed project resources, volatile political environment, unfavorable economic conditions, conflict with stakeholders, ever changing and not adapting to latest technology among other factors.

While traditional projects have been determined successful because it is completed in time and within budget, it is also important to consider quality delivery of projects. Most factors mentioned have direct bearing on project performance. Project owners have in recent times been taking keen interest in project performance, signifying that performance of construction projects shall also be main input into project objectives.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter identifies research methodology to be applied in this study, procedures and techniques that was used in the collection, processing, analysis and presentation of data. It covers the type of research design to be used, target population, sample size and sampling procedures, research procedures, data collection instruments, research analysis methods and pre-testing of instrument. It also focuses on validity and reliability of instruments, ethical issues and operational definition of terms

#### 3.2 Research Design

This research study adopted descriptive survey research design to gather information on factors influencing performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, Olkaria Naivasha. Descriptive research was considered suitable for this study as it describes systematically and accurately facts and characteristics of a given population or area of interest to discover associations and/or relationships between or among selected independent and dependent variables (Dulock, 2013). The research study incorporated quantitative approach. The research design was considered in this study to investigate the factors influencing performance of construction of power generation infrastructure projects.

#### 3.3 Target Population

Study population is the entire set of objects, things and people under consideration in a research study, normally referred to as the target group or population. Creswell (2014) defines target population as the total number of all units, subjects or the total environment of interest possessing certain specified characteristics on which a sample seeks to draw inferences.

The target population in this research to which findings were generalized were key players and stakeholders at Kenya Electricity Generating Company Limited PLC (KenGen), Olkaria Geothermal Field, Naivasha, Nakuru County as shown in table 3.1. They include the KenGen



Project Managers, KenGen technical staff (Engineers, Architects, Quantity Surveyors, Technicians and Foremen), consultants and contractors.

**Table 3. 1 Target Population**

<b>Category</b>	<b>Frequency</b>	<b>Percentage (%)</b>
KenGen Project managers	5	7
KenGen Technical Staff	50	67
Consultants	10	13
Contractors	10	13
<b>Total</b>	<b>75</b>	<b>100</b>

**Source: (Kenya Electricity Generating Company Limited (July 2018))**

The type of population was considered to get past and current information from people who have directly participated and have had an impact in the implementation of construction projects at KenGen and have from time to time experienced implementation challenges that could affected performance of construction projects.

### **3.4 Sample size and sampling procedures**

This section described how the sample size was determined.

#### **3.4.1 Sample size**

A sample is a representative part of a population (Creswell, 2014). Sample design is the determination of a sample from a given population. It refers to the techniques to be adopt in selecting a sample. It is used to determine an optimum sample size. An optimum sample size fulfills the requirements of efficiency, representativeness, reliability and flexibility (Kothari, 2004).

Kothari (2004) posits that where the target population is small, the entire population can be considered as the sample. He further stated that the complete enumeration of all items in the

population is known as a census inquiry. Therefore, the target population was considered as the sample in this study.

**Table 3. 2 Sample size by census**

<b>Category</b>	<b>Target Population N</b>	<b>Sample n</b>	<b>Percentage (%)</b>
Project Managers	5	5	7
KenGen Technical staff	50	50	67
Consultants	10	10	13
Contractors	10	10	13
<b>TOTAL</b>	<b>75</b>	<b>75</b>	<b>100</b>

### **3.4.2 Sampling procedure**

Sampling methodology to be applied was be non-probabilistic sampling using purposive sampling method. Purposive sampling was selected because the study had a pre-determined purpose and also the sample population was pre-determined and known to only include people with knowledge in the study and those with no knowledge to the study were not be considered (Oso & Onen, 2005).

### **3.5 Research instruments**

Accurate and systematic data collection is important to conducting research study as this allows collection of information about the study objects. For the purpose to this study, primary data collection instrument employed was be self-administered structured questionnaire. The choice of the questionnaire was due to the descriptive survey research design that was adopted for this study. The questionnaire was prepared based on the research objectives to ensure that all required and relevant information were accurately captured.

#### **3.5.1 Pilot testing of the instruments**

The aim of this pilot is to test research instruments to be used in the main study for accuracy, validity and reliability. The pilot testing involved ten KenGen staff KenGen Olkaria. These respondents did not take part in the main study to avoid chances of bias.

### **3.5.2 Validity of instruments**

(Kothari, 2004) postulates that validity is the degree to which an instrument measures what it is supposed to measure; the extent to which differences found with a measuring instrument reflect true differences among those being tested. Instruments to be used in this research were subjected to expert judgement including the University of Nairobi Supervisor.

### **3.5.3 Reliability of instruments**

Reliability of a measuring instrument is its ability to give or provide consistent results. (Kothari, 2004). It is important that a measuring instrument provides the same results at all given times while measuring under the same conditions. (Kothari, 2004) identified two types aspects of reliability viz. stability aspect of reliability which is concerned with securing consistent results with repeated measurements of the same person and with the same instrument and equivalence aspect of reliability which considers how much error may get introduced by different investigators or different samples of the items being studied.

In this study, reliability was improved by standardizing the conditions under which the measurement were to take place and considering careful measurement with no variation from group to group, by using trained and motivated persons to conduct the research and also by broadening the sample of items used (Kothari, 2004).

To test reliability a test re-test method was considered to the same categories of respondents within a carefully determined duration of time to examine the consistency of response between the two tests in a pilot study.

## **3.6 Data collection procedure**

Approval was obtained from the relevant authorities to undertake this research. Self-administered questionnaires were administered by hard copy. The target population to be considered were college educated respondents who included KenGen staff, consultants and contractors; those who were able to read, understand and give responses to questions.

### **3.7 Data analysis techniques**

Primary data collected was first be processed by organizing, editing, coding, classification and tabulation of the data. All collected and organized data were then validated. During the validation process, data collection instruments were checked for completeness, accuracy and to determine the required number is submitted for analysis. During organization and edition of the collected data, special emphasis was considered to ensure that there were no omissions and / or errors. The data was checked for legibility and whether the submitted responses were adequate. Organized data were then coded as appropriate in preparation for data analysis.

The study had both quantitative and qualitative data. Quantitative data was analyzed using descriptive and inferential statistics. Descriptive statistics such as frequencies, percentages and mean scores were used to analyze quantitative data. Inferential statistics such Karl Pearson correlation analysis was also be used to analyze quantitative data. Statistical Package for Social scientist (SPSS) version 20 was used as an aid in data analysis. Results of data analysis were presented in tables.

Content analysis was used to analyze qualitative data. Responses from open ended questions in the questionnaire were categorized based on emerging themes. The emerging themes were then used to supplement quantitative data and make conclusions in the study.

### **3.8 Ethical Issues**

The study took into consideration strict adherence to ethical issues. The research was carried out honestly and without deception, distortion or misleading or manipulation of data of any part of the research. Conclusions were drawn based on objective inferences and as guided by the data collected.

Respondents were duly informed as to the purpose of the study. The principle of voluntary participation was implemented. Respondents were not coerced into participating in the research. Respondents who voluntarily took part in the research were guaranteed confidentiality during the entire process. Their anonymity was also guaranteed.

### 3.9 Operationalization of the variables

**Table 3. 3 Operationalization of variables**

Nos	Objectives	Variables	Indicators	Scale of measurement	Data analysis technique	Tools of analysis
1	To assess the influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company	Regulatory framework	i. Availability of governing laws, policies and regulations ii. Adequacy of governing laws, policies and regulations iii. Enforcement of governing laws, policies and regulations	- Nominal, - Ordinal	Descriptive Statistics Inferential Statistics	Likert scale, Karl Pearson's rank correlation
2	To establish the influence of project funding on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company	Project funding	i. Source of funding ii. Budget allocation and cash flows iii. Adequacy of funds	- Nominal, - Ordinal	Descriptive Statistics Inferential Statistics	Likert scale, Karl Pearson's rank correlation
3	To determine the influence of construction inputs on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company	Construction inputs	i. Materials ii. Equipment iii. labour	- Nominal, - Ordinal	Descriptive Statistics Inferential Statistics	Likert scale, Karl Pearson's rank correlation

<b>Nos</b>	<b>Objectives</b>	<b>Variables</b>	<b>Indicators</b>	<b>Scale of measurement</b>	<b>Data analysis technique</b>	<b>Tools of analysis</b>
<b>4</b>	To examine the influence of stakeholder's involvement on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company	Stakeholder involvement	i. Stakeholder representation ii. Stakeholder management iii. Stakeholder Participation	- Nominal, - Ordinal	Descriptive Statistics Inferential Statistics	Likert scale, Karl Pearson's rank correlation
<b>5</b>	Factors influencing performance of construction of power generation infrastructure projects in Kenya: a case of Kenya Electricity Generating Company, Olkaria, Naivasha	Dependent variable	i. Completion time ii. Cost management iii. Quality standards	- Nominal, - Ordinal	Descriptive Statistics Inferential Statistics	Descriptive survey,

## **CHAPTER FOUR**

### **DATA ANALYSIS, PRESENTATION AND INTERPRETATION**

#### **4.1 Introduction**

This chapter contains results of data collected, data analysis, presentations and interpretation of findings. The objective of the study were to assess the influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, to establish the influence of project funding on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, to determine the influence of construction inputs on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, and to examine the influence of stakeholder's involvement on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. Descriptive statistics have been used to describe respondents' characteristics.

#### **4.2 Questionnaire return rate**

The response rate was 100%. All the 75 questionnaires that were administered to the sample size of 75 respondents were returned filled. This response return rate was possible because the questionnaires were administered to each respondent in person to ensure that every sampled respondent took part in the study. Follow ups thorough phone calls were also made to the respondents to remind them to complete the questionnaire.

#### **4.3 Data Analysis**

Descriptive statistics were used to analyze and present the data. Questions in the questionnaires were discussed after which related data was analyzed and interpreted. The data was analyzed in different categories as per the layout of the questionnaire. The data was presented through frequency tables with respective calculated percentages. This was then followed by a narrative analysis.

#### **4.4 Demographic characteristics of the respondents**

The respondent's demographic information is analyzed here as they were drawn from various categories. This concerned elements regarding gender, age, working experience, highest level of

education, current designation and years of experience in that capacity. These social attributes were relevant to the study in providing information that is valid and reliable to the study.

#### 4.4.1 Role of respondents in project implementation at Kenya Electricity Generating Company PLC

Respondents were requested to state their role in the implementation of construction projects at KenGen. This was necessary to appreciate the various roles that the respondents play in the implementation of construction projects at KenGen.

**Table 4. 1: Role in project implementation at KenGen**

<b>Role in project implementation at KenGen</b>	<b>Frequency</b>	<b>Percentage (%)</b>
KenGen Project Manager	5	7
KenGen Technical Staff	50	67
Consultant	10	13
Contractor	10	13
<b>Total</b>	<b>75</b>	<b>100</b>

5 KenGen Project Managers, 50 KenGen technical staff, 10 consultants and 10 contractors working on various projects at KenGen, therefore, participated in this survey.

#### 4.4.2 Gender of respondents

The following was the distribution of gender among the respondents;

**Table 4. 2: Gender of respondents**

<b>Gender of respondents</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Male	57	76
Female	18	24
<b>Totals</b>	<b>75</b>	<b>100</b>



Study findings indicated that 57 respondents, representing 76% of total respondents were male while 18 respondents, representing 24% of the respondents were female. The respondents, therefore, comprised mostly of males at 76%.

#### 4.4.3 Age of respondents

The respondents were requested to indicate their ages from among choices of age classes provided in the questionnaire.

**Table 4. 3: Age of respondents**

<b>Age of respondents</b>	<b>Frequency</b>	<b>Percentage (%)</b>
20 – 29 Years	21	28
30 – 39 Years	29	39
40 – 49 Years	19	25
Above 50 Years	6	8
<b>Totals</b>	<b>75</b>	<b>100</b>

The findings of the study indicated that 21 respondents, representing 28% of the respondents were between the ages 20 – 29 years; 29 respondents, representing 39% of total respondents were between the ages 30 – 39 years; 19 respondents, representing 25% of the total respondents were between the ages 40 – 49 years, while 6 respondents, representing 8% of the total respondents were above 50 years of age. The findings established that majority of the respondents were aged between 30 – 39 years, followed by 20 – 29 years, 40 – 49 years and lastly, over 50 years.

#### 4.4.4 Level of education of respondents

The respondents were requested to indicate their highest academic qualification from among choices of academic qualification classes provided in the questionnaire.

**Table 4. 4: Level of education of respondents**

<b>Level of Education of respondents</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Ordinary Diploma	14	19
HND	7	9
Bachelor's Degree	30	40
Master's Degree	22	29
Doctorate	2	3
<b>Totals</b>	<b>75</b>	<b>100</b>

The research findings indicated that all the respondents at least had attended college. Bachelor's degree was mostly represented with 30 respondents representing 40% of the total respondents. This was followed closely by 22 respondents who had attained their master's degree, representing 29% of the total respondents. 14 respondents (19%) had an ordinary diploma while 7 respondents (9%) had attained Higher National Diploma. Only 2 respondents in this study (3%) had Doctorate Degree. The findings indicated that all the respondents have attained tertiary education, implying high literacy levels among the respondents.

#### **4.4.5 Overall working experience of respondents**

The respondents were requested to indicate their overall working experience from among academic qualifications choices provided in the questionnaire.

**Table 4. 5: Overall working experience of respondents**

<b>Overall working experience</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 2 Years	5	7
2 – 5 Years	9	12
6 – 10 Years	20	27
11 – 20 Years	23	31
21 – 30 Years	14	19
Above 30 Years	4	5
<b>Totals</b>	<b>75</b>	<b>100</b>

The respondents' experience in construction industry was aimed to determine whether they have handled several projects long enough to be able to inform an observable pattern that can be deduced to form a research opinion. The study findings obtained that 23 respondents (31%) had experience between 11 – 20 Years. 20 respondents (27%) had experience between 6 – 10 years while 14 respondents (19%) between 21 – 30 years.

#### **4.4.6 Current designation**

The respondents were requested to indicate their current designation in the company they represent from among the choices of job designations provided in the questionnaire.

**Table 4. 6: Current designation of respondents**

<b>Current designation of respondents</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Foreman	9	12
Technician	12	16
Engineer	24	32
Architect	9	12
QS	13	17
Project Manager	8	11
Other (state)	0	0
<b>Subtotal</b>	<b>75</b>	<b>100</b>

The respondents' current designation was aimed at determining their current active responsibility in the construction industry. This was to provide insight into the role they play in shaping the overall performance of a construction project. This was also intended to ensure only specific job responsibilities were surveyed dependent on their influence in the industry. The finding noted that Engineers were the majority with a total of 24 Engineers surveyed, giving an overall representation of 32%. This was closely followed by 13 Quantity Surveyors (17%); 12 Technicians (16%); 9 Architects, (12%); 9 foremen, (12%), and 8 Project Managers, (11%).

#### **4.4.7 Duration of service of respondents in their current designation**

The respondents were requested to indicate their duration of service in their current designation in the company they represent from among the choices provided in the questionnaire.

**Table 4. 7: Duration of service of respondents in their current designation**

<b>Duration of service of respondents in their current designation</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Below 1 Year	4	5
1 – 3 Years	16	21
3 – 10 Years	34	45
Above 10 Years	21	28
<b>Subtotal</b>	<b>75</b>	<b>100</b>

The respondents' duration of service in their current designation was important to the study. This was aimed at determining whether, with the length of their service in their current responsibility, they have played major roles in shaping the outcome of projects to be able to inform an observable pattern that can be deduced to form a research opinion. The research findings noted that, out of the 75 respondents surveyed, 34 of them had been in their current designation for a duration between 3 – 10 years, forming the majority at 45%. 21 respondents were in their current designation for periods above 10 years, coming in second at 28%. 16 respondents were within 1 – 3 years (21%) while 4 respondents were below 1 year (5%). This therefore implied that majority of the respondents have been in their current designation long enough to be able to provide responses to the survey that are accurate.

#### **4.5 Regulatory Framework and performance of construction projects**

Project are required to be implemented within the realm of provided and applicable laws, policies and regulations. Respondents were asked questions related to the regulatory framework that influence the performance of power generation infrastructure projects in Kenya with the case of Kenya Electricity Generating Company PLC (KenGen) at Olkaria.

#### 4.5.1 Familiarity with laws, policies and regulations

Respondents were asked their familiarity with laws, policies and regulations that govern the construction industry in Kenya.

**Table 4. 8: Familiarity with laws, policies and regulations**

<b>Are you familiar with laws, policies and regulations that govern the construction industry</b>	<b>Frequency</b>	<b>Percent</b>
Yes	72	96.0
No	3	4.0
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the data collected as presented in table 4.8, it was noted that 72 of the respondents, (96%) responded that they were familiar with applicable laws, policies and regulations that govern the construction industry in Kenya; 3 of the respondents (4%) responded that they were not aware of these laws. This could be attributed to their working experience as they all had worked in the construction industry for up to two (2) years or less.

#### 4.5.2 Use of and/or reference to laws, policies and regulations

The respondents were then asked to indicate if they use and/or refer to these laws, policies and regulations during implementation of projects.

**Table 4. 9: Use of and/or reference to laws, policies and regulations**

<b>Do you use and/or refer to these laws, policies and regulations during implementation of projects</b>	<b>Frequency</b>	<b>Percent</b>
Actively	52	69.3
Less actively	20	26.7
Not at all	3	4.0
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the data collected and presented in table 4.9, 52 of the respondents (69%) indicated that they actively use and refer to provided laws, policies and regulations; 20 others (26.7%) responded that they only have less actively use and reference to the laws, policies and regulations; Therefore, a cumulative 96% of the respondents stated that they either actively or less actively use these laws, policies and regulations. The remainder 3 respondents, (4%) indicated that they don't use these documents at all. This could be attributed to their working experience as they all had worked in the construction industry for up to two (2) years or less and having stated in the first question that they were not even aware of the laws governing the construction industry.

### 4.5.3 Enforcement of laws, policies and regulations

Laws, policies and regulations are just documents to gather dust on the shelves if they are not put to active use. Respondents were asked to indicate if they do enforce these laws, policies and regulations during implementation of projects at KenGen, Olkaria.

**Table 4. 10: Enforcement of laws, policies and regulations**

<b>Do you enforce adherence of these laws, policies and regulations during implementation of projects</b>	<b>Frequency</b>	<b>Percent</b>
Yes	52	69.3
Only sometimes	20	26.7
No	3	4.0
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the data collected, 52 respondents, (69.3%), indicated that they do enforce the use of laws, policies and regulations during implementation of projects at KenGen, Olkaria. 20 respondents (26.7%) indicated that they only sometimes enforce the use of the laws, policies and regulations. A cumulative 96% of the respondents therefore agreed that they do enforce adherence to the laws, policies and regulations. Another 3 of the respondents (4%) indicated that they don't enforce the laws, policies and regulations, because they have hardly interacted with them. This could also be attributed to their working experience as they all had worked in the construction industry for up to two (2) years or less and having stated in the earlier question that they were not even aware of the laws governing the construction industry.

#### 4.5.4 Availability of governing laws, policies and regulations

On availability of governing laws, policies and regulations, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influenced performance of construction of power generation infrastructure projects at KenGen.

**Table 4. 11: Availability of governing laws, policies and regulations**

Availability of governing laws, policies and regulations	Frequency	Percent
Very low influence	3	4.0
Low influence	3	4.0
Moderate influence	4	5.3
High influence	7	9.3
Very high influence	58	77.3
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 58 respondents (77.3%) responded that availability of governing laws, policies and regulations very highly influenced the performance of construction of power generation infrastructure projects. Cumulatively, 86.7% stated that availability of laws, policies and regulations highly and very highly influenced the performance of construction of power generation infrastructure projects. 5.3% expressed moderate influence opinion. 4% of the respondents each stated that availability of governing laws, policies and regulations had low and very influence on performance of construction power generation infrastructure projects.

#### 4.5.5 Adequacy of governing laws, policies and regulations

On adequacy of governing laws, policies and regulations, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.



**Table 4. 12: Adequacy of governing laws, policies and regulations**

<b>Adequacy of governing laws, policies and regulations</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	3	4.0
Moderate influence	3	4.0
High influence	8	10.7
Very high influence	60	80.0
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 60 respondents (80%) responded that adequacy of governing laws, policies and regulations had very high influence on the performance of construction of power generation infrastructure projects in Kenya. 10.7% of the respondents expressed high influence opinion, while 4% expressed both moderate influence and low influence opinions. 1.3% of the respondents expressed very low influence opinion. Cumulatively, 90.7% of the respondents expressed that adequacy of governing laws, policies and regulations highly and very highly influenced performance of power generation infrastructure projects at KenGen Olkaria.

#### **4.5.6 Enforcement of governing laws, policies and regulations**

On enforcement of governing laws, policies and regulations, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.

**Table 4. 13: Enforcement of governing laws, policies and regulations**

<b>Enforcement of governing laws, policies and regulations</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	3	4.0
Moderate influence	3	4.0
High influence	5	6.7
Very high influence	63	84.0
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 63 respondents (84%) expressed the opinion that enforcement of governing laws, policies and regulations had very high influence on performance of construction of power generation infrastructure projects. 6.7% of the respondents expressed high influence opinion, 4% expressed moderate influence opinion, 4% expressed low influence opinion while 1.3% indicated very low influence. Cumulatively, 90.7% of the respondents indicated that enforcement of governing laws, policies and regulations highly and very highly influenced performance of power generation infrastructure projects at KenGen Olkaria.

#### **4.5.7 Correlation analysis for regulatory framework and construction project performance**

To establish the relationship between regulatory framework and performance of construction of power generation infrastructure projects, Karl Pearson correlation analysis was undertaken.

**Table 4. 14: Correlation analysis for regulatory framework and construction project performance**

	<b>Correlation analysis</b>	<b>Project Performance</b>
<b>Regulatory Framework</b>	Pearson Correlation	.318(**)
	Sig. (2-tailed)	.005
	N	75

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

The study established that there existed positive correlation between regulatory framework and project performance as correlation coefficient  $r = -0.318$  (\*\*),  $P = 0.005 < 0.01$ . This indicated that

issues of regulatory framework would positively influence performance of power generation infrastructure projects in Kenya.

#### 4.6 Project funding and performance of construction projects

Respondents were presented with factors related to project funding that influence the performance of construction of power generation infrastructure projects in Kenya with the case of Kenya Electricity Generating Company PLC (KenGen) at Olkaria.

##### 4.6.1 Source of funds

On source of funds, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.

**Table 4. 15: Source of funds**

<b>14A - Source of funds</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	5	6.7
High influence	11	14.7
Very high influence	56	74.7
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 56 respondents (74.7%) responded that source of funds had very high influence on the performance of construction of power generation infrastructure projects at KenGen. 14.7% of the respondents expressed high influence opinion, 6.7% expressed moderate influence, 2.7% expressed low influence while 1.3% expressed very low influence. Cumulatively, 89.3% of the respondents indicated that source of project funding had high influence on performance of power generation infrastructure projects at KenGen Olkaria. This was a clear indication that source of funds had a very high influence of performance of construction of power generation infrastructure projects in Kenya.

#### 4.6.2 Adequacy of funds

On adequacy of funds, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.

**Table 4. 16: Adequacy of funds**

<b>Adequacy of funds</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	1	1.3
Moderate influence	4	5.3
High influence	8	10.7
Very high influence	61	81.3
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 61 respondents (81.3%) indicated that adequacy of funds had very high influence on performance of construction of power generation infrastructure projects in Kenya. 10.7% expressed high influence opinion, 5.3% expressed moderate influence opinion, while 1.3% expressed both low influence and very low influence opinions. A cumulative of 92% of the respondents expressed high and very high influence opinions. This demonstrated that adequacy of funds had a very high influence of performance of construction of power generation infrastructure projects in Kenya.

### 4.6.3 Cash Flow

On cash flow, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.

**Table 4. 17: Cash flow**

<b>Cash flow</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	4	5.3
High influence	10	13.3
Very high influence	58	77.3
<b>Total</b>	<b>75</b>	<b>100.0</b>

From the findings, 58 respondents (77.3%) indicated that cash flow had very high influence on the performance of construction of power generation infrastructure projects in Kenya. 13.3% indicated high influence, 5.3% indicated moderate influence, 2.7% indicated low influence while 1.3% indicated very low influence. A cumulative 90.7% of the respondents expressed high and very high opinions. This demonstrated that cash flow had a very high influence on performance of construction of power generation infrastructure projects in Kenya.

### 4.6.4 Correlation analysis on project funding and performance of construction projects

To establish the relationship between project funding and performance of construction of power generation infrastructure projects, Pearson correlation analysis was undertaken.

**Table 4. 18: Correlation analysis on project funding and construction project performance**

	<b>Correlation analysis</b>	<b>Project Performance</b>
<b>Project Funding</b>	Pearson Correlation	.328(**)
	Sig. (2-tailed)	.004
	N	75

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

The study established that there existed positive correlation between project funding and project performance as correlation coefficient  $r=0.328^{(**)}$ ,  $P=0.004 < 0.01$ . This demonstrated that project funding would positively influence performance of power generation infrastructure projects in Kenya.

#### **4.7 Construction inputs and performance of construction projects**

Respondents were presented with factors related to construction inputs that influence the performance of construction of power generation infrastructure projects in Kenya. These were construction labour, materials and equipment.

##### **4.7.1 Construction labour**

On construction labour, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influences performance of construction of power generation infrastructure projects at KenGen, Olkaria.

**Table 4. 19: Construction labour**

<b>Construction labour</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	5	6.7
High influence	14	18.7
Very high influence	53	70.7
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 53 respondents (70.7%) responded that construction labour had very high influence on the performance of construction of power generation infrastructure projects at KenGen Olkaria. 18.7% expressed high influence opinion, 6.7% indicated moderate influence, 2.7% stated low influence while 1.3% indicated very low influence. A cumulative 89.4% of the respondents indicated that construction labour had high and very high influence on performance of construction of power generation infrastructure projects at Olkaria.

#### **4.7.2 Construction materials**

On construction materials, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen Olkaria.

**Table 4. 20: Construction materials**

<b>Construction Materials</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	1	1.3
Moderate influence	3	4
High influence	12	16
Very high influence	58	77.3
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 58 respondents (77.3%) responded that construction materials had very high influence on the performance of construction of power generation infrastructure projects in Kenya. A further 16% expressed high influence. 4% indicated moderate influence while 1.3% indicated both for low influence and very low influence. A cumulative of 93.3% believed that construction materials had very high influence on performance of construction of power generation infrastructure projects at KenGen Olkaria.

#### **4.7.3 Construction equipment**

On construction equipment, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.



**Table 4. 21: Construction equipment**

Construction equipment	Frequency	Percent
Very low influence	1	1.3
Low influence	3	4
Moderate influence	4	5.3
High influence	12	16
Very high influence	55	73.3
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 55 respondents (73.3%) expressed the opinion that that construction equipment had very high influence on the performance of construction of power generation infrastructure projects in Kenya. 16% indicated high influence, 5.3% indicated moderate influence, 4% indicated low influence and 1.3% indicated very low influence. Cumulatively, 89.3% expressed high and very high influence. This was an indication that construction materials do have very high influence of the performance of construction of power generation infrastructure projects at KenGen.

#### 4.7.4 Correlation analysis on construction inputs and performance of construction projects

To establish the relationship between construction inputs and performance of construction of power generation infrastructure projects, Pearson correlation analysis was undertaken.

**Table 4. 22: Correlation analysis for project funding and construction project performance**

Correlation analysis		Project Performance
<b>Construction Input</b>	Pearson Correlation	.323**
	Sig. (2-tailed)	.005
	N	75

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

The study established that there existed a positive correlation between construction inputs and performance of construction projects as correlation coefficient  $r=0.323^{**}$ ,  $P=0.005 < 0.01$ . This

demonstrated that construction inputs would positively influence performance of construction of power generation infrastructure projects in Kenya.

#### 4.8 Stakeholder involvement and performance of construction projects

Respondents were presented with factors related to stakeholder involvement that influence performance of construction of power generation infrastructure projects at KenGen, Olkaria. These were stakeholder representation, stakeholder management and stakeholder participation. They were asked to consider the factors and their influence in construction of power generation infrastructure projects.

##### 4.8.1 Stakeholder representation

On stakeholder representation, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen, Olkaria.

**Table 4. 23: Stakeholder representation**

<b>Stakeholder representation</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	7	9.3
High influence	12	16
Very high influence	53	70.7
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 53 respondents (70.7%) indicated that stakeholder representation highly influenced the performance of construction of power generation infrastructure projects. 16% indicated high influence, 9.3% indicated moderate influence, 2.7% noted low influence while 1.3% expressed very low influence. A cumulative 86.7% of respondents expressed the opinion that stakeholder representation very highly influenced the performance of construction of power

generation infrastructure projects. This was a clear indication that stakeholders representation had the significant effect to highly influence the performance of construction of power generation infrastructure projects at KenGen, Olkaria.

#### 4.8.2 Stakeholder management

On stakeholder management, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influences performance of construction of power generation infrastructure projects at KenGen, Olkaria.

**Table 4. 24: Stakeholder management**

<b>Stakeholder management</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	3	4
High influence	13	17.3
Very high influence	56	74.7
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 56 respondents (74.7%) stated that stakeholder management had very high influence on the performance of construction of power generation infrastructure projects. 17.3% of the respondents indicated high influence; 4% indicated moderate influence; 2.7% indicated low influence while 1.3% indicated very low influence. 92% of the respondents believed that stakeholder management had a very high influence on performance of construction of power generation infrastructure projects at Olkaria. This clearly demonstrated that stakeholder management had high influence on the performance of construction of power generation infrastructure projects.

### 4.8.3 Stakeholder participation

On stakeholder participation, respondents were requested to indicate, in their own opinion, on a Likert scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence, the extent to which this factor influence performance of construction of power generation infrastructure projects at KenGen.

**Table 4.25: Stakeholder participation**

<b>Stakeholder participation</b>	<b>Frequency</b>	<b>Percent</b>
Very low influence	1	1.3
Low influence	2	2.7
Moderate influence	7	9.3
High influence	11	14.7
Very high influence	54	72
<b>Total</b>	<b>75</b>	<b>100</b>

From the findings, 54 of the respondents (72%) indicated that stakeholder participation very highly influenced the performance of construction of power generation infrastructure projects. 14.7% of the respondents indicated high influenced, 9.3% indicated moderate influenced, 2.7% stated low influenced while 1.3% noted very low influenced. Cumulatively, 86.7% stated that stakeholder participation had high influence on the performance of construction of power generation infrastructure projects at KenGen, Olkaria.

### 4.8.4 Correlation analysis on stakeholder involvement and performance of construction projects

To establish the relationship between stakeholder involvement and performance of construction of power generation infrastructure projects, Pearson correlation analysis was undertaken.

**Table 4.26: Correlation analysis for stakeholder involvement and construction project performance**

<b>Correlation analysis</b>		<b>Project Performance</b>
<b>Stakeholder Involvement</b>	Pearson Correlation	.301 **
	Sig. (2-tailed)	.009
	N	75

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

The study established that there existed positive correlation between stakeholder involvement and performance of construction projects as correlation coefficient  $r=0.301^{**}$ ,  $P=0.009 < 0.01$ . This demonstrated that construction inputs would positively influence performance of construction of power generation infrastructure projects in Kenya.

## CHAPTER FIVE

### SUMMARY OF STUDY FINDINGS, DISCUSSION CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents summary of the study findings, discussions, conclusions and recommendation of the research. The chapter also contains suggestions for further studies that may be carried out in the future.

#### 5.2 Summary of findings

The purpose of this study was to investigate factors influencing performance of construction of power generation infrastructure projects in Kenya: a case of Kenya Electricity Generating Company PLC, Olkaria, Naivasha. The findings are summarized as follows: -

On the first objective, to assess the influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, the study investigated three areas of concern, availability, adequacy and enforcement of governing laws, policies and regulations. On availability of governing laws, policies and regulations, 77.3% of the respondents stated that availability of governing laws, policies and regulations very highly influenced performance of construction of power generation infrastructure projects in Kenya; 9.3% of the respondents stated there was a high influence, followed by 5.3% of the respondents who stated moderate influence; 4% of the respondents stated low influence while a further 4% stated very low influence. On adequacy of governing laws, policies and regulations, 80% of the respondents stated that adequacy of governing laws, policies and regulations very highly influenced performance of construction of power generation infrastructure projects in Kenya; 10.7% of the respondents stated there was a high influence, followed by 4% who stated moderate influence; 4% stated low influence while another 1.3% stated very low influence. On the aspect of enforcement of governing laws, policies and regulations, 84% of the respondents stated that enforcement of governing laws, policies and regulations very highly influenced performance of construction of power generation infrastructure projects in Kenya; 6.7% indicated high influence;

4% indicated moderate influence; 4% of the respondents indicated low influence while another 1.3% indicated very low influence.

On the second objective, to establish the influence of project funding on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, three areas of concern, source of funds, adequacy of funds and cash flows were investigated. On source of funds, 74.7% of the respondents indicated that source of funds very highly influenced performance of construction of power generation infrastructure projects in Kenya; 14.7% indicated high influence, 6.7% indicated moderate influence; while another 2.7% and 1.3% indicated low influence and very low influence respectively. On adequacy of funds, 81.3% of the respondents stated that adequacy of funds very highly influenced performance of construction of power generation infrastructure projects in Kenya; 10.7% stated high influence; 5.3% stated moderate influence, while 1.3% indicated low and very low influence. On cash flow, 77.3% of the respondents stated that cash flow very highly influenced performance of construction of power generation infrastructure projects in Kenya; 13.3% stated high influence; 5.3% indicated moderate influence; 2.7% indicated low influence while another 1.3% indicated very low influence.

In relation to the third objective, to determine the influence of construction inputs on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company, three areas of concern were investigated: construction materials, construction labour and construction equipment. On construction labour had influence on performance of construction of power generation infrastructure projects in Kenya, 70.7% of the respondents stated that construction labour influenced performance of construction of power generation infrastructure projects very highly; 18.7% stated high influence, 6.7% stated moderate influence; while 2.7% and 1% indicated low and very low influence respectively. On construction materials had influence on performance of construction of power generation infrastructure projects in Kenya, 77.3% agreed that construction materials very highly influenced performance of construction of power generation infrastructure projects in Kenya; 16% indicated high influence; 4% stated moderate influence; another 1.3% stated low and very low influence each. On construction equipment had influence on performance of construction of power generation infrastructure projects in Kenya, 73.3% of the respondents agreed that construction equipment very highly influenced performance

of construction of power generation infrastructure projects in Kenya; 16% stated high influence, 5.3% indicated moderate influence; another 4% and 1.3% indicated low and very low influence respectively.

On the fourth and last objective, to examine the influence of stakeholder's involvement on performance of construction of power generation infrastructure projects in Kenya, the study investigated three areas of concern: stakeholder representation, management and participation. 70.7% of the respondents stated that stakeholder representation very highly influenced performance of construction of power generation infrastructure projects in Kenya; 16% expressed high influence opinion; 9.3% indicated moderate influence, while 2.7% and 1.3% indicated low and very low influence. On stakeholder management had influence on performance of construction of power generation infrastructure projects in Kenya, 74.7% agreed that stakeholder involvement very highly influenced performance of construction of power generation infrastructure projects in Kenya; 17.3% indicated high influence, 4% indicated moderate influence, while 2.7% and 1.3% indicated low and very low influence respectively. On stakeholder participation had influence on performance of construction of power generation infrastructure projects, 72% agreed that the stakeholder participation very highly influenced performance of construction of power generation infrastructure projects in Kenya; 14.7% indicated high influence, 9.3% indicated moderate influence, while 2.7% and 1.3% indicated low and very low influence.

### **5.3 Discussion of findings**

Study findings have shown that there is positive correlation between performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company PLC and objectives of this study.

The research established that an average of 80.4% of respondents stated that there was very high influence of regulatory framework on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. This was represented by 77.3%, 80% and 84% of respondents who stated that availability, adequacy and enforcement of governing laws, policies and regulations, respectively, very highly influenced performance of construction of power generation infrastructure projects. This conforms to a study report by Wairau (2014) that



noted that the regulatory framework is an important aspect for any building code in regulating and enhancing performance of projects. The International Labour Organisation, (2001) indicated that the construction industry the world over face various challenges that laws, policies and regulations seek to mitigate. Development and enforcement of these laws, policies and regulations were determined of significant importance as represented by 84% of the respondents. Wairimu (2014) noted that lack of reviewing and/or enforcement of existing laws, policies and regulations and the absence of a competent authority to enforce the laws could be reason behind problems in the construction industry resulting to poor performance of construction projects. To ensure that there is adequate regulation of the construction industry in Kenya, the National Construction Authority (NCA) was formed to rid the sector of rogue contractors and put in check poor performance of the construction sector through consolidation of tasks involved in the approval of the construction process to ensure that all stages of the construction business conforms to the set regulations (Kagai, 2012).

On the issue of project funding, an average of 77.8% of the respondent surveyed stated that project funding very highly influenced performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. Cumulatively, 89.3% of respondents indicated that source of project funds had high and very high influence on performance of construction of power generation infrastructure projects. This is supported by many scholars. According to Asinza, Kanda, Muchelule, & Mbithi (2006), financial capacity is an important element in the construction industry since most of these projects are capital intensive and requires an elaborate and comfortable financial strength to implement. This also agrees with Abdul-Rahman, Wang, Takim, & Wong (2010) who stated that funding challenges affect the performance of a project's since, most projects are implemented within constraints of approved budget or approved costs to be incurred and are subject to availability of funds. Sullivan (2007) stated that early consideration of project funding can accelerate project development and ensure that it is completed within time, budget, scope and to desired quality; issues that affect project performance such as delays, poor workmanship, among other factors can be attributed to lack of funds or a lowering of funding priority for the project.

81.3% of the respondents agreed that adequacy of project funding had very highly influenced performance of construction projects. 10.7% other respondents agreed that adequacy of funds had

high influence on performance of construction of power generation infrastructure projects. Cumulatively, 92% of the respondents opined that adequacy of funds had high influence on performance of construction of power generation infrastructure projects. As reported by Asinza, Kanda, Muchelule, & Mbithi (2016), inadequate funding for a project hinders contractors from employing skilled labour and acquiring materials of the right quality and quantity, procuring good quality machinery, factors that contribute to performance problems in the construction industry. Obuya (2012) noted that to solve their problem of inadequate funding, some contractors substitute high quality materials for cheap and substandard materials to save on costs of construction projects, while some employ cheap labour and unqualified staff to save on project costs but which ultimately affect project performance.

On cash flows, 77.3% of the respondents agreed that cash flow had a very high influence on performance of construction of power generation infrastructure projects while another 13.3% responded that cash flow had high influence. This gave a cumulative of 90.7% of respondents who believed that cash flow had high and very high influence on performance of construction of power generation infrastructure projects. According to Asinza, Kanda, Muchelule, & Mbithi, (2016), contractors need to have the financial capability to be able to implement projects they have been awarded; however, sometimes, most contractors rely on release of funds by clients who often delay in release of funds for project implementation, affecting contractor's cash flow. In such cases, if a contractor is not prepared with other sources of funding for implementation of the project, delays and substandard works often result.

The study sought to determine the influence of construction inputs on the performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. In overall, 73.8% responded that construction input had very high influence on performance of construction of power generation infrastructure projects; 16.9% responded that construction input had high influence; 5.3% indicated moderate influence while 2.7% and 1.3% indicated low and very low influence respectively.

Asked on the specific inputs, 70.7% of the respondents stated that construction labour had the very high influence on performance of construction of power generation infrastructure projects at

KenGen, Olkaria. 18.7% stated that construction labour had high influence. This means, 89.3% of the respondents agreed that construction labour had high and very high influence on performance of construction of power generation infrastructure projects at KenGen, Olkaria. The findings are in line with studies conducted Rustom & Amer (2011) who stated that the construction industry is one of the world's largest and most challenging industries in terms of management of its Human Resource. They stated that construction labour had an important role toward improving the performance of construction projects. Most respondents noted that hiring of qualified and experienced construction labourers and personnel one of the main factors influencing performance of construction projects. One issue that was significantly highlighted is productivity of the entire workforce. Attar, Gupta, & D.B.Desai (2013), stated that where productivity is improved cost overruns are reduced, poor workmanship is mitigated, quality is guaranteed giving overall best performance of construction project.

The respondents were asked on the influence of construction materials on the performance of construction of power generation infrastructure projects at KenGen, Olkaria. 77.3% believed that construction materials had very high influence on performance of construction of power generation infrastructure projects. 16% agreed that construction materials had high influence. Therefore, 93.3% of responded indicated that construction materials had high and very high influence on performance of construction of power generation infrastructure projects. Most respondents cited quality of the materials used in construction projects as key and very important, and defects in materials could have disastrous consequences on the performance of construction projects. Cevallos, Ávila, & Aldaz, (2016) stated that poor quality materials affect performance of structures, compromises their structural integrity and shorten the lifespan of completed project, causing hefty economic losses to developers. Quality requirements are therefore becoming more stringent for construction materials and most respondents believe this is so.

The respondents were also asked on the influence of construction equipment on the performance of construction of power generation infrastructure projects. 73.3% believed that construction equipment had very high influence on performance of construction of power generation infrastructure projects. 16% agreed that construction equipment had high influence. Overall, 89.3% of the respondents agreed that construction equipment had high and very high influence on

performance of construction of power generation infrastructure projects at KenGen, Olkaria. Construction equipment reflect construction power of a construction company. Studies taken by different scholars agrees on this. Liang Shilian (2010) posits that construction equipment are essential facilities in the construction industry. Aadal, Fard, Rad, Sabet, & Morshedi (2014) contends that adequate availability of construction equipment for a project endeavor has direct bearing and impact on the project progress and performance of construction projects. Selection of the appropriate type, size, and purpose of construction equipment often affects the required amount of time and effort and job-site productivity of a project.

The study finally sought to determine the influence of stakeholder involvement on the performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. An average of 72.4% of the respondents agreed that stakeholder involvement had very high influence on performance of construction of power generation infrastructure projects at KenGen, Olkaria. 16% responded that stakeholder involvement had high influence on performance of construction of power generation infrastructure projects. 7.6% responded with moderate influence, while 2.7% and 1.3% responded that stakeholder involvement had low and very low influence on performance of construction of power generation infrastructure projects. Most respondents agreed that stakeholder identifications played a major role in the performance of construction of power generation infrastructure projects. Overall, 86.7% agreed that stakeholder representation had high and very influence on performance of construction of power generation infrastructure projects. 92% of the respondents stated that stakeholder management had high and very high influence on performance of construction of power generation infrastructure projects. Finally, overall 86.7%% of the respondents believed that stakeholder participation had high and very high influence on performance of construction of power generation infrastructure projects. 12% were neutral while 4% believed that this aspect had low influence on performance of construction of power generation infrastructure projects at KenGen, Olkaria. This study, therefore, conforms to finding by scholars such as Kihoro & Waiganjo (2015) who stated that one of the most critical aspects of managing a project is doing what's necessary to develop and control relationships with all individuals and stakeholders that the project impacts since they have the potential to control the outcome of the overall project performance; and Bpayne & Watt (2016) who correctly stated that a project is successful when it achieves its objectives and meets or

exceeds the expectations of stakeholders. Kihoro & Waiganjo (2015) also stated that by successfully managing stakeholders, project managers can mitigate issues that would otherwise affect the performance of a project and culture a healthy project environment in which a project is implemented. The finding also notes that management of stakeholders is of vital importance. According to Chandana (2017), project managers are required to manage the influence of stakeholders in relation to project requirements by balancing the interests of the stakeholders and the requirements of the project. The project manager's goal is to leverage stakeholder relationships and build coalitions that foster project success and ensure that stakeholders get what they need, can see business value in the results, and identify the project as an overall positive experience (Kihoro & Waiganjo, 2015).

#### **5.4 Conclusions**

Good performance of power generation infrastructure projects is important for consideration during formulation of a project. Good performance means projects that are completed in within time, in accordance to scope, costs are properly managed to mitigate cost overruns, and quality is guaranteed. It is, therefore, important for project managers, contractors, consultants, engineers and other technical staff to ensure that factors that influence performance of construction projects are discussed at project inception, and measures taken to ensure that negative effects are mitigated while positive effects are enhanced and promoted.

The study findings determined that there was positive correlation between performance of construction projects and influence of regulatory framework, project funding, construction inputs and stakeholder's involvement on performance of construction of power generation infrastructure projects at Kenya Electricity Generating Company. The positive correlation suggests that when one factor that influences performance of construction of power generation project is impacted negatively and it in turn negatively impact on the project, then this will result to performance challenges on the project being implemented.

#### **5.5 Recommendations**

Based on the findings, the following recommendations were drawn: -

- i. It is recommended that Project proponents and implementation team ensure that they make laws available during implementation of projects and ensure compliance to them.
- ii. It is recommended that project developers firm their source of funds during project formulation or initiation to ensure that the project is not cash trapped during project implementation. It also recommended that the funds need to be adequate for the value of the project. Contractors and consultants as implementors of projects awarded to them by project developers need to ensure that they also have steady and stable cash flow.
- iii. It is recommended that project developers, contractors and consultants employ competent staff. Project Managers and other technical staff should ensure that projects are well supervised, and they can make decisive decision that steer the project successful completion. They will also ensure that quality aspects of the project are achieved. Project managers need to employ efficient materials management systems that will ensure materials are delivered on time and only quality materials are brought to site. Project managers also need to ensure that they employ latest technology equipment on site and relevant to the work it is intended to do. They also need to hire competent and qualified plant operators who can use the equipment efficiently and effectively in implanting the intended purpose.
- iv. Project developers and project managers need to hold stakeholder engagements during the lifetime of the project, and in case it is a community project, then, all throughout the entire operations of the project.

## **5.6 Suggestions for further research**

KenGen as an organization, is mandated to generate electricity through various sources, such as geothermal, hydro, wind and solar. Other sources include nuclear and biomass. Due to this, KenGen is present in many areas within Kenya and Olkaria, Naivasha is just one of the areas that generates electricity through geothermal sources. All these areas are involved in capacity expansions that involve construction and development of new power generation infrastructures. The scope for this study can be, therefore, much wider since this study was taken at only its Olkaria operations. It is worth noting that, there are also Independent Power Producers (IPPs), who are involved in the business of generating electricity through these various sources and who also are involved in the development of power generation infrastructure projects. Clearly, factors

influencing performance of construction of power generation infrastructure projects present themselves differently considering other KenGen areas and other organizations. Therefore, one suggestion for further research is to consider this study in other KenGen areas and other organizations involved in power generation.

Respondents to this research study indicated other factors influencing performance of construction projects aside from those studied and presented in this report. Such factors include corruption, project planning and scheduling, project management supervision, trainings of project personnel, communication, project design, procurement of contractors and consultants among other factors. These are factors that could be studied as factors influencing performance of construction of power generation infrastructure projects.

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## APPENDICES

### Appendix I: Letter of transmittal of data collection instrument

Nicholas Omenya  
Student No. L50/89108/2016  
University of Nairobi,  
Department of Open and Distance E- Learning  
Email: [niqueomenya@gmail.com](mailto:niqueomenya@gmail.com)  
Phone No. 0722 677 894

September 6, 2018.

Resource Development and Infrastructure Manager,  
Kenya Electricity Generating Company Ltd,  
Naivasha, Olkaria

Dear Sir

**RE: REQUEST FOR APPROVAL FOR DATA COLLECTION FOR STUDY ON  
FACTORS INFLUENCING PERFORMANCE OF CONSTRUCTION OF POWER  
GENERATION INFRASTRUCTURE PROJECTS IN KENYA; A CASE OF KENYA  
ELECTRICITY GENERATING COMPANY PLC**

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My name is Nichols Omenya, National Identity No. 23451576, a postgraduate student at the University of Nairobi, Department of Open and Distance Learning, registration number L50/89108/2016. I am currently undertaking a research project as a requirement for award of the degree of Master of Arts in Project Planning and Management. I am carrying out a study on factors influencing performance of construction of power generation infrastructure projects with a focus on Kenya Electricity Generating Company PLC, Olkaria, Naivasha.

The purpose of this letter is to kindly request for your approval to undertake this research within your organization, to allow me to collect data and to request for introduction to your staff, consultants and personnel, who shall be instrumental to me during collection of data. I shall be using two assistants to assist me in collection of the data. Data collected from respondents will be treated with utmost confidentiality and only used for this research. Details of respondents and sources of information shall also be kept strictly confidential.

I look forward to your positive and favourable response. Thank you.

Yours Sincerely,



**NICHOLAS OMENYA**

## Appendix II: Questionnaire

### QUESTIONNAIRE FOR RESPONDENTS

No.	
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#### ***INTRODUCTORY REMARKS***

My name is Nichols Omenya, ID No. 23451576, a postgraduate student at the University of Nairobi, Department of Open and Distance Learning, registration number L50/89108/2016. I am carrying out a research study on factors influencing performance of construction of power generation infrastructure projects in Kenya with a focus on Kenya Electricity Generating Company PLC, Olkaria, Naivasha. I would like to collect data that will assist me in accomplishing the objectives of this study. This is to kindly request that you provide me your honest views and answers to this questionnaire by ticking and/or explaining in the spaces provided. Information provided will be treated anonymously and with utmost confidentiality. Your contribution will be much appreciated.

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#### **SECTION A: GENERAL INFORMATION**

*(Tick (✓) applicable)*

1. What is your role in project implementation at Kenya Electricity Generating Company PLC

- KenGen Project Manager ( )
- KenGen Technical Staff ( )
- Consultant ( )
- Contractor ( )

2. Your Gender

- Male ( )
- Female ( )

3. Your Age (years) Between

- 20 – 29 ( )
- 30 – 39 ( )
- 40 – 49 ( )
- Above 50 ( )

4. Level of education

- KCSE ( )
- Ordinary Diploma ( )
- HND ( )
- Bachelor's Degree ( )
- Master's Degree ( )
- Doctorate ( )

5. Overall Working Experience

- Below 2 Years ( )
- 2 – 5 Years ( )
- 6 – 10 Years ( )
- 11 – 20 Years ( )

21 – 30 Years ( )  
 Above 30 Years ( )

6. Your Current Designation      Foreman ( )  
    Technician ( )  
    Engineer ( )  
    Architect ( )  
    QS ( )  
    Project Manager ( )  
    Other (state) ( ) \_\_\_\_\_

7. How long have you served your company in your current designation above?  
    Below 1 Year ( )  
    1 – 3 Years ( )  
    3 – 10 Years ( )  
    Above 10 Years ( )

**SECTION B: REGULATORY FRAMEWORK**

*[indicate your answer with a Tick (✓)]*

8. Are you familiar with laws, policies and regulations that govern the construction industry?

Yes	
No	

9. Do you use and/or refer to these laws, policies and regulations during implementation of projects at KenGen?

Heavy use	
Limited use	
No use	

10. Do you enforce adherence of these laws, policies and regulations during implementation of projects at KenGen?

Yes	
Only Sometimes	
No	

11. In your own opinion, to what extent do the following factors regarding regulatory framework influence performance of construction of power generation infrastructure projects at KenGen. Rate on a scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence. *[indicate your answer with a Tick (✓)]*

<b>Regulatory Framework</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Availability of governing laws, policies and regulations					
Adequacy of governing laws, policies and regulations					



<b>Regulatory Framework</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Enforcement of governing laws, policies and regulations					

### **SECTION C: PROJECT FUNDING**

12. In your own opinion, to what extent do the following factors with regrade to project funding influence the performance of construction of power generation infrastructure projects at KenGen. Rate on a scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence. [indicate your answer with a Tick (✓)]

<b>Project Funding</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Source of funds					
Adequacy of funds					
Cash flow					

### **SECTION D: CONSTRUCTION INPUTS**

13. In your own opinion, to what extent do the following factors regarding construction inputs influence performance of construction of power generation infrastructure projects at KenGen. Rate on a scale of 1 to 5 where 5 represents very great extent, 4 great extent, 3 moderate extent, 2 low extent and 1 represent very low extent. [indicate your answer with a Tick (✓)]

<b>CONSTRUCTION INPUTS</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Construction labour					
Construction materials					
Construction equipment					

### **SECTION E: STAKEHOLDER INVOLVEMENT**

14. In your own opinion, do project stakeholders have an influence on performance of construction projects at KenGen?

Yes

No

15. In your own opinion, to what extent do the following factors regarding stakeholder's involvement, influence performance of construction of power generation infrastructure projects at KenGen. Rate on a scale of 1 to 5 where 5 represents very high influence, 4 high influence, 3 moderate influence, 2 low influence and 1 represent very low influence. [indicate your answer with a Tick (✓)]

<b>Stakeholders' involvement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Stakeholder representation					
Stakeholder management					
Stakeholder participation					

**SECTION F: PROJECT PERFORMANCE**

16. Do you agree or disagree on the following statements? Indicate on a scale of 1 to 5 where 5 represents strongly agree, 4 agree, 3 neutral, 2 disagrees and 1 represent strongly disagrees. [indicate your answer with a Tick (✓)]

<b>Project performance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Projects should be completed on time					
Projects cost should be managed efficiently					
Projects should be completed to standard and in accordance to available standards					

**SECTION G: OPINION**

17. Please state any one (1) factor that, in your own experience, has contributed to and most significantly influenced performance of construction of power generation infrastructure projects at KenGen.

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**THANK YOU FOR YOUR TIME AND CONSIDERATION**

## Appendix III – National Commission for Science, Technology and Innovation Research Authorization



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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Email: dg@nacosti.go.ke  
Website : www.nacosti.go.ke  
When replying please quote

NACOSTI, Upper Kabete  
Off Wanyuki Way  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/18/33832/25421**

Date: **12<sup>th</sup> October, 2018**

Nicholas Noi Omenya  
University of Nairobi  
P.O Box 30197-00100  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Factors influencing performance of construction of power generation infrastructure projects in Kenya: A case of Kenya Electricity Generating Company, Olkaria, Naivasha,”* I am pleased to inform you that you have been authorized to undertake research in **Nakuru County** for the period ending **12<sup>th</sup> October, 2019**.

You are advised to report to **the Managing Director, Kenya Electricity Generating Company, the County Commissioner and the County Director of Education, Nakuru County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

**GODFREY P. KALERWA MSc., MBA, MKIM  
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The Managing Director  
Kenya Electricity Generating Company.