

**FACTORS INFLUENCING THE COMPLETION OF RENEWABLE ENERGY
INFRASTRUCTURAL PROJECTS: A CASE OF KENGEN COMPANY, NAKURU
COUNTY**

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DECLARATION

This research project report is my original work which has not been presented for an award of a degree in any other university.

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DEDICATION

I dedicate this research work to my Wife Margret and Children Ruth, Dan and Joy for the support during my entire study.

A special appreciation goes to my parents Mr Patrick Ochako (Late) and Mrs.Baskaria Ochako who started this journey many years ago besides the sacrifices they made to ensure successful I got a good start.

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ABBREVIATIONS AND ACCRONYMS

ADB	African Development Bank
ERC	Energy Regulatory Commission
FiT	Feed-in-Tariff
GDC	Geothermal Development Company
GoK	Government of Kenya
IFC	International Finance Corporation
IPO	Initial Public Offering
IPP	Independent Power Producers
IPPA	Interim Power Purchase Agreement
IPS	Isolated Power Station
KenGen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KPLC	Kenya Power Company Limited
M&E	Monitoring and Evaluation
MoE	Ministry of Energy
MTP	Medium-Term Plan
MW	Mega Watts
NACOSTI	National Council of Science and Technology
NSE	Nairobi Stock Exchange
OECD	Organization for Economic Cooperation and Development
RES	Renewable Energy Sources
SDG	Sustainable Development Goals
SREP	Scaling -up Renewable Energy Program

ABSTRACT

This report is tasked with the objective of analyzing the success factors for infrastructural development projects in the renewable energy sector in Kenya, the case of KenGen Company Ltd, Nakuru County. The objectives guiding this research are to establish the level to which capital availability, top management team support, training of project team and technical team competence affect the development and completion of infrastructural projects in the renewable energy sector. The study used descriptive survey design method which encompasses measurement, classification, contrast and interpretation of data. This method is appropriate as it is used in assembling data from a comparatively great number of circumstances at a specific interval. The target population for the study included staff drawn from Management, with a total population of 2831 employees of KenGen Company Ltd. A sample of 340 as obtained by application of Krejcie and Morgan table from the total population of 2831 was interviewed by use of questionnaire to generate response required for the study. The researcher collected data through personally-administered questionnaire method which is suitable as it reaches a large number of subjects who are literate. A pilot study was channeled beforehand the real study was done to ascertain the reliability of the questionnaires in collecting the data and involved 34 respondents picked randomly from the groups to show how closely related a set of items are as a group in order to give logical deduction. To ensure content validity of the instruments, the researcher thoroughly checked with the Supervisor who aided in quantifying the variables to be measured by the instruments and also aided in influencing whether or not the set of articles were precisely representative of the variables under study. A split-half method was used to test for reliability where the items in the instrument were separated into two sub groups of even and odd numbered items given to a few respondents and the results interrelated. The data collected was scrutinized by use of descriptive statistics where the responses from the questionnaires were tallied, tabulated and analyzed using percentages, frequencies, mean and standard deviation. The data was further analyzed using correlation analysis. The study revealed that the respondents were homogeneous in how they perceived the research questions and this led to consistency in response. Findings for capital availability revealed measure of central tendency of slightly high mean of 4.088 and standard deviation of 0.953. Findings for top management team support revealed a measure of central tendency of mean of 3.936 and standard deviation of 1.048. For training, measure of central tendency indicated a mean of 3.34 and standard deviation of 1.302. For technical team competency, measure of central tendencies of mean 3.588 and standard deviation of 1.255 was obtained. Pearson correlation analysis was conducted on the data and it was found that the response on how the independent variables affect the dependent variable were correlated with the correlation coefficient of between capital availability against top management support being highest at 0.9809 and capital availability against training of project staff being lowest at 0.6135. The study concluded that all the four independent variables influence significantly the implementation of infrastructural projects in KenGen. Measures need to be put in place to ensure that success of implementation of infrastructural projects is assured through capital availability, top management team support, proper training and technical team competency in order to successfully address repeated episodes of project failures as seen in many infrastructure build up. It is recommended that the independent variables mentioned should be strengthened through a collective effort of the project leadership in order to successfully address the problem. The researcher recommended that similar studies be conducted in other energy sectors of the country and other independent variables be studied on too.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

The current source of energy across the world is dependent on fossil fuels which are on the decline in addition to the negative environmental impact. Further the demand for energy demand is on the increase thus requiring that alternative sources of energy be sought. This increase in demand has created two primary sources of energy the fossil fuel based type of energy and the secondary which is the renewable energy sources. As a result of the concerns originated by the fundamental sources of energy fossil fuels and so as to decrease current and futuristic alterations to climatic conditions generated by the primary sources of energy fossil fuels, there have been calls for more rapid switch from fossil (Mallon, 2006).

The need to transition from fossil energy to renewable energy is often met with obstacles which primarily emanates from the source of energy, the (Geller, 2003; Mendonça, 2007; McCormick, 2007). It is therefore important that these issues be analyzed so as to establish what are the challenges that renewable energy infrastructure projects encounter are and how best these challenges can be mitigated.

From a project perspective infrastructure are classified as either soft or hard infrastructure (Bhattacharyay, 2008). While previous projects include energy (electricity generation, electrical grids, gas and oil pipelines); transport (railways, ports, and roads); telecommunications (internet and telephone) and, basic utility (schools, water supply, irrigation, hospitals and health clinics) they are majorly used to support the society and the economy. The latter denotes non-tangibles associate to the progress and action of hard infrastructure, for instance regulatory, policy related and governance mechanisms; institutional frameworks; systems and processes; social systems; and accountability and transparency of procuring and financial systems (Bhattacharyay, 2008).

The importance of energy infrastructural systems towards wellbeing and development of the economy of a country cannot be disputed. This is often due to essential form of its services, plus its important socio-cultural dimensions that governments are often called to include such infrastructure projects in planning. Therefore, Sustainability of Infrastructure Development (SID) is advancing infrastructure tenacities which evoke understanding for now and the future. The notion cuddles using cost verses benefit breakdown as fragment of all decisions, by use of life

cycle cost, management of the use of prevailing incomes, creation of suitable investment choices, and production in an intelligent format, approving the use of modern machinery and new merchandises, support of infrastructure technology research and applying current ways of production, and creation of opportunities from our reserves (Khennas, 2000).

Kenya is devoted to dropping by half the number of people who don't have access to modern energy services by 2015 in endeavor to keep up with the SDGs (Sustainable Development Goals,) in addition to reduction by half of total number of citizens who are poor. Availability of inexpensive power is a fundamental condition to accomplishing commercial growth and poverty decline in Kenya (SREP, 2011). Therefore this possess is a crucial challenge in the achievement of the envisaged growth and moving Kenya into a middle income country by the year 2030. If this vision is to be achieved, then all energy projects are to be completed on time.

Further the SREP (2011) eludes that the energy sector having been modernized in accordance with the Sessional Paper No.4 of 2004 and the Energy Act No.12 of 2006. The established prearrangement in the electricity sub sector in Kenya comprises Kenya Electricity Generating Company (KenGen), Kenyan Power and Lighting Company (KPLC), the Rural Electrification Authority (REA), -the Ministry of Energy (MOE), Energy Regulatory Commission (ERC), Kenya Electricity Transmission Company (KETRACO), Independent Power Producers (IPPs) and Geothermal Development Company (GDC) .

According to envisaged vision 2030, Kenya possesses an extended long term expansion approach, which purposes to move the country into a universally economical in addition to affluent economy having great worth of living. This vision covers between 2008 and 2030, the national current design of development aiming to renovate Kenya into afresh industrialized economy, "middle income country providing a high quality life to all its citizens by the year 2030". The Med-Term Plans (MTP 2008 and 2012) had been organized to implement the first phase of the policy. It called-for for the purpose of rehabilitation of the network of roads, railways up gradation, improvement of urban-public transportation system, and expansion and accessibility of electric power and safety of water, scale-up of renewable energy program (SREP, 2011).

The electricity power supply and demand in the country Kenya has suggestively been unsatisfactory since it covers a mere 20% of the people in Kenya (Kariungi, 2014). The African Development Bank (ADB) affirms the findings of Kariungi (2014) as they indicate the key encounters fronting Africa's power sector include but not limited to insufficiency of generation volume, lower power consumption, higher costs, limited electric capacity, unreliable services, and a financial gap of nearly \$22 billion annually. The encounters require a complete over haul of the progress of the power sector especially renewable energy infrastructure that pursues to utilize the enormous renewable resource within the globe, not limited to hydro-potential. Several endeavors are accompanied in electrical power installation projects, therefore the need for good administration to guarantee a condition where by material and work procurement and supply is inside the scheduled time, (Chandra, et al. 2012). This study therefore sets out to conduct an analysis of infrastructural development-projects within the renewable energy sector in Kenya: the case of KenGen company ltd.

1.1.1 Energy Sector

Most African countries are considered as under developed or developing; however the potential that lies in this countries is vast. This potential in terms of growth and development pushes up the need for reliable energy. On this backdrop that it has been established that Africa is gifted with gigantic renewable and non-renewable sources of energy. As such Africa has a capacity to generate 1,750TWh from Hydro sources and 14,000 MW of geothermal potential. This is not including the huge potential in solar energy that is still underdeveloped.

The renewable energy infrastructure in Kenya as is in Africa remains largely underdeveloped, thus shard focus has been put on government institutions mandated to develop this areas. In Kenya the situation points towards a situation that indicates the institution tasked with developing this sources are either underfunded, supply of basic infrastructure, policies and as such it is on this desire that various interventions have been put forward which include the Energy Act of 2006 and the Feed in Tariff (FiT) policy, the Vision 2030, Sessional Paper No. 4 of 2004, the country's administration is devoted to stimulating generation of electric power from Renewable-Energy-Sources (RES). The Governing body of the country further advocates setting up of a Green Energy Fund Facility under the National Task Force on Accelerated Development

of Green Energy and whose purpose is to lend funds to viable Renewable Energy projects at concessional rates.

Clearly, the electricity in Kenya is estimated at 1,191MW while the generating capability from Geothermal, Hydro, Biogas (cogeneration) and wind account for 51.1%, 14.2%, 1.9% and 0.4% correspondingly whereas fossil based thermal maintains at 32.5%. The demand for electricity is expected to peak 15,000 MW by the year 2030. In order to match this mandate, the predictable fitted volume need to upsurge progressively to 19,200MW as at 2030.

Therefore for the country to be able to meet this demand it is expected that infrastructure development within the energy sector needs to be prioritized. In view of the foregoing the geothermal resource in Kenya is positioned surrounded by the Rift Valley thru a projected potential of between 7,000 MW to 10,000 MW spreading across 14 prospectively located localities. Geo-thermal possesses bountiful achievements than supplementary springs of energy: it is not affected by drought and climatic variability; has the highest availability at over 95 %; is green energy with no adverse effects on the environment; native and readily available in Kenya not like thermal energy that depends on imported fuel. This makes geothermal the most appropriate source for base load electricity generation in the country.

1.1.2 Overview of Kengen

KENGEN (Kenya Electricity Generating Company) is a limited-liability company, enumerated underneath the Company Act. The Company stood integrated in 1954 as Kenya Power Company Limited (KPC) retitled KenGen in 1997 succeeding depiction of the adjustments in the sector of energy. Its fundamental business remains the development, management and operation of power generation plant with the objective supplying electric power to the designated market of Kenya, and in the future, it in addition plans supplying of power to the Eastern Africa markets. With account for over 80% of all the electric power consumption in the Country with the Independent Power Producers accounting for 20%. KenGen is the leading electric power manufacturer in Kenya. Until 17th May 2006, the Company was entirely owned by the government.

Through the Sessional-Paper number 4 of 2004 about Energy, the Kenyan Government (GoK) resolved to undertake the first phase of divestiture from KenGen complete with an IPO (Initial Public Offering) on the NSE (Nairobi Stock Exchange). As at 30th June 2006, the Company had a total installed capacity of 946 MW comprising of hydropower 677.28 MW (71.28%),

geothermal 115MW (12%), thermal 147 MW (16%), Isolated Power Station (IPS) 5.2 MW (1%) and Wind 0.35MW.

KenGen takes a formal Interim Power Purchase Agreement (IPPA) in place with KPLC that specifies the tariff and trading arrangements under the regulation of the Electricity Regulatory Board (ERB), (KenGen's 62nd annual report & financial statements, 2014). The preliminary tariff study report recommends a plant specific two-tier tariff structure containing of capability and energy charge for KenGen plants. The capacity burden will recover all capital associated costs (returns on equity, repaying of foreign and local loan, tax and duty) based on target available and a contracted volume of plant. The capacity charge will also recover all fixed operation and maintenance costs. The energy charge will recover the variable operation and maintenance cost based on the energy delivered by the plant to the delivery point.

The isolated Power Stations have been faced with resource constraints coupled with high operational costs due to their locations that need prominently limited generation capacity and network expansion at a pace consistent with growth in demand. To redress this situation, in October 2004, MOE (Ministry of Energy) delineated the National Energy Policy in the Sessional Paper No. 4 of 2004 about Energy.

1.2 Statement of the problem.

There have been concerted efforts to increase output on renewable energy as a source of power and electricity. This is due to its environmental and economic attractiveness. However there is a challenge when it comes to technology, affordability and availability. Thus there is need and an urgent concern to address these challenges if the year 2030 projections are to be met while at the same time alleviating the factors that hamper the dispersion and implementation of renewable energy development projects (Geller, 2003; Mendonça, 2007; McCormick, 2007).

There are several challenges that tend to hinder the quick achievement and realization of these goals which most often tend to revolve around infrastructural framework in developing countries (McCormick kes 2007). In addition there is the aspect of stakeholders' involvement and participation, the technological aspect of innovation and financial resource availability are key determinant factors. In addition the demand uncertainty also play a great role, since such projects

are capital intensive and therefore they are financed through loans and grants and thus they require high demand to generate revenue for repayment.(Saliem Fakir, 2012).

However in spite of the importance of renewable energy there is lack of in-depth analysis of infrastructure development projects in the renewable energy sector not only in Kenya but also across the world. Previous studies that the researcher reviewed either those that have been done locally or internationally do not analyze the state and status of infrastructure development projects in the renewable energy sector. The researcher sought to analyze infrastructural developmental projects in the renewable energy sector in Kenya against this background of information: a case of KenGen company ltd as the basis of the study.

1.3 Purpose of the study

This study purposed to analyze the factors influencing the completion of renewable energy infrastructural projects: a case of KenGen company ltd.

1.4 Objectives of the study

The following objectives guided this study:

- i. To determine the extent to which capital availability influences completion of the renewable energy infrastructure development projects.
- ii. To examine the influence of top management team on completion of the renewable energy infrastructure development projects.
- iii. To assess how training of infrastructure projects team in the renewable energy sector influence their completion.
- iv. To examine the influence of technical team competence on completion of the renewable energy infrastructure development projects in the renewable energy sector.

1.5 Research questions

This research study sought to answers to the following questions:

- i. How does availability of capital influence completion of the renewable energy infrastructure development projects?
- ii. How does top management team influence completion of the renewable energy infrastructure development projects?

- iii. To what extent does training of infrastructure development team influence their completion of projects?
- iv. How does technical team competence influence completion of the renewable energy infrastructure development projects?

1.6 Significance of the study

Results of this study are of value to the renewable energy sector as it prioritized the factors that are critical in ensuring infrastructure development projects are completed on time within KenGen Company Ltd. This study will hopefully assist in the planning for resources to be used in the execution of the work and thereby improving productivity in various other similar projects. The findings will hopefully contribute to the general understanding of factors that influence the implementation of the infrastructure development projects in the renewable energy sector in Kenya as well as understanding the aspect of project management and hence assist in designing interventions in a way that will hopefully help them improve on meeting timelines.

For the attaining SDGs (Sustainable Development Goals), the results of this study are also critical in its focus on provision of affordable energy to all consumers by the year 2030. Indeed, security of energy is within the SDG goal with the aim of mitigation of poverty and enhancing productivity. Consequently, to understand the factors that impact the implementing of the infrastructural development projects in the renewable energy sector in Kenya in the study-area in view of generating strategy which may simply be approved to promotion of sustainability in the renewable energy level in addition to contributing and aiding of achievement of the objectives.

Last but not least, this research results aim to enable makers of policy to the notion of formulating, designing and implementing policy with the aim of creating enabling environment with sustainability of projects in addition to their successes and private sector involvement in development projects. This research study hopefully will also be of value to other researchers and scholars as it forms a basis for further research and be a source of reference material in other related topics.

1.7 Limitation of the study

Collecting much data on all areas of operation and infrastructure development across the KenGen Company Ltd was set to be tough, complex and time consuming task for the period set.

In addition, not all the sites were visited due to accessibility of the sites, security concern and time constrain, the few chosen may not provide all the necessary evidence for the study. However, the researcher covered as many project sites as possible with the help of the three research assistants in the hope that they will gather sufficient information and that all information gathered was of better use for decision making in the future.

1.8 Delimitation of the study

This study purposes to analyze infrastructural developmental project in the renewable energy sector in Kenya: the case of KenGen Company Ltd. The location of this study is accessible as it is at KenGen head office in Parklands Nairobi and Olkaria, Naivasha. The instruments of the study are questionnaire to be formulated by the researcher hence making monitoring and control of the study feasible.

1.9 Basic Assumptions of the study

This research assumes there will be enough number of workers stationed at the Olkaria Geothermal-power station to sustain a study; however the researcher believes that other top level managers who are based in Nairobi should be included in the study. Secondly the study assumes that every infrastructure development project being completed by involving the various actors and players meets basic approval from relevant government agencies.

1.10 Definitions of Significant Terms Used in the Study

Availability of Capital: Refers to money in the form of wealth or any other asset owned by an individual or institution or whose availability is for the purpose of start-up of an investment or a company.

Management Team commitment: Refers to dedication of the leadership of an organization towards achievement of the organization goals and objectives. It implies transforming the promise into reality

Training: Denotes the teaching or increasing in the knowledge of oneself or others useful skills and knowledge that relate to definite suitable proficiencies.

Training has precise goals of educating one's capability, capacity, performance and productivity.

Technical Team Competency: denotes aptitude in the engineering skill (the effective solicitation of mathematical and scientific principles to practical ends such as design, assembly, and operation of efficient and structures, cost-effective, methods, machines and systems) or scientific expertise (the operative application of physics, aerodynamics, thermodynamics, chemistry, astronomy, and so forth, toward investigation and analysis of the properties of matter and energy) required to carry out the projects effectively (Murch, 2011).

1.11 Organization of the study

Five chapters forms the organization of this study.

Chapter one presents the introduction of the study that consists of the background of the study, statement of the problem, purpose of the study, objectives of the study, research questions, and significance of the study, basic assumptions and the definition of significant terms.

Chapter two dwells on the review of the literature on factors that influence the completion of infrastructure development projects in the renewable energy sector in Kenya, A case of KenGen company ltd. The literature review has the following aspects of the study: The four objectives deals with international perspective, the national perspective and finally the local perspective on factors influencing completion of infrastructural development projects in the renewable energy sector in Kenya, a case of KenGen Company Ltd, Olkaria

Chapter three discusses the research methodology to be used in the study, it discusses research design, target population, sample and sampling procedures, research instruments, instruments validity and instrument reliability. Also included are data collection procedures and data analysis techniques.

Chapter four, the data presentation, data analysis and interpretation discusses the questionnaire return rate and presents all the data collected from the field. This includes categorization of data into appropriate groups for easy interpretations and analysis.

Finally, chapter five present summary of the findings, conclusions, recommendations and suggestions for further studies stemming from this study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Chapter two contains pertinent literature material that is linked and dependable with the objectives of the study was revised. This literature review pulls resources from numbers of sources. The chapter mainly highlights literature on how skilled labor/capital influences completion of the renewable energy infrastructural development projects, how capital availability influences completion of the infrastructural development projects, influence of top management team involvement on completion of the infrastructural development projects and how training influences completion of infrastructure development projects, the theoretical framework, the proposed conceptual framework and the research gap.

2.2 Completion of Renewable Energy Infrastructure Development Projects

Infrastructure denotes services derived from utilization of electric power, telecommunications, gas, water and transport works such as bridges urban transit systems, roads, airports and seaports vital in stimulating financial growth and development in a country (Kaundinya, 2009). A sound infrastructure set up is vital in promotion of effectiveness, efficiency and spurs productivity at all levels of the economy. Poor infrastructure impedes economic growth and can be seriously detrimental to the efficient use of scarce resources (All Africa Energy Week, 2012).

Alazraque-cheni (2008) posits that the scope of a project, the uniqueness and specificity of services offered, and its salient social angle call for the government's role in planning, promoting and ensuring independent regulation that will ensure equity and fairness for the public and private sector players (Anderson, 2012). Project success can be defined as one which accomplishes composite happenings that meet precise set of objectives inside the limitations of funds, stage, and performance objectives (Thilmany, 2004). Internationally, two divergent views exist about project accomplishment. There is the view which recognize project achievement uniquely in terms of customary project objectives of time, cost and quality and the view which considers project accomplishment in terms of these objectives and the usefulness of the project's product (Guru, 2008).

There are various gridlocks that exist in renewable energy development depending on source of energy, development location and the available technology (Geller, 2011; Mendonça, 2009; McCormick, 2007). The positive impacts derived from renewable energy sources development can be enormous; therefore it is imperative to properly plan for its development to efficiently surmount these bottlenecks. Whereas the traditional project management realization principles appears to have durable grasp of the project management public, the utmost imperative achievement benchmarks are reflected by the product measures of meeting the owner's needs.

It is good to note that willpower of a successful project deliverables are measured by the degree to which the project completes composite activities that meet precise set of objectives within the restrictions of capitals, time, and performance objectives, but Johnson (1999) says that, suggestions of successful project results are the achievement of the precise objectives of the project as well-defined by the project participants and are reliant on on the joint efforts of project management and the project team.

The expansion of renewable energy generation projects emerges eye-catching to a diversity of energy users, installations and large organizations, land and real estate proprietors, and others (jointly denoted to herein as the project "sponsor" or "host") who distinguish the economic, environmental, and/or security prospective of renewable energy. Whether the aim is for projects large or small, and notwithstanding whether the sponsors will eventually finance and construct the project on their own, each will find it compulsory to yield to the title role of project inventor throughout the primary phases of project growth (Springer, 2013).

Kenya is performing well in terms of investing in renewable energy and has been placed second after merely South Africa for clean energy investment in Africa and sixth worldwide. Supplementary, Kenya's renewable energy prospective is enormous. By this time the world's 8th leading manufacturer of geothermal energy, Kenya too owns idyllic environments to exploit wind and solar assets for electricity production. With this massive resources and prevailing capital for project expansion are reinforced by a pro-renewable partisan climate wherever renewable energy policy is both advantageous and steady (Wilson, 2016). It is for these reasons that there is a need to analyze infrastructure development projects in the renewable energy sector in Kenya

2.3 Capital Availability and completion of infrastructural projects

Capital availability refers to resources in the form of wealth, be it monetary or assets possessed by a person or institution or accessible for the reason such as investment or company start-up (Bayle, 2010). In any investment project, the price of accumulating capital is a major task that is faced prior to breaking ground particularly in the case for infrastructure projects like power generation which in many cases consume large upfront costs, and long construction lead times and operating on a permanent basis. Consequently better-quality sponsoring terms such as dropped interest rates or extended repayment horizons can meaningfully decrease project charges (Tomer, 2001).

In renewable energy projects, financing relations are chiefly important since renewables are often capital rigorous, hence necessitate a bigger notch of up front debt and equity more than power plants with low capital cost. Supplementary, influences that make it much difficulty for renewable energy to attain backing at rational prices more than conventional generation technologies: many projects stand professed by the financial community to have high resource and technology risks (Wiser, 2008). The experience of evaluating renewable energy source risk is an attribute that most financial institutions do not have significant experience in (Wohlgenuth, 2000). Numerous renewable energy projects are similarly apparent as unconfirmed, with large presentation dangers. Reminiscence of previous project disappointments by institutions make raising capital challenging and costly for many renewables developers. The mentioned real and perceived risks commonly end in financing that is extra costly than that obtainable to more traditional generation bases.

2.4 Top Management Team commitment and success of infrastructural projects

Diversity in top management team is the disparity of social and cultural characteristics amongst persons co-existing collectively in a distinct employment or market setting (Cox, 2001). The variations and different associations include but not limited to gender, race, country origin, religion, age group and work specialism, among others. Diversity of Top Management Team debated in the study is the magnitude to which the executive team is diverse with respect to gender, age, educational experiences, occupancy, professional credentials and practical back grounds. Uniformity is a progressively imperative factor in organizational life as organizations worldwide become more varied in terms of gender, race, ethnicity, age and other features

(Griscombe and Mattis, 2012). Studies on diversity can be regarded in two standpoints. These are cognitive diversity and demographic diversity.

Cognitive diversity is well-defined in terms of variances in preferences and beliefs held by upper-level administrators within a firm. More unambiguously, cognitive diversity refers to variation in principles regarding cause effect relations and variation in preferences regarding various goals for the organization (Miller, 2010). Cognitive diversity includes knowledge, education, morals, insight, affection and personality features (Nishii, Gotte and Raver, 2007). Such variation triggers variances in perceptions that tend to withstand through time. Modern research on group problem resolving evidently reveals that cognitive resources are a key determining factor of group enactment (Yetton and Bottger, 2013) resulting in either negative outcomes or positive outcomes.

Demographic diversity on the other hand comprises of variables such as age, gender, ethnic background, tenure, functional background, religion, race and education among others. The benefits of using demographic variables include their objectivity, miserliness, all-inclusiveness, rational consistency, analytical power, and testability (Hambrick and Mason, 2008). Preceding studies show that team demography affects team processes, such as social incorporation and communication, and these processes in turn affect organizational strategy and outcome. Unambiguously, the outlines of the TMT impact the choice of competitive fields and the patterns of actions and responses in the chosen fields.

In modern years curiosity in executive diversity has hoven. Amongst researchers increasing this surge, many have reasoned that higher levels of diversity lead to executive inspiration, more operative executive decision-making, and more optimistic organizational, however, the argument is that advanced stages of executive diversity end result in less communication among executives, less effective executive decision-making, and less positive administrative outcomes (O'Reilly, Snyder, 2002). Hence, the topic of TMT heterogeneity residues a highly provocative one and is the primary focus of this review of upper echelons research.

Hamrick and Mason, (2004) claimed that TMT multiplicity would be preeminent able to manage raging complex environments since team member differences may stimulate debate about the appropriate strategy, allow them to generate greater range of strategic alternatives and collectively better appraise the possibility of such replacements. Top Management Team assortment however comes with some challenges as initial conflict arises as the teams set norms (Carson et al., 2004).

2.5 Training of Project Team and success of infrastructural projects

Training denotes the instruction or increasing of one-self or other people, valuable expertise, and facts that relay to precise treasured proficiencies. Training has definite goals of enlightening one's competence, capability, routine and efficiency (Aguire, 2015). Capability in human resources is a homogeneous requirement for an individual to appropriately perform a specific job. Cuban (2001) perceived that there are many ways to define and quantity the suitability of staff competency, capacity and the usefulness to the project. The issue of timely accomplishment of construction projects in Kenya is gradually becoming a question of concern among the stakeholders in the renewable energy industry. In a country like Kenya, construction workers are relatively unskilled and lack of adequate planning at the initial stages of the project marks in time and cost overruns.

To explain a project's staff aids and proficiency into nominal action, staff memberships must have the inspiration and readiness to exoneration of their responsibilities and perform their authorized occupations according to customs of professional behavior. Employee inspiration and will to act is not straight observable, but it is linked to incentives and rewards for good performance within a project team. The relative attractiveness of the agency's compensation package and prospects for professional progression and promotion can inspire staff and serve as enticements for good enactment. Norms of professional conduct set standards and potentials on how staff members ought to conduct themselves in the course of their work. The degree to which these standards are adhered to also deliver some signal of quality of staff performance and of how successfully an organization is achieved Kent (2011).

Gardner (2003) contends that capable personnel staff trusted with project implementation ought to have compulsory technical proficiency in the area. Where indispensable, talent intensities

ought to be enlarged to meet the requirements and with ongoing investments in developing such capability in the office as needed.

2.4 Technical Team Competency and success of infrastructural projects.

Technical competency in this study framework embodies capability in the engineering-proficiency (the operational solicitation of mathematical and scientific principles to functional end for instance design, assembly, and operationalization of efficiently and structured, cost-effective, methods, machinery and system) or methodical capability (the functioning solicitation of thermodynamics, chemistry, astronomy, physics, aerodynamics, and onward, on the way to investigation and analysis of the possessions of matter and energy) required to carry out the projects effectively (Murch, 2011).

Technical team competency denotes aptitude in the key infrastructural project execution skills disseminated by the infrastructural project manager from the start to the completion of the project. Murch, (2011) suggests that infrastructural project group should retain appropriate technical knowledge and expertise to implement their jobs. This is predominantly dynamic in the energy industry where projects are exceedingly technical and intricate, and appreciativeness of engineering principles and scientific application are essential. In this atmosphere, the project manager should have at least a working level appreciative technical challenge the project team is in front of. Technical skills augment the capability of the technical team to lead and accomplish the infrastructural projects, through a thoughtfulness of the composite matters developing, during the life-cycle of the (Lewis, 2008). Nonetheless, technical competency does not always compare unswervingly to prosperous infrastructural project management (Monson, 2009). This is generally echoed in the organization structures, as the most theoretically proficiency personnel are on frequent occasions used as consultant instead of being amalgamated as part of the project team. The Technical Team's capability to spot the users' desires is highly influential for the realization of any infrastructural project.

Ascom, (2013) designates that trainings are measured as the best aptitude construction tools. Adequate preparation is fundamental for proficiency to be accomplished. Cherrington (2015) defines training as the method that empowers employees to attain new knowledge, learn new skills, and perform behaviors in a new way. It denotes the achievement of specific skills and

knowledge. The author additionally recommends that training programs endeavor to demonstrate to trainees how to complete specific accomplishments or a specific job. Training is a learning experience in that it searches for a relatively enduring alteration in an individual that will progress his / her ability to perform on the job (Robbins 2014).

Staff training, especially training geared towards creating technological proficiencies doesn't occur spontaneously or overnight and a series of battered intrusions must therefore be made. These may include workshops, training sessions, peer reviews and joint planning and implementation, as well as experts' visits and contributions. They should be considered permitting to the requirements of the organization. To be successful, the involvements must be unswervingly related to the groups' day-to-day tasks and continue over a significant period, (Kliger and Tweraser, 2010). Trainings permit the technical team to develop familiarity with the products, thus building product knowledge, which is one of the essential competencies for the technical team. The suitable knowledge of products benefits the team make faster and more operative judgments when antagonized with technical difficulties.

A research completed by World Bank (2018) exhibited that 8 infrastructural projects in Kenya are at the projection of crumbling because the national government did not invest in technical training of the project team. The county financial management board invested in management training and did not dwell on technical training. Wibowo and Alfen (2013) conducted a study on the effect of team competency on success of infrastructural projects, a descriptive survey of was done on various categories of projects laying more focus on road construction projects. A sample of 100 projects was used and data was analyzed using a regression model, the results of the analysis showed that there was a positive relationship between technical team competency and growth of the level of GDP.

A research by Royle, (2005) on Effect of Project team competency on effective administration of Information Systems revealed that the project team composure and attitude is key to project success throughout the project life cycle. In addition he asserted that adequate training of technical team on the new infrastructural system that has been installed is necessary for its implementation.

2.6 Theoretical framework

The theoretical framework refers to the construction that can support or hold a theory of a research study. The theoretical framework familiarizes and designates the theory that expounds why the research problem under study subsists.

2.6.1 Structural Functionalism Theory

Structural functionalism theory is founded on Emile Durkheim's structural functionalism theory. This theory advances the argument consisting of different components or sub-systems, which are compelled to function in tandem for the survival of the entire system. When an element or any subsystem fails to work, the entire system ceases to operate and gets in jeopardy. So as to enhance and harmonize and stabilize the structures, the systems are coordinated from a central authority where each structure is interrelated and interlaced and a malfunction of one structure is bound to have ripple effects on the whole unit.

Consisting of a number of groups with divergent individual characteristics employed in tandem, it is critical to acknowledge that formal organizations harmoniously work towards realization of a common goal. It is argued that most administrations are large and composite social elements containing many collaborating sub-units which are from time to time in consensus but more often than not they are in diametric disagreement with each other. Functionalism is disturbed with the perception of order, formal work in organizations and in by what means order seems to overcome in both systems and societies regardless of the variations in employees which repetitively takes place.

This theory pursues the understanding of the relationship amongst the parts and the entire system in a society in particular and categorizes how permanence is for the most part accomplished. Structural functionalism further advocates for an analysis of the apparent struggles of interests manifested midst the many groupings of parties.

This study examines the central and critical role played by organizational strategy in Kengen. Generally strategies are supposed to address and existing methods of obtaining capital needed to undertake the infrastructural projects. Strickland & Gamble (2005) suggests organizations employ competitive strategies to attract project financing and achieve targeted objectives. Secondly the study looks into management commitment, therefore the logic and rationale for project financing includes how prepared the management are to undertake the task involved in

the success of these infrastructure projects. Thirdly the study intends to establish how training and fourthly how technical team competency influences the development of infrastructural projects.

It is crucial to take into consideration each of these independent variables separately in relation to this theory in the direction of accomplishment of infrastructural goal (Apey, 2016). The theory consequently correctly illuminates the renewable energy sectors management obligation to ponder on putting in to account the four independent variables in the study in order to building a consistent and a goal oriented system that pull collected on the way to accomplishing goals and how to succeed in both conflicts and excitements. Under this, the theory will help to unearth how effective tools are used to improve the quality of project planning and management.

2.7 Conceptual Framework

The proposed conceptual-framework springs the linking amid the independent-variables and the dependent variables. Herein, key consideration is that independent variables are Skilled Labour, Capital Availability, Top Management Team and Project Staff Training while the dependent variable is the development of renewable energy infrastructure which should be timely, within the scope, conforming to the specifications and be cost effective.

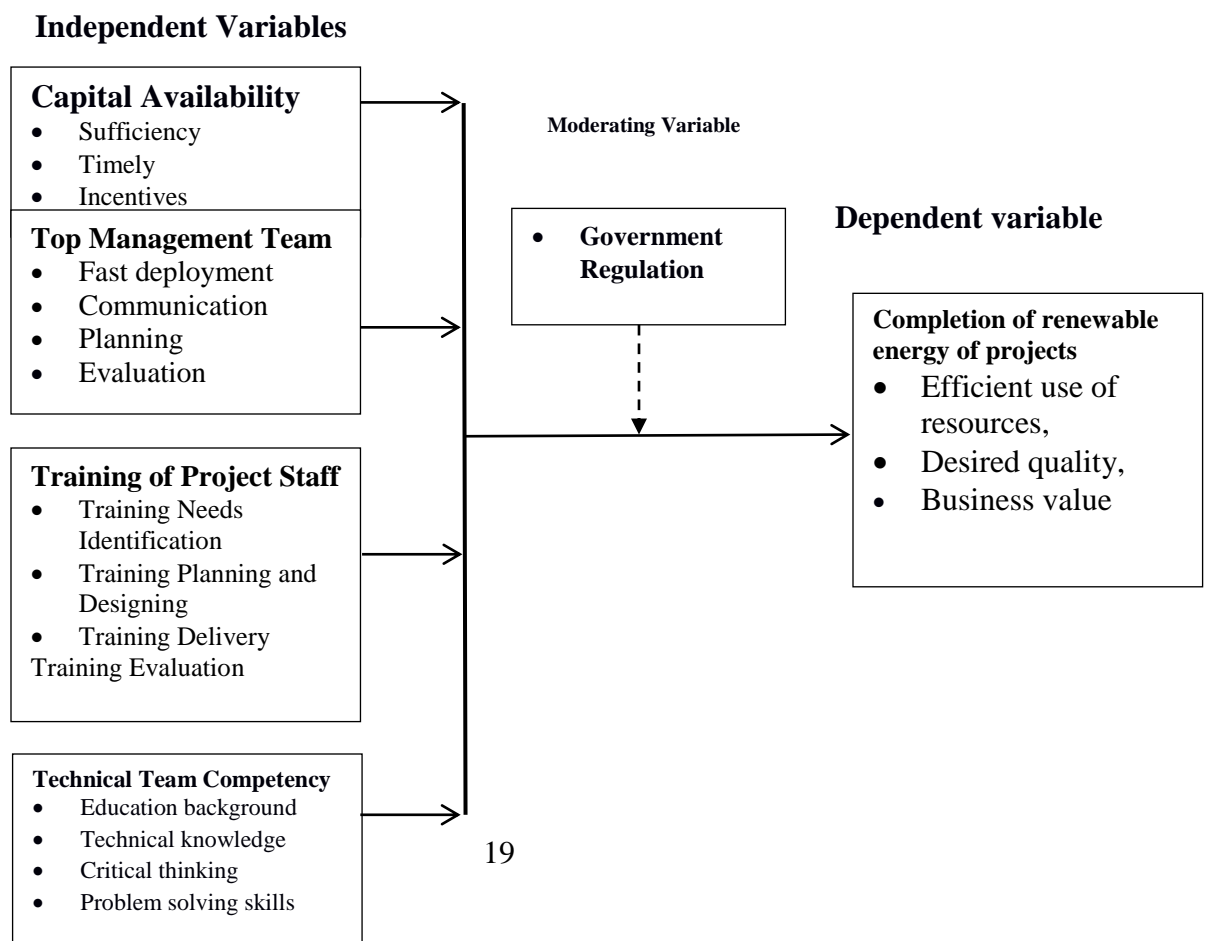


Figure 1. Conceptual framework

Capital availability, top management support, training project staff and technical team competency all affect the completion of renewable energy projects at varying magnitudes. Improvement in any of the independent variables leads to success of the completion of the projects just the same way as depreciation of the independent variables lead to failure in the completion of the projects. Government regulations form part of the moderating variable as they form part of the legislative direction on procedures of funding, governing public institutions, training and recruitment requirement among others.

2.9 Research gap

There is a precarious deficit in the study of renewable energy infrastructure projects. Sadia (2017) did a study on Factors Influencing Implementation of Infrastructure Development Projects in the Renewable Energy Sector in Kenya: A Case of Kenya Power And Lighting Company Limited. The study established that energy policies and strategies provide an institutional, regulatory and legal framework that guarantees provision of reliable, adequate, safe, lucrative and affordable supply of energy while ensuring the conservation of the environment. In another study by Gakuo (2015), on the Affiliation between Government Investment in Energy Infrastructure and Economic Growth in Kenya. She found KenGen’s organization culture supports implementation of renewable energy development projects. However both studies came short of establishing capital requirements, top management team and training of project implementers roles on renewable energy infrastructure development projects

This study therefore was done to fill this gap by analyzing infrastructure development projects in the renewable energy sector in Kenya: a case of KenGen Company Ltd.

Table 2.2 Research Gap

Variable	Author and Year	Title	Findings	Knowledge Gap
Capital Availability	Muleme (2013)	Effects of Capital availability on success of project management	Capital deficit occurred as a result of lack of transparency in existing programs hence withdrawal of funds by donor	Intervention by private/local citizens and government not covered in this study
Top management support	Alicio (2009)	Link between improving sustainability in infrastructural project security	A positive correlation was observed between sustainability of projects and management support	This study focused only on sustainability and not success of the projects

		and management support		
Training of Project Staff	Kuchal (2011)	Effect of training of farmers on success of irrigation projects in Arid communities.	There is a necessity to include training that promoted knowledge on irrigation farming whilst pursuing economic efficiency and financial viability.	There is gap in the nature of recruitment of the farmers initially at the onset of the project.
Technical team competency	Steward (2008)	Employee competency as a key factor to workforce performance in manufacturing firms	Criticized on theoretical rather than practical approach to recruitment policies in many companies	Employee competency did not capture factors like drive to achieve and hardwork

2.10 Summary of Literature

This chapter yields a comprehensive evaluation of existing works on the subject of the study. The relevant local and international literature reviewed reveal consequential knowledge gaps in understanding the factors influencing successful completion of infrastructural renewable energy projects. From the conceptual framework, the study investigated influence of the four independent variables; capital availability, training of project team, technical team competence and technical team competence against the completion of renewable energy projects as the dependent variable. Government policy has been considered as moderating variable in this study. The study is informed by structural functionalism theory.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the research methodology employed to carry out the study is outlined. The researcher's aims are selection of target population, explanation of the research design method, calculation of sample-size and sampling-procedure assumed, the methods of data collection and procedure and the research instruments tools that was employed. It further defines how validity & reliability was boosted in the study, methods of data collection as well as data analysis procedure. This chapter settles with an explanation of how ethical issues were adhered to.

3.2 Research Design

Cooper & Schindler (2008) posit that a research design depicts the overall strategy of how one administers the answering of the research question. This study employed descriptive survey research design as it permits a study of phenomenon in an accurate and a cost effective way from a big population. Saunders, Lewis and Thornhill (2007) denote that a descriptive research design is appropriate for this study as it benefits the researcher in assembling qualitative and quantitative data.

3.3 Target Population

Mugenda and Mugenda (2012) asserts that population is a comprehensive census of all objects of research or people in a researcher's area of research. Accordingly, Mugenda and Mugenda (2012) emphasizes that the target population ought to have some noticeable features, which the study proposes to oversimplify the outcomes. The population for the study includes staff drawn from all levels within KenGen Company Ltd. The KenGen Human Resource and Administration Management Report (2016) indicates that there are 2831 employees of KenGen Limited.

Table 3.1 Target Population

Staff Category	Number
Top Management	15
Middle Management	124
Operational Management	342
Technical staff	2350
Total	2831

3.4.1 Sampling procedure

In determining the sample size, the study relied on published tables, which provides the sampled individuals for a given set of criteria. Therefore, the respondents were selected using Krejcie and Morgan's (1970) sample size table. Therefore based on this criterion, the study selected, a sample of 340 and from the estimated population 2831 drawn from all the staff category as shown in appendix III.

3.4.2 Sample Size

Simple random sample is a collection of subjects (a sample) in statistics nominated as of a bigger cluster (population). Uniquely, subject from the population, a random selection and done entirely by chance, such that to each focus there remains the same chance (or probability) of being chosen at whatever stage all through the sampling progression. An impartial random assortment of subjects is imperative in order to end up representing the entire population. Simple random sampling simply permits one to draw outwardly effective deductions about the entire population based on the sample. Theoretically, simple random sampling is the unassuming of the probability sampling techniques. It obliges for a complete sampling frame for small populations. A simple random sample gives each member of the population an equal chance of being chosen. One way of realizing a simple random sample is to number each element in the sampling frame (for example gives everyone on the Kengen Master-roll register a number) and then use random numbers to select the required sample.

The first respondent was picked randomly after which the next was chosen using systematic random sampling.

Table 3.2 Sample Size

Staff Category	Number	Sample
Top Management	15	10
Middle Management	124	85
Operational Management	342	90
Operation Staff	2350	155
Total	2831	340

3.5 Data collection instruments

Data was collected by the researcher through self-administered questionnaires. This methodology is suitable as it influences a huge quantity of subjects who are knowledgeable. The researcher modeled the questionnaire hooked on sections: Section A comprises background information, Section B: comprises of questions on factors that Influence completion of infrastructure projects in renewable energy sector. The interrogations were measured on a five point continuous likert scale where 1 implied strongly disagree, 2 disagree, 3 neutral, 4 agree and 5 strongly agree.

The study used both primary and secondary data collection. This tool is chosen for the study because of its effectiveness in generating the necessary responses. The questions which are closed ended are simpler to manage as for each item, an alternative answers follows and it is inexpensive to use in terms of time and money. Alternatively the open ended question is suitable for the study as it allows a larger depth of responses particularly as the study appraises sensitivity which is attitude based in nature thus this type of questions allow the respondents to express feeling, background, hidden motivations, interest and decision (Mugenda and Mugenda, 2012).

3.5.1 Pilot testing

Mugenda and Mugenda (1999) recommend a pre-test sample of 1-10% contingent on the sample size. Those who were tangled in the pilot study were not be involved later in the same research. The questionnaire was pretested to 34 respondents at the Kengen head-quarters before rolling out the survey to other respondents. Processes that were used in pre-testing the questionnaire were alike to those which were castoff for the duration of the definite data collection.

3.5.2 Validity of research instruments

Orodho (2000) says that validity is a test of measure of in what way a test measures what it is supposed to measure. The researcher finds it necessary to test the content validity of the research instruments to ascertain whether all the areas that are critical for this study were included in the research instrument. The questionnaire was pilot tested to some selected respondent group among the sample population, with the outcome being used to improve it by ensuring the data obtained is sufficient to the subjects.

3.5.3 Reliability of instruments

Mugenda and Mugenda (2012) observes the concepts that constancy with which questionnaire articles are responded to or individuals tallies continue to be fairly similar can be evaluated by use of test re-test technique at dissimilar periods. This characteristic of the instrument is essentially denoted to as steadiness. If we have a stable degree, then the outcomes ought to be alike.

To check for reliability, a split-half technique was employed. The articles in the instrument were separated into two sub clusters of even and odd numerical. They were distributed to few respondents then correlation was performed on the outcomes. The split half is a better process of analyzing reliability. The split-half aids the researcher to manage the questionnaire henceforth decreasing budgets and time expended.

3.6 Data collection procedure

Data collection was began by the researcher with attaining a letter of introduction from the University of Nairobi Extra-mural department, then proceeding to obtain authorization from National Council of Science and Technology (NACOSTI) to gather data. Subsequently the researcher made arrangements with the respondents in order to obtain consent to carry out the study. Administering of the questionnaires began after permission was granted and it took about two weeks to finish the exercise. This was made probable through the help of the two research assistants who were thoroughly overseen by the researcher. The research used the drop method to oversee the questionnaires to the sample population.

3.7 Data analysis technique

Data was prepared and checked for logic fidelity and any needless information was detached before analysis. Coded information involved the conversion of the response to numerical representation. Collected data was scrutinized using quantitative technique of analysis. The quantitative figures were analyzed by use of descriptive statistics whereby the respondent information derived out of the questionnaires was tallied, tabulated and analyzed by use of percentage, frequency, mean and standard deviation then hypothesis testing done using chi square. The data was there after further correlated.

3.8 Ethical considerations

Munyoki, (2014), argues that Ethics in research should be viewed as integral part of the research planning and implementation, not viewed as an afterthought or a burden. With this in mind, the research work will be guided by strict adherence to research ethics which do not allow the researcher to engage in deception or invasion of privacy. The study collected delicate data; hence, the researcher ought to be morally sensitive and responsibility in handling the data in a modest way was mandatory. It was ensured by the researcher that the respondents' privacy was upheld to ensure that the respondents were non-reluctant to cooperate in providing the researcher with the required response as sought by the research tools.

The respondents right not to respond to the questions was clarified from the onset and consent sought from the word go. The anonymity of the respondents was assured and confidentiality guaranteed as an integral part of the research. The researcher maintained humility and conducted the research with utmost honesty avoiding distortions and misleading data manipulation.

3.9 Operationalization of Variables

The different variables and how they are applicable to the study are summarized in Table 3.3

Table 3.3 Operationalization of Variables

Objective	Variables	Indicators	Measurement Scale	Total of Analysis	Type of Data Analysis
To determine the extent to which capital availability influences completion of the infrastructure development projects in the renewable energy sector.	Financial/ Capital Availability	<ul style="list-style-type: none"> • Sufficiency • Timely • Incentives 	Nominal Ordinal	Mean Percentage	Quantitative and inferential statistics
To examine the influence of top management team on completion of the infrastructure development projects in the renewable energy sector	Top Management Team	<ul style="list-style-type: none"> • Fast deployment • Communication • Planning • Evaluation 	Nominal Ordinal	Mean Percentage	Quantitative Statistics
To investigate how training of infrastructure development team in the renewable energy sector affects their completion.	Training of Project Staff	<ul style="list-style-type: none"> • Training Needs Identification • Training Planning and Designing • Training Delivery • Training Evaluation 	Nominal Ordinal	Mean Percentage	Quantitative Statistics
To determine the extent to which technical team competency influences completion of the infrastructure development projects in the renewable energy sector.	Technical team competency	<ul style="list-style-type: none"> • Education background • Project completion rate • Critical thinking • Problem solving skills 	Nominal Ordinal	Mean Percentage	Quantitative Statistics
completion of the infrastructure development projects	Completion of Infrastructural projects	<ul style="list-style-type: none"> • Efficient use of resources , • Desired quality , • Business value. 	Nominal Ordinal	Mean Percentage	Quantitative Statistics

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The basis of this report is to study the success factors for infrastructural expansion projects in the renewable energy sector in Kenya, the case of KENGEN Company. Outcomes from the experiment study are presented in order of the research questions and relevant hypotheses. An argument of discoveries is presented at the end of each results section to facilitate interpretation of the results in relation to the research hypotheses and questions.

4.2 Preliminary data

This section displays the response rate and sample demographics which form part of preliminary findings of the research.

4.2.1 Questionnaire Response Rate

The percentages of the questionnaires completed and reverted by the respondents from the field are illustrated by the questionnaire response rate. The analyzed questionnaires are the ones that were returned. The response rate from the sample size is shown below in Table 4.1.

Table 4.1: Questionnaire Response Rate

Staff Category	Number	Sample
Top Management	15	7
Middle Management	124	60
Operational Management	342	71
Operation Staff	2350	112
Total	2831	250

250 of the targeted respondents filled and submitted the questionnaires which constituted a response rate of 74%. As noted by Mugenda and Mugenda (2003) this response rate is excellent and representative of the target population who hypothesize that a response rate above 70% is excellent whereas a rate of 60% is good and 50% is sufficient for analysis and reporting.

4.3 Demographic Characteristics of the Respondents

The study pursued to establish the background information of respondents. This included age, gender and level of education.

Table 4.2: Demographic characteristics of the Respondents

Age (years)	Frequency	Valid Percent	Male	Female
20 and below	42	17	17	25
21-30	72	29	37	35
31-40	65	26	42	23
41-50	40	16	24	16
51 and above	31	12	20	11
Total	250	100	140	110

As illustrated in table 4.2 above, a popularity of the respondents constituted the youth aged below 40 years. It indicates that most of the project members are the youth, while a few of the persons engaged are middle aged and the elderly. The information further shows that most respondents are males being 140(56%) while females are the minority at 110(44%) of the respondents. The above table further shows that in the past, the company has hired more males but in the recent past has embraced the practice of gender mainstreaming.

4.3.3 Illustration of respondents in accordance with time worked in KenGen

Table 4.3 Distribution of Respondents by time participated in the projects

Years worked	Frequency	Valid Percent	Cumulative Percent
Less than 3	28	11%	11%
3-5	55	22%	31%
6-10	78	31%	66%
11-15	41	19%	85%
Above 15	38	15%	100%
Total	250	100	

The above analysis shows that most of the respondents interviewed have worked in KenGen for less than 10 years. This confirms that most of the respondents were the youth.

4.4 Capital availability

The first objective was to scrutinize the role of capital availability in success of infrastructure projects.

Table 4.4 Capital Availability and success of infrastructural projects

Rating on effect of Capital availability	Frequency	Percent
Very high extent	95	38%
High extent	107	43%
Some extent	28	11%
Small extent	15	6%
No extent at all	5	2%
Total	250	100%

95(38%) of the respondents were for the opinion that Capital availability to a very high level affect the achievement of infrastructure projects. 107(43%) of the respondents were of the opinion that Capital availability to a high extent affect the success of infrastructure projects. 28(11%) were of the opinion that Capital availability to some extent affect the success of infrastructure projects. 15(6%) were of the opinion that Capital availability to a small extent affect the success of infrastructure projects. 5(2%) were of the opinion that Capital availability to no extent at all affect the success of infrastructure projects. From the above information, it is clear according to the opinion of majority that Capital availability to a high extent affects the success of infrastructure projects. Rating of occurrence ranked 1-5 (5 being very high extent) the mean was found to be 4.088 which indicated that Capital availability to a high extent affect the success of infrastructure projects and standard deviation 0.953.

4.5 Top management team Support and the success of infrastructural projects

The second objective was to establish the influence of top management team competence on the success of infrastructure projects.

Table 4.5 Top management team Support

Rating on effect of Top Management team Support	Frequency	Percent
Very high extent	79	32%
High extent	113	45%
Some extent	28	11%
Small extent	23	9%
No extent at all	7	3%
Total	250	100%

79(32%) of the respondents were for the opinion that top management team support to a very high extent affect the success of infrastructure projects. 113(45%) of the respondents were of the opinion that top management team support to a high extent affect the success of infrastructure projects.28(11%) were of the opinion that top management team support to some extent affect the success of infrastructure projects.23(9%) were of the opinion that top management team support to a small extent affect the success of infrastructure projects. 7% (3) were of the opinion that top management team competence to no extent at all affect the success of infrastructure projects. From the above information, it is clear according to the opinion of majority that top management team support to a very high extent affects the success of infrastructure projects. Rating of occurrence ranked 1-5 (5 being very high extent) the mean was found to be 3.936 which indicated that top management team support to a high extent affect the success of infrastructure projects and standard deviation 1.048.

4.6 Training of Project Staff

The third objective was to determine the influence of training project staff in the success of infrastructure projects.

Table 4.6 Training Project Staff and the success of infrastructural projects

Rating on effect of training project staff	Frequency	Percent
Very high extent	27	11%
High extent	115	46%
Some extent	47	19%
Small extent	38	15%
No extent at all	23	9%
Total	250	100%

27(9%) of the respondents were for the opinion that training project staff to a very high extent affect the success of infrastructure projects. 115(46%) of the respondents were of the opinion that training project staff to a high extent affect the success of infrastructure projects. 47(19%) were of the opinion that training project staff to some extent affect the success of infrastructure projects. 38(15%) were of the opinion that training project staff to a small extent affect the success of infrastructure projects. 23(9%) were of the opinion training project staff to no extent at all affect the success of infrastructure projects. From the above information, it is clear according to the opinion of majority that training project staff to a high extent affects the success of infrastructure projects. Rating of occurrence ranked 1-5 (5 being very high extent) the mean was found to be 3.34 which indicated that training project staff to a high extent affect the success of infrastructure projects and standard deviation 1.302.

4.7 Technical team competency

The fourth objective was to assess the influence of technical team competency in the success of infrastructure projects.

Table 4.7 Technical team competency and the success of infrastructural projects

Rating on effect of technical team competency	Frequency	Percent
Very high extent	50	21%
High extent	110	43%
Some extent	40	16%
Small extent	37	15%
No extent at all	13	5%
Total	250	100%

50(21%) of the respondents were for the opinion that technical team competency to a very high extent affect the success of infrastructure projects. 110(43%) of the respondents were of the opinion that technical team competency to a high extent affect the success of infrastructure projects. 40(16%) were of the opinion that technical team competency to some extent affect the success of infrastructure projects. 37(15%) were of the opinion that technical team competency to a small extent affect the success of infrastructure projects. 13(5%) were of the opinion that technical team competency to no extent at all affect the successful implementation of infrastructural projects. From the above information, it is clear according to the opinion of majority that technical team competency to a high extent affect the success of infrastructure projects. Rating of occurrence ranked 1-5 (5 being very high extent) the mean was found to be 3.588 which indicated that technical team competency to a high extent affect the success of infrastructure projects and standard deviation 1.255.

Table 4.8 Summary of Mean and Standard deviation computed for the variables.

Factors	Mean	SD
Capital Availability	4.088	0.953
Top management team	3.936	1.048
Training of project staff	3.34	1.302
Technical team competency	3.588	1.255

The mean calculated ranged between 3.34 and 4.088 stipulating a general high value response in the likert scale. Data was moreover analyzed with standard deviation which revealed homogeneity of response of the respondents thereby implying that there was a generally constant congruence between the independent variables and the success of infrastructure projects.

4.8 Pearson Correlation Coefficient

Pearson’s correlation coefficient is a measure of linear dependence between two variables. The researcher correlated the findings of each of the independent variables against that of dependent variables. The results are provided in Table 4.15.

Correlation coefficient,
$$r = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$$

Where x is the independent variable

y is the dependent variable

n is the number of respondents

Table 4.9 Correlation Analysis

		Capital Availability	Top management team	Training of project staff	Technical team competency
Capital Availability	Pearson Correlation	1			
	Sig (2tailed)	0.000			
Top management team	Pearson Correlation	0.9809	1		
	Sig (2tailed)	0.00001	0.000		
Training of project staff	Pearson Correlation	0.6135	0.7475	1	
	Sig (2tailed)	0.00001	0.00001	0.000	
Technical team competency	Pearson Correlation	0.8385	0.9254	0.9359	1
	Sig (2tailed)	0.00001	0.00001	0.00001	0.000

NB: Correlation is significant at the 0.05 level (2 tailed)

The result in table 4.14 revealed that there was a positive and significant relationship between Capital Availability and Top management team support ($r=0.9809$, $p=0.00001$). There was a positive and significant relationship between Capital Availability and Training of project staff ($r=0.6135$, $p=0.00001$). There was a positive and significant relationship between Capital

Availability and Technical team competency ($r=0.8385$, $p=0.00001$). There was a positive and significant relationship between Top management team support and Training of project staff ($r=0.7475$, $p=0.00001$). There was a positive and significant relationship between Top management team support and Technical team competency ($r=0.9254$, $p=0.00001$). There was a positive and significant relationship between Training of project staff and Technical team competency ($r=0.9359$, $p=0.00001$).

The Pearson correlation coefficient of the relation above showed a strong positive correlation between the variables. The findings revealed that the independent variables have positive significant relationship with success of infrastructural development. The findings of Tucci (2009) states that for infrastructure development continuity to be successful then business leadership must put focus on availability of factors to aid prop the project. The role of the leader should encompass setting the metrics that will drive disaster recovery decision making involving project staff, spending and culture developed in the lifespan of the project. Infrastructural development continuity needs to be perceived as a management activity that adds value to the economy (Wong & Shi, 2014). A study also by Gibb and Buchanan (2006) alluded to similar findings that the issue of the responsibility for project support should be one of the responsibilities of senior management.

The Pearson correlation coefficient of 0.5 showed a strong positive correlation between the variables. The findings revealed that Infrastructural Organizational systems have a positive significant relationship with infrastructural development continuity. This supports the study of Mintzberg (2014) who highlighted that there are many routine activities that are performed in an institution to keep it running smoothly and they should be carried out efficiently. The study was also in line with the findings of Wong (2014) who asserted that suitable reports on infrastructural development activities and the status of crisis management preparations are to be prepared for the Board and senior management at pre-defined intervals in the life of the infrastructural development cycle.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The summary of the key discoveries, discussions, conclusions and necessary recommendations are presented in this chapter. Findings are summarized accordingly with the objectives of the study.

5.2 Summary of Findings

This section presents the results from the study on success factors for infrastructural expansion projects in the renewable energy sector in Kenya, the case of KenGen Company.

5.2.1 Availability of Capital

It was established that majority of respondents are of the belief that availability of capital to a high extent affects the successful implementation of infrastructural projects in KenGen. The measure of central tendency revealed a slightly high mean of 4.1 which indicated that availability of capital to a high extent affect the successful implementation of infrastructural projects in KenGen and standard deviation 0.959. Hypothesis testing revealed significant relationship between availability of capital and the successful implementation of infrastructural projects in KenGen. Pearson correlation on response pattern of availability of capital with the response pattern of the other independent variables revealed high correlation coefficient of between 0.6135 and 0.9809 which confirmed credibility of the respondent information.

5.2.2 Management Team commitment

The study established that majority of respondents were of the opinion that management team commitment to a high extent affect the successful implementation of infrastructural projects in KenGen. The measure of central tendency revealed a relatively high mean of 3.95 which indicated that management team commitment to a high extent affect the successful implementation of infrastructural projects in KenGen and standard deviation 1.038. Hypothesis testing revealed a significant relationship between management team commitment and the successful implementation of infrastructural projects in KenGen. Pearson correlation on response

pattern of management team commitment with the response pattern of the other independent variables revealed high correlation coefficient of between 0.7475 and 0.9254 which confirmed credibility of the respondent information.

5.2.3 Training of project staff

The study established that majority of respondents were of the opinion that training to a high extent affect the successful implementation of infrastructural projects in KenGen. The measure of central tendency revealed a relatively high mean of 3.38 which indicated that training to a high extent affect the successful implementation of infrastructural projects in KenGen and standard deviation 1.144. Hypothesis testing revealed significant relationship between training and the successful implementation of infrastructural projects in KenGen. Pearson correlation on response pattern of training with the response pattern of the other independent variables revealed high correlation coefficient of between 0.6616 and 0.8258 which confirmed credibility of the respondent information.

5.2.4 Technical Team Competency

The study established that majority of respondents were of the opinion that technical team competency to a high extent affect the successful implementation of infrastructural projects in KenGen. The measure of central tendency revealed a relatively high mean of 3.736 which indicated that technical team competency to a high extent affect the successful implementation of infrastructural projects in KenGen and standard deviation 1.186. Hypothesis testing revealed significant relationship between technical team competency and the successful implementation of infrastructural projects in KenGen. Pearson correlation on response pattern of technical team competency with the response pattern of the other independent variables revealed high correlation coefficient of between 0.9359 and 0.8385 which confirmed credibility of the respondent information.

5.3 Discussion of Findings

Key findings on the determinants of successful implementation of infrastructural projects in KenGen are in tandem with Jiang (2005) who posit that for successful implementation of any project, success drivers include proposals for growing the influence of factors for success while decreasing the influence of factors for disappointment and use of existing upright way of doing

things. The input variables are categorized into factors for success (drivers and enablers), and factors for failure (barriers and inhibitors). Commitment by KenGen to promote success through increase of drivers and enablers and reduction of barriers and inhibitors is key to the successful implementation of infrastructural projects in KenGen.

The findings on capital availability are in line with Jones (2009) assertion that in order to win support of various stakeholders (The capital can be in form of monitoring of success, material contribution, resource mobilization, collaborative partnership and giving information) financing of the project must happen from the planning stages of the project. From this research majority of the respondents felt that capital availability to a high extent affect the successful implementation of infrastructural projects in KenGen with a mean of 4.088 which indicated that capital availability to a high extent affect the successful implementation of infrastructural projects in KenGen.

Findings on top management support conform to Hooper (2006) argument that aligning the top management activities with the organizational strategic goals helps the institute to progress its enactment. The key is to discover ways how to individually, and as a collection formed by organizational management particularly the first line managers, the proficiencies can be established and thus performance upgraded. Based on Personal Assessment Form the job explanations should be written, and a development plan made. From this research majority of the respondents felt that management support to a high extent affect the successful implementation of infrastructural projects in KenGen with a mean of 3.936 which indicated that management support competence to a high extent affect the successful implementation of infrastructural developments in KenGen.

Research findings on training are coherent to Ojala, (2013) who asserts that training is what happens when the project switch is turned on. It is often an underestimated task of the implementation of project since most project team members assume the project staff is competent and look onto other things. Correspondingly Bayot (2009) argues that training could be an indicator of an organization's level of commitment to the success of any project. It was clear according to the opinion of majority that training to a high extent affect the successful implementation of infrastructural projects in KenGen with a mean of 3.34 which indicated that training to a high extent affect the successful implementation of infrastructural projects.

Findings on technical team competence are in conformity with Cameron (2006) who argues that technical team competence is an enduring set of qualities, knowledge and capabilities that characterize organizations and their members and corporate organizations should align their competences with the strategic direction of the business. Majority of the respondents revealed that technical team competence to a high extent affect the successful implementation of infrastructural projects in KenGen with a mean of 3.588 which indicates a high rating on the effect of technical team competence to successful implementation of infrastructural projects in KenGen.

5.3 Conclusion

In order to acquire capital for various aspects of infrastructure project (The capital can be in form of monitoring of success, material contribution, resource mobilization, collaborative partnership and giving information) involvement of the financiers of the project must happen from the planning stages of the project. Establishing a transparent, clear vision for capital planning based on desired outcomes for the infrastructure is key to the success from conception of the project. Project managers should be certain of the complete funding of the project from the conception stage of the project.

Top management team support reveals the commitment any infrastructural project management has on ensuring the overall objectives of the project are achieved. It simply answers the questions; will the goals of the project be achieved? Will the deliverables function as planned? What will be the error rate of the project? Will user needs be met and what effect will the project have on them? If there is dissatisfaction on the way the management conducts itself, most or all of the following questions will not be resolved. The management should work towards handling any issues that arise and averting risks through strategizing through visionary planning. Top management support helps in assessing what works and what doesn't work and helps filling holes in the project.

Often, training develops employee competency organically over time from the cumulative training opportunities the employee attends. A company's training pattern will be echoed in its business philosophy, allocation of spending, turnover, hiring decisions, treatment of employees,

client satisfaction and every other aspect of operations. Training whether shaped purposely or grown organically, influence to the basic of a company's project implementation practice and upset every characteristic of business from each member to customer to public appearance.

Achievement of technical team competency involves aligning employee competences with the organization's strategic goals. This is achieved through proper recruitment and employee training through all phases of the project. The basis is to discovery ways how to separately, and as groups formed by organization sections, the capabilities can be established and consequently performance upgraded. The top players must be taught in such way that they are intelligent to keep up with their level without getting bored or start looking for new openings, and even cultivating their level to a higher notch. They need to be dared and specified to new chances in their day-to-day responsibilities. This doesn't essentially imply that they have to be prearranged with more labor or new work areas. They ought to be led to find more ways to do their current tasks even more professionally and to reach even additional goals. In most of the circumstances they have a long involvement in performing the task, but capability alone doesn't generate best performance. The greatest way to comprehend what makes the personnel decent to some degree, is to find out as of them. Some staffs may require training for certain skills, but similarly imperative is coaching and mentoring workforces when necessary.

5.4 Recommendations

1. This study has revealed the significance of availability of capital in relation to the successful implementation of infrastructural projects in KenGen. This research recommend more emphasize on effective utilization of funding criteria, and up until tenders are released and the regular project financing performance evaluation can be passed on to the individual departments, it is important to have a central headquarters for the coordination of utilization of the capital for the whole project. It further recommend mitigation of weakness so as to reduce risk of project letdown after the funding period. The study also recommends that, stakeholder analysis be carried throughout the project and involvement of the financiers throughout the life cycle of the project in order to guarantee sustainability of the project. In order to win support of various stakeholders, involvement of the stakeholders must happen from the planning stages of the project.

2. The consequence of the study demonstrates that there is a tremendously robust relationship amongst top management team commitment and the achievement of infrastructure project in KenGen. In infrastructure projects the Project Management team is measured to be one of the greatest imperative groups of individuals who can top and drive the projects in the right direction and accomplish the infrastructural project effectively. Furthermore, they can play the most significant role vis-à-vis the development of the organization's presentation, the organization's success and the customer's gratification. The research long-established that the management team is a very indispensable element to the success of the infrastructure project. It further has an impact at every stage of the project. So it is recommended that the recruitment of a management team should be prudently completed with esteem to experience, knowledge, power/authority and decent thoughtfulness to the kind of the project. Keywords: Project Management, Construction Management, Project Success Factors.

3. The research commends that training ought to be steered on time to time basis to guarantee that workers have the essential appointment to modification procedures, innovation; better routine and job eagerness for improved employee and organizational enactment. It also endorses that the management of KenGen desires to guarantee training policies are not only affiliated to output but also to improving employee enthusiasm for greater routine. Further KenGen management needs to evaluate its training strategies with respect to job satisfaction to ensure that the effects are uniformly attained across the organization.

4. Technical team competence of the project team ought to be aligned with the organization's strategic goals. This is achieved through proper recruitment and employee training through all phases of the project. The objective is to find ways how to independently, and as groups formed by organizational subdivisions, the capabilities can be advanced and thus performance improved. The best players need to be trained in such way that they are capable of keeping up with their level short of getting bored or starting to look for new prospects, and even refining their level. They must be defied and given new opportunities in their daily tasks. It doesn't fundamentally imply that they ought to be subjected to more work or new work areas. They ought to be led to finding additional methods of undertaking their daily responsibilities even much more skillfully and to achieve even more objectives. In most of the cases they have a long involvement in performing the task, but long time exposure alone does not generate top performance. The study

recommends some personnel be skilled for certain abilities, but correspondingly coached and mentored when need ascends.

5.5 Suggestions for Further Research

On the foundation of what has been originated out from this research, the researcher indorses that similar studies be conducted in other energy sectors other than KenGen since success of infrastructure in the energy sector is a combined effort of several players in the energy field working as a team. Similar studies should be conducted with different variables being; stakeholder participation, technological advancement, strategic leadership commitment among others.

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APENDICES

APPENDIX I: LETTER OF TRANSMITAL

9th September 2019

University of Nairobi
Department of Extra Mural Studies
P.O. Box 30197 00100
Nairobi

Dear Sir/Madam,

RE: DATA COLLECTION

I am Mr. Richard Ochako, a student at The University of Nairobi, pursuing a Degree of Master of Arts in Project Planning and Management, registration number: L50/71948/2014.

It is a requirement of the course that I collect data from the field with which a research project report will be prepared for presentation. My research topic is **FACTORS INFLUENCING THE COMPLETION OF RENEWABLE ENERGY INFRASTRUCTURAL PROJECTS: A CASE OF KENGEN COMPANY, NAKURU COUNTY**

All the data collected is related to the research topic mentioned and it is purely for academic purposes. Information gathered will be treated with utmost confidentiality.

Your cordial cooperation and sincerity will be highly appreciated.

Yours faithfully,

Richard Ochako

APPENDIX II: QUESTIONNAIRE

Please fill in the questionnaire as honestly and objectively as possible. The questionnaire seeks to determine factors that influence the completion of the infrastructure development projects in the renewable energy sector in Kenya: A case of KenGen Company Ltd, Olkaria. Please give as much information as possible and tick (✓) to fill in the spaces where applicable.

All responses will be treated with utmost confidentiality and used only for the intended purpose.

SECTION A: DEMOGRAPHIC INFORMATION

1 Your Name (Optional)

2 Your Gender (Please tick one only): Male [] Female []

3 What is your highest level of education? (tick as applicable)

Primary [],

Secondary [],

Certificate [],

Diploma [],

Undergraduate [],

Postgraduate [].

4 How long have you been an employee of KenGen (Choose one only).

Less than 2 years? [],

2 - 5 years [],

5 – 10 years [],

More than 10 years [],

5 What is your employment position at KenGen (Choose one only).

Management [],

Union [],

Contract [],

6 How long have you worked at Kengen (Choose one only).

Less than 3 years [],

3 – 5 years [],

5 - 10 years [],

10 – 15 years [],

More than 15 years [],

SECTION B: Capital Availability

7) To what extent do the following factors influence the completion of renewable energy projects? Use a scale of 1 to 5 where 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1-strongly disagree.

Factors	1	2	3	4	5
KenGen has sufficient amount of resources able to service its projects					
KenGen organization has its projects always done timely					
KenGen organization has design/structure supports implementation of renewable energy development projects					

SECTION C: Top management Team

8) To what extent do the following factors influence the completion of renewable energy projects? Use a scale of 1 to 5 where 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1-strongly disagree.

Factors	1	2	3	4	5
Fast deployment of staff					
Communication of timely information					
Planning of activities prior to their happening					
Evaluation of performance by management					

SECTION E: Training of Project Staff

9) To what extent does training of staff influence the completion of renewable energy projects? Use a scale of 1 to 5 where 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1- strongly disagree.

Factors	1	2	3	4	5
Training needs are identified and documented awaiting implementation					
There is design and planning of training					
The delivery of training is adequately performed					
There are evaluations conducted after training					

SECTION D: Technical team competency

10) To what extent does technical team competency influence the completion of renewable energy projects? Use a scale of 1 to 5 where 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1- strongly disagree.

Factors	1	2	3	4	5
The technical team staff education level influence completion of projects					
The technical knowledge affect completion of infrastructure projects					
Critical thinking affect completion of infrastructure projects					
Problem solving skills affect project completion of infrastructural projects					

SECTION F: Project Completion

12) To what extent do the following factors influence the completion of renewable energy projects? Use a scale of 1 to 5 where 5-Strongly Agree, 4-Agree, 3-Neutral, 2-Disagree, 1- strongly disagree.

Factors	1	2	3	4	5
The number of completed projects are as projected					
Project completion reports are availed in a timely manner					
KenGen has issued commensurate completion certificates that match projects					
Completed projects are of the envisioned quality					
The staff available are sufficient to supervise projects to completion					
Extension for completion dates are rare during KenGen's projects					

Thank you for your participation

APPENDIX III: KREJCIE AND MORGAN TABLE

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*



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

Your Ref:

Our Ref:

Telephone: 318262 Ext. 120

REF: UON/ODEL/NLC/31/290

Main Campus
Gandhi Wing, Ground Floor
P.O. Box 30197
NAIROBI

23rd October, 2019


TO WHOM IT MAY CONCERN

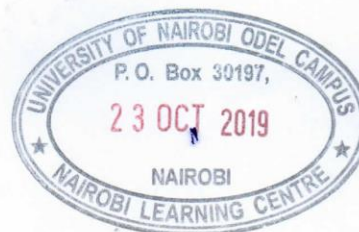
RE: RICHARD OGORO OCHAKO - REG NO: L50/71948/2014

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

He is proceeding for research entitled "*Analysis of success Factors for Infrastructure Development Projects in the Renewable Energy Sector in Kenya: The Case of KENGEN Company LTD*"

Any assistance accorded to him will be appreciated.


CAREN AWILLY
CENTRE ORGANIZER
NAIROBI LEARNING CENTRE





KenGen

**Kenya Electricity
Generating Company Ltd.**

Stima Plaza, Kolobot Road, Parklands
P.O. Box 47936 - 00100, Nairobi, Kenya
Telephone: +254-20-3666000 Fax: +254-20-2248848
Website: www.kengen.co.ke

Our Ref: Staff / 32 /JM /am

Date: 20th November, 2019

Richard Ogoro Ochako
University of Nairobi
P.O Box 30197
NAIROBI

Dear Richard,

RE: APPROVAL TO CONDUCT RESEARCH

Reference is made to your letter dated 23rd October, 2019.

This is to confirm that you have been granted an approval to conduct an academic research in our Company on "Analysis of success factors for infrastructure development projects in the Renewable Energy Sector in Kenya".

The data collected is strictly for the intended purposes only and should be treated in strict confidence. You are expected to submit a copy of your research thesis to the undersigned after completion of your research.

You will be accorded all the necessary assistance in your research.

Yours faithfully,

FOR: KENYA ELECTRICITY GENERATING COMPANY PLC.

SALLY KARAU

For: HUMAN RESOURCE DEVELOPMENT MANAGER



Signature

