

**FACTORS INFLUENCING IMPLEMENTATION OF RURAL
ELECTRIFICATION PROGRAMME IN KENYA: A CASE OF KIENI
EAST SUB COUNTY, NYERI COUNTY**

BY

KAREITHI ROSEMARY NYAMBURA

**A Research Project Report submitted in partial fulfillment of the requirements for the
award of the degree of Master of Arts in Project Planning and Management in the
University of Nairobi**

SEPTEMBER 2017

DECLARATION

This project report is my original work and has not been submitted or presented for examination in any other University, either in part or as a whole.

Signature: _____ **Date:** _____

Rosemary Nyambura Kareithi

L50/76201/2014

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

Signature: _____ **Date:** _____

Dr.George .O. Muhua

School of Mathematics

University of Nairobi

DEDICATION

I wish to dedicate this work to my husband James Kariuki and my daughter Pauline Wambui for their support and encouragement throughout my studies.

ACKNOWLEDGMENTS

I wish to acknowledge and thank the University of Nairobi and the Department of Continuing and Distance Education for giving me the opportunity to pursue the degree of Master of Arts in Project Planning and Management. My deepest appreciation goes to my Supervisor, Dr. Odwesso Muhua for his patience, guidance and constructive criticisms that helped me stay focused from the beginning of this work to the end. I thank all the Lecturers who taught me during the Master of Arts degree programme and all my dear classmates who contributed immensely in the group work and discussion.

TABLE OF CONTENTS

	Page
DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGMENTS	iv
LIST OF TABLES	viii
LIST OF FIGURES	x
ABBREVIATIONS AND ACRONYMS.....	xi
ABSTRACT.....	xii
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background to the Study.....	1
1.1.1 Nyeri County.....	2
1.2 Statement of the Problem.....	3
1.3 Purpose of the Study.....	4
1.4 Objectives of the Study.....	4
1.5 Research Questions.....	4
1.6 Significance of the Study.....	4
1.7 Delimitations of the Study	5
1.8 Limitations of the Study	5
1.9 Assumptions of the Study.....	5
1.10 Definition of Significant Terms	6
1.11 Organization of the Study	6
CHAPTER TWO: LITERATURE REVIEW	8
2.1 Introduction.....	8
2.2 Rural Electrification Programmes	8
2.3 Rural Electrification in Kenya	9
2.4 Funding and implementation of rural electrification programme.....	11
2.5 Cost of electricity and implementation of rural electrification programme	12
2.6 Alternative sources of power and implementation of rural electrification programme	13
2.7 Demand for electricity and implementation of rural electrification programme.....	14

2.8 Theoretical review	14
2.8.1 Stakeholder theory	15
2.8.2 Theory of Constraints	16
2.8.3 Rational Choice theory.....	16
2.9 Conceptual Framework.....	18
2.10 Knowledge Gap	18
2.11 Summary of literature	19
CHAPTER THREE: RESEARCH METHODOLOGY	20
3.1 Introduction.....	20
3.2 Research Design	20
3.3 Target Population.....	20
3.4 Sample Size and Sampling procedure	20
3.5 Data Collection Instruments	21
3.6 Validity and Reliability.....	22
3.6.1 Validity of Research Instrument	22
3.6.2 Reliability of the Research Instrument.....	22
3.7 Data Collection Methods	23
3.8 Data Analysis and Presentation.....	23
3.9 Ethical Considerations	24
3.10 Operationalization of Variables	25
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION	26
4.1 Introduction.....	26
4.2 Response rate	26
4.3 General Information.....	26
4.4 Funding and implementation of REP.....	28
4.5 Cost of electricity and implementation of REP	31
4.6 Alternative Sources of Power and implementation of REP.....	33
4.7 Demand for electricity and implementation of REP.....	35
4.8 Implementation of REP	37
4.9 Regression Analysis.....	41
4.10 Coefficients	42

4.11 ANOVA	44
CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS.....	45
5.1 Introduction.....	45
5.2 Summary of the findings and discussion	45
5.3 Conclusions.....	47
5.4 Recommendations.....	48
5.5 Suggestions for Further Studies	48
REFERENCES.....	49
APPENDICES	53
Appendix I: Letter of Introduction	53
Appendix II: Questionnaire for households	54
Appendix III: Interview Schedule for REA officials	60
Appendix IV: Research permit.....	62

LIST OF TABLES

Table 3.1: Operationalization of variables of the study	25
Table 4.1: Gender of the Respondents	26
Table 4.2: Age of the respondents in years	27
Table 4.3: Respondents' highest level of education	27
Table 4.4: Length of time lived in the area	28
Table 4.5: Marital Status of Respondents	28
Table 4.6: Funding affect REP implementation	29
Table 4.7: Funding affect on the implementation of REP	29
Table 4.8: Sources of funding	30
Table 4.9: Level of agreement on statements relating to funding	30
Table 4.10: Whether cost of electricity affect REP	31
Table 4.11: Extent to which cost of electricity affect the implementation of REP	31
Table 4.12: Level of agreement on statements related to cost of electricity	32
Table 4.13: Sources of power	33
Table 4.14: Whether alternative power affect the implementation of REP	33
Table 4.15: Extent to which alternative power influence implementation of REP	34
Table 4.16 Level of agreement on statement relating to alternative sources of power	34
Table 4.17: Whether demand for electricity affect the implementation of REP	35

Table 4.18: Demand for electricity influence on implementation of REP	35
Table 4.19: Level of agreement on statements related to demand for electricity	36
Table 4.20: Existence of REP	37
Table 4.21: Extent to which REP has been implemented	37
Table 4.22: Statements relating implementation of rural electrification programme	38
Table 4.23: Period under which REA has worked in REP	39
Table 4.24: Is funding given to REP adequate	39
Table 4.25: Extent to which cost of electricity affect the implementation of REP	39
Table 4.26: Usage of alternative Sources of power	40
Table 4.27: Extent to which other sources of power other than electricity affected the implementation of REP	40
Table 4.28: Extent to which demand for electricity affects implementation of REP	40
Table 4.29: Extent to which REP been implemented	41
Table 4.30: Extent of challenges in the implementation of REP in Kieni East	41
Table 4.31: Summary Table.....	41
Table 4.32: Regression Coefficient.....	43
Table 4.33: ANOVA.....	44

LIST OF FIGURES

Figure 2.1: Conceptual Framework	18
--	----

ABBREVIATIONS AND ACRONYMS

ESMAP	Energy Sector Management Assistance Programme
IAP	Indoor Air Pollution
ICT	Information Communication and Technology
IEG	Independent Evaluation Group
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power & Lighting Company
MDGs	Millennium Development Goals
MENR	Ministry of Environment and Natural Resource
OECD	Organization for Economic Co-operation and Development
REA	Rural Electrification Authority
REP	Rural Electrification Programme
UNDP	United Nations Development Programme
VOLY	Value of Lost Years
VOSL	Value of Statistical Life

ABSTRACT

The Government of Kenya through numerous policies and programmes have come up with the rural electrification programmes which is to play a crucial role in the provision of electricity to rural areas in a bid to spur human, social and economic development in the Country. However, the implementation of rural electricity programme has been a challenge to the government with only 36% of the rural population having access to electricity. Kieni East Sub County has experienced a low connectivity to electricity despite the government rolling out the rural electricity program in the entire Nyeri County. The purpose of this study was to determine the factors influencing the implementation of rural electrification programme in Kieni East Sub County. The specific objectives guiding the study included: to establish the influence of funding on the implementation of rural electrification programme, to assess the influence of cost of electricity on the implementation of rural electrification programme, to determine the influence of alternative sources of power on the implementation of rural electrification programme and to establish the influence of demand for electricity on the implementation of rural electrification in Kieni East Sub County. The study adopted a descriptive survey research design. The target population of the study was 4289 households and 10 Rural Electrification Authority Team in Kieni East Sub County. Simple random sampling and Purposive sampling was used to select a sample of 94 households and 5 Rural Electrification Authority Officials. The data was collected through structured questionnaires. Reliability of the questionnaires and validity was tested through piloting. Ethics in research was observed and responses were handled with utmost confidentiality, while the study ensured fair gender representation of respondents. The data was analyzed using statistical package for social sciences (SPSS) v20 and presented through tables and graphs for ease of understanding and interpretation showing frequencies, percentages, means, standard deviation and regression method. The study found that funding, cost of electricity, alternative sources of power and demand affected implementation of Rural Electrification Programme to a great extent. Thus, these factors play a key role in determining the success of the implementation of Rural Electrification Programme in Kieni East Sub County. The study recommended that subsidizing of consumer connections cost, wiring material cost and unit cost of energy should be lowered and also provision of incentives for investments in alternative power sources such as allocation of sufficient funds and timely disbursement for implementation of grid extension in Kieni East should be encouraged by involving policy makers and the government in formulation of policies favorable for the implementation of Rural Electrification Programme in rural areas of Kenya. The study suggests that further studies should be carried out on the influence of institutional factors on the implementation of rural electrification programs in Kenya. The study is of important to policy makers and government in formulation and implementation of policies concerning electrification in rural areas in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Despite widely recognized importance, electricity is not available everywhere with many people still depending on alternative sources of energy such as wood, charcoal and kerosene (Pellegrin & Tasciotti, 2012). Although literature indicates that rural electrification (RE) is a global phenomenon, 1.3 billion people in the World do not have access to electricity, representing 18 percent of the global population, many of them live in Africa and South Asia (IEA, 2013). Bringing electricity to rural areas started in United States of America (USA) in 1920s and by 1965, all the rural areas in USA had electricity (Katie, 2010). All Developed Countries and some Asian Countries such as Vietnam, Thailand and Sri-Lanka currently have access to electricity in rural areas. First growing economies have higher rural electrification rates with Brazil having rural access rate of 88%, China 99%, India 52.1% and South Africa 55% by 2009 (Alexander, 2010).

In Africa, rural electrification rate is at 28 percent with North Africa having access rate of 99 percent while Sub Saharan Africa has 18 percent (IEA, 2013). Affordability proves to be an obstacle in trying to ensure access to reliable modern energy in Sub-Saharan Africa. The rural populations are poor and vulnerable hence there is continued dependence on traditional source of fuel for domestic use (Abdullah & Markandya, 2012).

In Kenya, Rural Electrification Programme was launched in 1973 to support both non-economic and commercial schemes in the rural areas with KPLC acting as the managing agent on behalf of the government. Rural Electrification Authority (REA) was charged with the responsibility of accelerating the pace of rural electrification in the Country. The Kenya Electricity Act amended in 1997 empowers the Minister of Energy to re-establish the Rural Electrification Programme Fund to support electrification in rural areas and other areas considered economically unviable for electrification by public electricity suppliers. Furthermore, the Minister may impose a levy of up to 5% on all electricity consumed in the

Country, the proceeds of which go into the Rural Electrification Programme Fund.

Despite, the substantial progress made towards the realization of sustainable development in the last decade, availability, accessibility and affordability of electricity for all people is still a major challenge around the World. Despite Kenya having a Rural Electrification Programme the implementation of the Programme has been a challenge (Mwangi & Ngugi, 2014). Kenya, with a total population of over 41 million, has a significant low level of electricity supply, standing at 1500 Megawatt hour (MWh) compared to Finland with a population of around 5.5 million but with energy supply of 400,000 MWh (Abdulla and Markandya, 2007). Insufficient attention to rural electrification in the Kenya by the Government has contributed to the widening gap in electricity access between the rural population and urban population (Abdullah & Markandya, 2012). The trend has occurred in almost all the Developing Countries where the respective governments have struggled with the issue of low electrification rates in their rural areas.

1.1.1 Nyeri County

Nyeri County is located in Central Kenya. It is one out of the five Counties in the former Central Province it has 8 Sub Counties namely Othaya, Tetu, Nyeri Municipality, Mukurweini, Mathira East, Mathira West, Kieni East and Kieni West. The total population of Nyeri County as per the statistics of National Census of 2009 is 693,558 (339,725 males and 353,833 females). Nyeri County is largely an agricultural economy with 53% of the residents in agricultural production. Tea, coffee and dairy farming are the major activities. The poverty level of Nyeri County is 32.7% with an age dependency ratio of 100:68. Rural electrification has been done in some areas in Nyeri County with the coverage being 26.33% of the households according to 2009 Census.

Kieni East is one of the Sub County in Nyeri County and is located about 156 kilometers east of Nairobi. The Sub County is made up of four Wards which include Naro-moru, Thegu, Kabaru and Gakawa. The main economic activity is subsistence mixed farming, where people plant maize, beans and potatoes and rearing of domestic animals. This being where agriculturally potential land is available, people from other areas are buying land and migrating in large numbers.

Kieni East Sub County has had electrification projects being implemented since the rolling of the Rural Electrification Programme. In Kieni the Rural Electrification Programme seeks to facilitate competitive, client-friendly and development-oriented organization for financing and promoting projects covering power generation, power conservation, power transmission and power distribution network though the accessibility to electricity in the area still remains low. According to REA (2014) in the more than 4,000 households in Kieni East approximately 700 households are connected to electricity.

1.2 Statement of the Problem

The Government of Kenya through the Kenya Rural Electrification Programme has played a crucial role in the provision of electricity to rural areas in a bid to spur human, social and economic development in the Country. However, the implementation of rural electricity programmes has been a challenge to the government with only 36% of the rural population having access to electricity (Republic of Kenya, 2013). This clearly shows that the poor who are the majority in the rural areas lack access to electricity and fail to get the benefits accrued from electricity.

There are various local studies done on rural electrification in Kenya. Dufe (2015) focused on accessibility to rural electrification in Naivasha, whereas Mwiti (2014) focused on the influence of rural electrification on poverty eradication. Research shows that in Nyeri County, Kieni East Sub County is the least beneficiary of the rural electrification programme having very few households connected to electricity compared to other Sub Counties in Nyeri County (Muturi, 2015). According to R.E.A (2014), despite access to electricity in Kieni standing at 46.7% the connectivity level was less than 20%.

The challenges in the implementation of the Rural Electrification Programme in Kieni East are the subject of this study. The researcher has identified a gap in knowledge and seeks to determine the factors influencing the implementation of rural electrification programme in Kenya, with a special focus on Kieni East Sub County in Nyeri County. The question is what are the factors influencing implementation of rural electrification programme in Kieni East Sub County?

1.3 Purpose of the Study

The purpose of this study was to determine the factors influencing implementation of rural electrification programme in Kieni East Sub County, Nyeri County, Kenya.

1.4 Objectives of the Study

- i. To establish the influence of funding on the implementation of rural electrification programme in Kieni East Sub County.
- ii. To assess the influence of cost of electricity on the implementation of rural electrification programme in Kieni East Sub County.
- iii. To determine the influence of alternative sources of power on the implementation of rural electrification programme in Kieni East Sub County.
- iv. To establish the influence of demand for electricity on the implementation of rural electrification programme in Kieni East Sub County.

1.5 Research Questions

- i. To what extent does funding influence the implementation of rural electrification programme in Kieni East Sub County?
- ii. To what extent does the cost of electricity influence implementation of rural electrification programme in Kieni East Sub County?
- iii. How do alternative sources of power influence implementation of rural electrification programme in Kieni East Sub County?
- iv. How does the demand for electricity influence the implementation of rural electrification programme in Kieni East Sub County?

1.6 Significance of the Study

This study is important to the policy makers and the government. It will provide information on the factors influencing the implementation of the rural electrification program in Kenya. This will assist the government in the formulation of policies concerning the electrification in rural Kenya.

The study will also be important to the researchers and academicians as it will act as a guide for future researchers interested in undertaking a study on implementation of rural electrification in Kenya.

The findings from the study will be of great benefits to the project planners and implementers. Project planners will take special interest in the factors influencing the implementation of electrification programme in rural Kenya. By understanding the factors, they will be able to facilitate project implementation and planning as far as electricity in rural areas is concerned.

1.7 Delimitations of the Study

The study focused on the factors influencing the implementation of rural electrification programme in Kieni East Sub County in Kenya. The target population was the households in Kieni East Sub County. This was because the main focus of the REP in Kenya is the households.

1.8 Limitations of the Study

Some of the limitations that were encountered included the unwillingness of some respondents to respond to some questions. To ensure timely collection of the data, the researcher took the respondent through the questionnaire for more clarity. The study was only carried out in Kieni East which limited the generalizability of the study.

1.9 Assumptions of the Study

The study assumed that the sample size would be representative of the population so as to ensure generalization of the findings. In addition, the study assumed that the data collection instruments would have the construct validity meaning that both content and predictor validity would be realized in order to draw findings that were logical indeed. It was further assumed that the respondents in the study would truthfully respond to the questions in the questionnaire.

1.10 Definition of Significant Terms

Cost	This refers to the price that has to be paid for electricity connection and the monthly electricity fees.
Demand for electricity	This is the act of developing the need for electricity and having the determination to be connected to the grid as a right, based on the need and awareness as well as having the ability and willingness to pay.
Funding	This is the process of providing finances to cater for electricity connection costs and can be done by the government, donor, community, institutions and individuals.
Implementation	This refers to rolling out of the government programme of ensuring expansion of rural electricity.
Power Sources	This refers to alternative methods by which people are able to obtain energy without necessarily being connected to the national electricity grid and they may include solar power, bio energy and kerosene among others.

1.11 Organization of the Study

The study is organized in five Chapters. Chapter one introduces the study in the context while defining the problem under investigation. The objectives are stated and the significance of the study outlined. The limitations as well as the delimitations of the study are described and further, the key assumptions and the key terms are defined.

Chapter two reviews the related studies with a view to generate the relational aspects of the concepts. The rural electrification concept is discussed and the theoretical framework given with the relevant theories explained. The relationship between the variables is conceptualized and the summary of the literature given.

Chapter three contains the research methodology. This include the research design, the target population, the sample and sampling procedures, the data collection procedures as well as the instruments used to collect the data. The data analysis techniques are explained with ethical considerations given.

Chapter four covers the data analysis, presentation and interpretation. The data is presented using tables and a thematic approach focusing on the study variables used. Chapter five contains the summary of findings, discussion of the findings based on the themes from the study variables, conclusions and recommendations. The suggestions for further research is outlined.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on rural electrification from Global, Africa and Kenya perspective. It also presents relevant theories and a conceptual framework on which the study is based.

2.2 Rural Electrification Programmes

Electrical energy is one of the prime inputs for social and economic development globally and remains partly a fundamental prerequisite to economic development (Ahlborg & Hammar, 2014). Most Developing Countries underpin the need for RE policies in intensifying RE programs, especially in Sub-Saharan Africa where over 585 million people lack access to electricity (IEA, 2015). Electricity access is increasingly at the forefront of governments preoccupations, especially in the poorest Countries. As a consequence, a lot of rural electrification programs and national electrification agencies have been created in these Countries to monitor more accurately the needs and the status of rural development and electrification.

China implemented the RE program and currently has only 0.6% population without connectivity. Through this program, China adopted a six phase framework aimed at developing locally managed electrical programs, and combination of central grid extension, local grids and off-grid solutions (Zhang & Kumar, 2011). Conversely, cooperatives and government electricity providers in Costa Rica expanded RE increasing its adoption to almost 100%. Bangladesh has experienced a more balanced approach towards rural electrification and subsequent success by underpinning to power residential units and advocate for optimal productive usage (Barkat, 2010).

North Africa is the region with highest connectivity (99%) in Africa. Tunisia's is the most electrified Country with 99.5% connectivity in this region (IEA, 2015). Tunisia success has been due to state commitment, integrated rural development process, effective institutional

approach and effective tariff policy (Cecelski & Ounalli, 2012). Sub-Saharan Africa has experienced low rural electrification rates with only 14.3% connectivity. Despite significantly low rates of RE accessibility in Africa, some Countries have substantially increased RE among them, for instance Ghana (with urban and rural accessibility at 99% and 49% respectively). The Ghanaian success story has been attributed to long-term energy planning with clear targets, availability of external funding, and active central government participation in the implementation of energy policies (Kemausuor et al., 2014). In South Africa, technology development through prepaid metering and blanket electrification, played an essential role in reducing the real cost per connection and thus contributed to the attainment of social objectives of the electrification program (Bekker, Eberhard, Gaunt & Marquand, 2014). Evidently, successful RE programmes have been realized under intense political support, participation of special institutions and local committees.

2.3 Rural Electrification in Kenya

Globally, 1.456 billion people have no access to electricity of which 83% are in rural areas. This is no exception in Kenya where majority of people in rural areas have no access to electricity and rely heavily on wood for cooking, which has adverse effects related to indoor pollution and health complications. Collecting firewood too takes a lot of time which mainly affects girl child education as girls are the ones who usually collect firewood. In Sub Saharan Africa 12% of rural population have electricity which is far less than the 35.4% average access of Developing Countries Worldwide (MoE, 2012).

Kenya's efforts towards rural electrification are stipulated in the Government's Sessional Paper Number 4 on Energy (MoE, 2013). This is the paper that laid the foundation for the formation of the Rural Electrification Authority (REA), which was charged with the responsibility of accelerating the pace of rural electrification in the Country and ensure that affordable, cost-effective and adequate quality energy sources are made available on a sustainable basis.

REA was established in 2007 under Section 66 of the Energy Act of 2006 with the principal mandate of extending electricity supply to rural areas, managing the rural electrification fund, mobilizing resources for rural electrification and promoting the development and use of

renewable energy (MoE, 2013). In Kenya, therefore, rural electrification projects are mainly undertaken by the REA, though some works are carried out by Kenya Power and Lighting Company (KPLC), which also connects customers and operates and maintains the national grid. The objective of the Rural Electrification Programme (REP), which is financed by the government, is to provide electricity in areas that are far from the national grid, and where electricity supply projects are not commercially viable, with a view to improving the social and economic lives of Kenyans in those areas.

In 2010/2011, the government, through KPLC and REA implemented a total of 1,033 projects spread across constituencies, projects which benefitted 734 market centers, 535 public schools, 34 polytechnics, 177 health centers, 44 government centers, 31 coffee factories, 75 tea-buying centers and 127 water projects among others. However, despite all these efforts, electricity access and connectivity rates still remain low in rural Kenya. One reason for this low level of electrification in rural areas is the lack of finance to cover capital and operating costs for generation, transmission and distribution of electricity, which are all higher than in urban areas.

A study by Abdullah and Markandya, (2012) on rural electrification programmes (REP) in Kenya indicates that rural electrification has faced setbacks due to high connection costs. The willingness to pay (WTP) to be connected to the grid and photovoltaic services is less due to the high cost which the government needs to deal with through reforming the energy sector by giving subsidies.

The Kenya overall electrification rate in rural area is 14% which far below the Sub Saharan Africa level of 23 % (Abdullah & Markandya, 2012). Lack of enough capital in rural areas has led to poor electrification as the cost increases with distance from the grid, which makes connection cost in urban areas cheaper than in rural areas. The low consumption of electricity in rural areas and low income makes extension of grid to those areas uneconomical. In Kenya, wood fuel provides up to 70% of the energy sector except for transport and commercial purposes. This has led to high indoor air pollution.

Kieni East Sub County is significant beneficiary of the rural electrification programme. Some rural households in the district have been connected to electricity. There are a number of challenges to the smooth achievement of the rural electrification in Kieni East. These include power line management, vandalism and distribution of transformers (Brian, 2013). Power supply disruptions caused by the transformer vandalism have become very difficult to predict hence difficult to control. A lot of resources have been put in place in engaging security services leading to a lot of arrests but the syndicates appear difficult to dismantle due to weak legislation and the law enforcers have no capacity or knowledge to understand the socio-economical implication of theft and vandalism.

2.4 Funding and implementation of rural electrification programme

Barnes & Foley (2009) revealed that the financial viability of electricity distribution utilities is governed by the balance of costs and revenues generated from sales of energy and the cost of providing service. Due to lower population density, often lower income, and concurrently lower specific energy consumption for rural communities, rural distribution systems realize far lower revenue per kilometer of rural distribution line than their urban counterparts. Moreover, Zhang & Kumar (2011) observes that, rural distribution service providers are also faced with higher operating expenses per household or commercial consumer served, given their lower energy density. Additionally, rural electric service providers recruit management and staff resources from communities that often have fewer trained engineers, accountants, financial specialists, and customer service specialists due to lower levels of professional and practical skills training. In short, the business of rural electrification provides few financial incentives for distribution service providers, while presenting significantly higher risks than those faced by urban distribution service providers (Barnes & Floor, 2006).

The emerging of power sector reforms such as commercialization, structural changes and privatization, and the relative success of the reforms in pioneer Countries stimulated adoption of similar reforms in many Countries (Wamukonya, 2003). Further, financing institutions such as the World Bank believed that the reforms could help improve technical and financial performance of the power sector and as such, started incorporating conditions for reforms in lending agreements (World Bank, 2010).

South Africa instituted an electrification programme that was funded mainly through cross subsidies and a consumer levy by the country's main utility, Eskom and the municipalities (Philpott & Clark, 2002). The National Electricity Regulator (NER) was responsible for management and administration of the RE fund and allocated subsidies to electrification concessionaires, set prices and regulated the performance of the companies. With this approach, South Africa was able to increase the level of access to electricity from 40% in 1994 to 66% (46% rural, 79% urban) in 2002. In other African Countries, RE was mainly financed by government subsidies. However, increased donor support was experienced in many African Countries such as Uganda and Zambia following reforms. With support from the Swedish Agency for International Development (SIDA), Zambia established some Energy Services Companies (ESCOs) that supplied electricity to selected rural areas using solar PV systems (SEI, 2001).

Funding plays a great role in the formulation of Renewable Energy Technologies (RETs) policies. Majority of advanced and electric RETs are not affordable to most of the population in Africa who are poor, with poverty degrees of between 50 to 70% (UNDP, 2009). This is true particularly for RETs that have huge cost of imported parts, than those that can be locally produced and assembled utilizing locally available parts. The RETs with huge cost of importing parts put an extra burden on foreign exchange reserves of African economies, which are frequently little and approaching exhaustion, and needs expensive funding strategies and huge subsidies (Karekezi & Kithyoma, 2003). The subsidies are unsustainable in the long term, except when the technologies given are planned to include income generation.

2.5 Cost of electricity and implementation of rural electrification programme

According to Schillebeeckx, Priti, Rahul and Gerard (2013), affordability of rural electrification program is determined by the capital cost and periodic payments further noting that in Bolivia a small grid doubled its connections by spreading the connection charges over 5 years while Malawi Electricity Company which demanded full upfront payment of 30 years cost of line extension resulted in a 2% rural electrification rate. In Thailand, electricity

related materials were standardized and manufactured locally, reducing procurement and transportation costs (Pellegrin & Tasciotti, 2012).

House wiring, connection charges and power tariff are a major constraint to the poor in accessing electricity. Cook (2013) revealed that the issues to addressing access of electricity to the poor have been addressed through ensuring that first, service providers provide access, the second instrument is required to reduce connection costs through tariff design or direct subsidies built in payment plan favoring the poor and third is to increase range of service providers to avail consumers with choice. Cook (2013) further indicated that achievement is difficult and slow and understanding of the issues that act as constraints are incomplete.

2.6 Alternative sources of power and implementation of rural electrification programme

Kenya is endowed with a significant amount of alternative power sources which includes biomass and biogas among others. Solar and wind are readily available with significant access of both rural and urban population (Jacobson, 2004). The affordability of the alternative sources of power is linked to the economic income of the population. In the upcountry, most people are able to afford biomass energy that is derived from woodlands, farm lands, bush lands, closed forests, plantations, industrial and agricultural residues. The forests provide over 45% of the biomass energy that is the largest means of alternative energy used in Kenya - both rural and urban areas. Solar and wind are also affordable compared to other sources of power like nuclear, fossil, coal, hydro and liquefied petroleum gas. A small section of the population uses hydro power and diesel fueled power.

The reliability of the alternative sources of power is based on the individual source of power. Hydro and diesel fueled power are unreliable because of the availability of diesel fuel in some areas where there is scarcity of fuel and hoarding by the dealers awaiting price increase to maximize profit. The wear and tear of the diesel generators affects its reliability. Biomass energy, solar and wind are reliable for a significant number of people across the Country. It has got less of other related costs compared to the diesel fuel generators (KIPPRA, 2007). Preference to most of the people is the biomass and solar. The availability of trees especially

in rural areas motivates people to use the biomass energy sources like wood. Solar is readily available in the Country with minimal related costs for buying and maintaining solar panels.

2.7 Demand for electricity and implementation of rural electrification programme

Rural households not only have limited access to modern energy sources but also have low demand for it due to high cost associated with electricity including connection fee and monthly charges compared to alternative fuel sources that are easily accessible due to low cost of connection and maintenance. For both electrified and non-electrified households, the three fuel sources: firewood, charcoal and kerosene represent a major proportion of their usage and some use solar energy. However, in comparative terms these three fuel sources take up 98% of the non-electrified total energy expenses, whereas the figure is 65% for their electrified counterparts. This means that the non-electrified households are spending considerably more on these traditional fuels than electrified households. One way of reducing the consumption of these fuels by the non-electrified is to provide them with electricity (Eberhard & Gratwick, 2005).

Rural areas have three categories of energy use: household energy, agricultural energy and energy for small/micro enterprises this influence the demand for the electricity. Despite the demand of electricity in rural areas, the generation of electricity remains low in Developing Countries leading to insufficient supply of generation that does not match with the demand for electricity.(Pellegrin & Tasciotti,2012).The attitude that rural people have that they cannot afford electricity and electricity is expense cause them to have low demand for electricity and turn to other sources of energy which includes solar,wood,kerosene and biogas among others.(Jacobson,2004)

2.8 Theoretical review

The study is based on various theoretical foundations. The theories relevant to the study are reviewed under this section. The reviewed theories include stakeholder theory, theory of constraints and rational choice theory.

2.8.1 Stakeholder theory

Stakeholder Theory was advanced by Edward Freeman in 1994. The basic idea of stakeholder theory is that organizations have relationships with many constituent groups and that it can engender and maintain the support of these groups by considering and balancing their relevant interests (Kirsi, 2010). Kirsi (2010) further noted four premises of the stakeholder theory that; corporations have relationships with many constituent groups (stakeholders) that affect or are affected by its decisions, the theory is also concerned with the nature of these relationships in terms of both processes and outcomes for the firm and its stakeholders, that the interests of all (legitimate) stakeholders have intrinsic value and not one set of interests is assumed to dominate others, and finally the theory focuses on managerial decision making. Based on the argument of instrument of power of this theory, a company using stakeholder approach will have increased organizational performance in terms of economics and other criteria.

Kirsi (2010) noted that while having its origins in strategic management, stakeholder theory has been applied to a number of fields, presented and used in a number of ways that are quite distinct and involves very different methodologies, concepts, types of evidence and criteria of evaluation. Similarly, Lynda (2006) after examining stakeholder theory concluded that the support of key stakeholders was essential for project success and consequently the success of programs. In relation to the study the theory can be applied in that managers of REP should on the one hand manage the organization for the benefit of its stakeholders in order to ensure their rights and participation in decision making and on the other hand the management must act as the stakeholder's agent to ensure the survival of the Authority to safeguard the long term stakes of each group. The theory is relevant in that the stakeholders in the rural electrification should be involved in the implementation of the rural program. Where some stakeholders like the community are not involved the implementation of the program may be faced by hitches. The program should also benefit each and every stakeholder in order to enhance its implementation.

2.8.2 Theory of Constraints

Theory of constraints (TOC) began as a production scheduling aid, developed by Eliyahu Goldratt in the late 1970s, terming it as ‘optimized production time table’ and was quickly developed in to a software package commonly known as optimized production technology. Ten years later, due to failures caused by the expectations associated with a turnkey package led Goldratt and others to realize that what was needed was to convince people to change ways, rather than tailor the package to simply automate their old policies and procedure – changes to their thinking and actions were needed if the potential gains were to be realized (Ruhl, 1996).

Sebastiano and Ragnhild (2014), revealed that what is considered as a constraint in project management can be categorized in to four; as political constraints (such as defined vision, mission, scope of projects), technical constraints (such as competencies, technologies, existing infrastructure and natural conditions like geology, landscape and climate), social constraints (such as codes of conduct, organizational hierarchies, personal relationships and accepted/expected behaviors) and administrative constraints (such as budgets, project schedules, scope, written contractual agreements among others).

Theory of Constraints (TOC) challenges managers to rethink some of their fundamental assumptions about how to achieve the goals of their organizations, about what they consider productive actions, and about the real purpose of cost management. TOC emphasizes the optimization of performance within the defined set of constraints of the existing processes and product offerings. Therefore, the study identifying the factors influencing the implementation of rural electrification program can lead to developing necessary remedies for overcoming constraints created by such factors.

2.8.3 Rational Choice theory

Rational Choice Theory was advanced by George Homans in 1961 and is an economic theory that assumes that individuals always make prudent and logical decisions that provide them with the greatest benefit or satisfaction and that are in the best self- interest (Scott cited in Browning et al, 2010). Most mainstream economics and theories are based rational choice

theory. Rational Choice theorists believe that most human decisions are based on maximizing a person's own benefits, while minimizing that which can hurt the individual.

Rational choice theory is a framework for understanding and often formally modeling social and economic behavior. It is the paradigm in the currently dominant school of microeconomics. Rationality is widely used as an assumption of the behavior of individuals in micro economic models and analysis which appears in almost all economics dealing with decision- making. Rational choice theory uses a specific and narrower definition of rationality, simply to mean that an individual act as if balancing costs against benefits to arrive at action that maximizes personal advantage (Scott,2000). In rational choice theory, the costs are only extrinsic to the individual rather than being intrinsic. This theory is relevant to the study in that it provides a basis for understanding the implementation of rural electrification in that the stakeholders have to make a decision on whether to implement the programme based on various factors.

2.9 Conceptual Framework

To assess the factors affecting the implementation of rural electrification like funding, cost of electricity, alternative sources of power, and demand of electricity was considered in the study. The relationship between the factors and the implementation is conceptualized in the figure 2.1.

Independent variables

Dependent variable

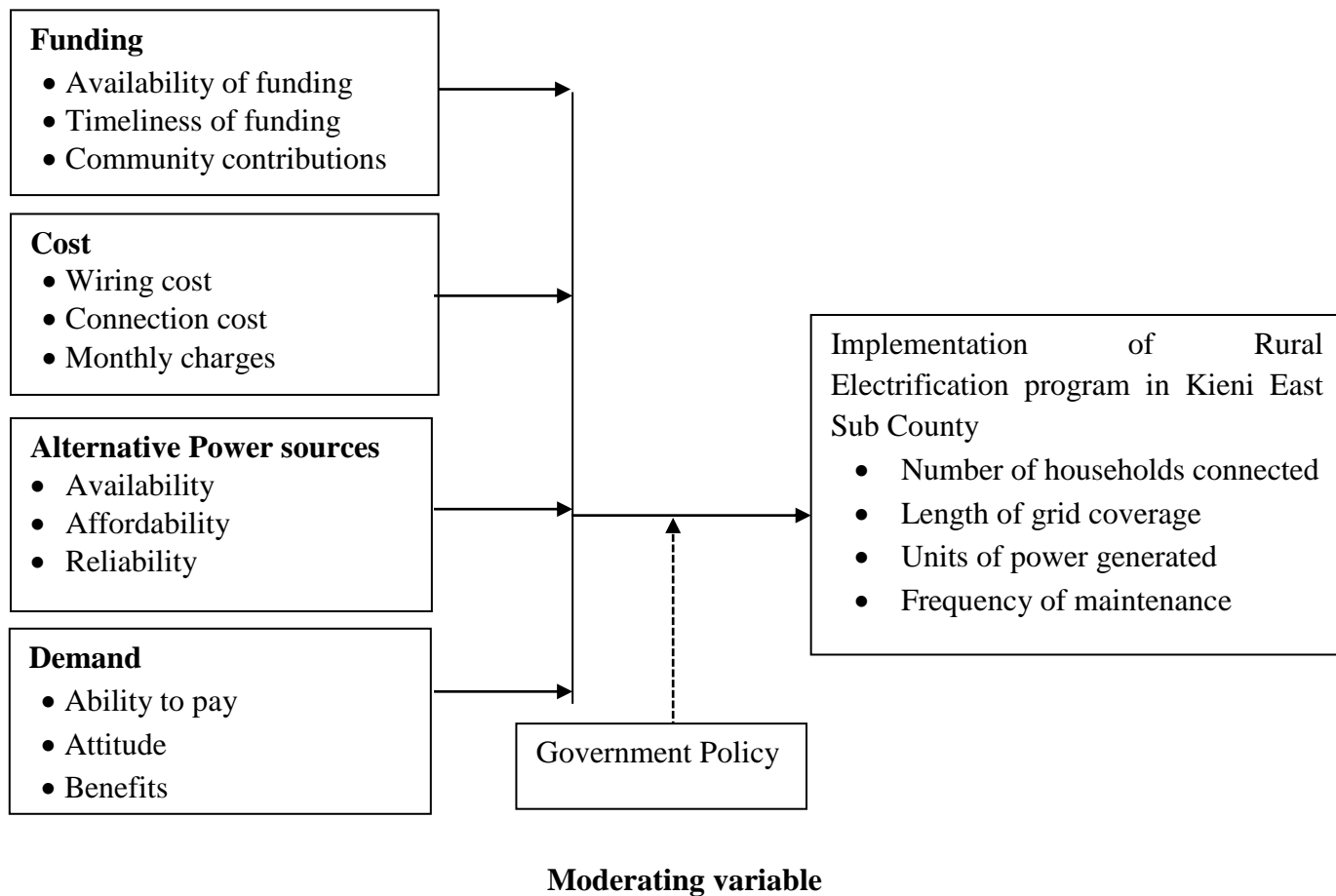


Figure 2.1: Conceptual Framework

2.10 Knowledge Gap

Most of the studies reviewed in the study have been carried out in developed economies other than developing economies like Kenya. Local studies have been carried out on electrification in rural Kenya. Kariuki (2014) did a study on the relationship between rural electrification and micro enterprises performance in Muranga County. Results revealed that electricity adoption was positive and significantly related with business performance. Ogalo (2011) did a study on the factors influencing electricity distribution in Nyamarambe Division, Kisii County. The study found out that cost of electricity connection was considered unaffordable and vandalism comprised security of electricity distribution network. Dufe (2015) sought to determine the factors influencing accessibility of rural electrification in Naivasha constituency. The study found that monitoring is not conducted on a continuous basis and public participation was found to be lacking. The local studies despite focusing on rural electrification have failed to establish the factors influencing implementation of the REP. They have also focused on other areas other than Kieni which creates a research gap. This study will be conducted in Kieni East Sub County since a rural electrification scheme has been carried out in the Sub County but minimal households have benefited. This creates a knowledge gap that this study seeks to fill.

2.11 Summary of literature

The study seeks to determine the factors affecting the implementation of rural electrification programme. Rural Electrification in Kenya is done through the Rural Electrification Authority (REA). The Authority ensures increased access to electricity in the rural areas. The study is based on the rational choice theory, stakeholder theory and the theory of constraints whose relevance to the study is indicated. The factors influencing the implementation of rural electrification programme have been discussed and the relationship between study variables has been conceptualized into funding, cost, alternative power sources and demand of electricity as the independent variables with implementation of rural electrification programme as the dependent variable. The relationship is moderated by the government control on the electrification in the Country.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that was used to carry out the study. The sub topics under this chapter included: research design, target population, sample and sampling design, data collection methods and data analysis techniques.

3.2 Research Design

This study used a descriptive survey research design. According to Mugenda and Mugenda (2003), this method involves coverage of large population but selecting and studying part of the population. The descriptive survey was credited for the study due to the fact that it allows analysis and relations of variables of the study. A survey was appropriate so as to enable the researcher to compare findings from different categories of study units [households] which enriched the information for the study. This requires a broad range of data which is only possible through a survey.

3.3 Target Population

Mugenda and Mugenda (2003) argue that the target population should have observable characteristics to which the study intends to generalize the result of the study. The target population of the study was 4,289 households in Kieni East Sub County (KNBS, 2015) and the 10 REA officials were also targeted by the study.

3.4 Sample Size and Sampling procedure

The study used Fisher, Laing and Stoeckel (1983) formula to arrive at the sample size that was used in this study. A sample of 94 households was selected for the study. Fisher, Laing and Stoeckel formula was used since the target population was large. The selection formula was:

$$n = Z^2 p \cdot q \frac{N}{e^2(N-1) + Z^2 p \cdot q}$$

Where n= the required sample size

p = proportion of population with the required characteristics of the study. If there is no reasonable estimate, then use 50 percent (the sample will be maximized at this value).

q = proportion of population without the required characteristics of the study (1-P)

N = Total population

e = accuracy level required Standard error = 5%

Z = Z value at the level of confidence at 95% = 1.96

$$n = 1.96^2 * 0.5 * 0.5 \left[\frac{4289}{(0.05^2 * 4288) + (1.96^2 * 0.5 * 0.5)} \right]$$

$$n = 0.9604 \left(\frac{4289}{42.88 + 0.9604} \right)$$

$$= 0.9604 \left(\frac{4289}{43.8404} \right)$$

$$= 0.9604 * 97.83214$$

$$= 93.95799$$

$$n = 94$$

According to Kothari (2004) sampling involves the selection and analysis of a small number of events, objects or individuals so as to make a conclusion about something from the entire population from where the sample is selected. Simple random sampling was used in selecting the 94 households who were used in the study. Purposive sampling approach was used to select 5 REA officials and the 94 respondents who were involved in the study. Purposive sampling allows the researcher to get cases that have the required information with respect to the objectives of his/her study (Kothari, 2004). It is a deliberate non-random method of sampling which aims at selecting a sample of people, settings or events with predetermined characteristics.

3.5 Data Collection Instruments

The data collection instruments used in the study was two sets of questionnaires, one for REA and one for all the other respondents. They were administered to the respondents who provided the information required. The questionnaires had closed-ended questions and Likert scale questions based on the objectives of the study. Closed-ended questions are helpful in

testing the score of a variety of characteristics, which helps to reduce the number of responses that are related so as to acquire more diverse responses. The likert scale had a scale of 1-5. 1 for strongly disagree, 2 for disagree, 3 neither agree or disagree, 4 for agree and 5 for strongly agree.

Questionnaires were preferred because they are an effective data collection instrument that allowed respondents to give much of their opinions in regard to the research problem. The information obtained from questionnaires were free from bias and researchers' influence and thus accurate and valid data was gathered. Interviews were also done to collect data from the REA officials. An interview schedule was administered at a place convenient for the REA officials.

3.6 Validity and Reliability

The study also established the validity and reliability of the research instruments used. Validity seeks whether the item actually elicits the intended information. According to Mugenda and Mugenda (2003), reliability is the measurement of consistency usually tested using the test–retest reliability method.

3.6.1 Validity of Research Instrument

Validity suggests fruitfulness and refers to the match between a construct, or the way a study conceptualizes the idea in a conceptual definition, and the data. To ensure validity, the instruments was reviewed by the research supervisors and other research experts. So as to enhance the research instrument validity, the necessary modification and revision was done to the research instrument.

3.6.2 Reliability of the Research Instrument

Reliability was enhanced by testing a diverse sample of the research individuals, using testing procedures that were uniform and putting many similar item as part of the measure. After the final confirmation, a pilot test was conducted by distributing the questionnaires to 20 respondents which helped in ensuring that the questionnaire was appropriate and the aspects investigated were generally understandable.

In order to check reliability of the results, study also used Cronbach's alpha methodology, which is a measure of internal consistency on how closely related a set of items are as if in a group. Test- retest methodology was also used where the questionnaires were presented to the pilot population and administered after about three days to see whether there was change in the responses. The Cronbach alpha value was calculated using SPSS to establish the reliability of the questionnaires which showed a high level of internal consistency. Cronbach alpha ranges between 0-1. Scores between 0-0.6 indicate that the instrument has a low reliability while scores of 0.7 and above indicate that the instrument has a high level of internal consistency and reliability.

3.7 Data Collection Methods

The researcher identified research assistants who helped in collection of the data. The training was also done which emphasized the translated questions to the respondents. The researcher also visited the respondents with the support from the assistants who helped in the translation. It took 30 days for the entire data collection to be completed.

3.8 Data Analysis and Presentation

The quantitative and qualitative data generated from the questionnaires was coded and keyed into SPSS v20 for descriptive and inferential analysis. Descriptive analysis was used to generate mean, standard deviation, frequencies, percentages and tabulations. Frequencies and percentage distribution were used to examine the relation between independent and dependent variables individually. Descriptive statistics, including frequency and percentages were generated for age, sex, level of education, and used to analyze the socio-demographic characteristics of the sample. In analyzing the data collected for objective one which was to establish the influence of funding on the implementation of rural electrification programme in Kieni East Sub County, mean and percentages were used. In analyzing the data collected for objective two which was to assess the influence of cost of electricity on the implementation of rural electrification programme in Kieni East Sub County, mean and standard deviation were used. In analyzing the data collected for objective three which was to determine the influence of alternative sources of power on the implementation of rural electrification programme in Kieni East Sub County mean was used. In analyzing the data

collected for objective four which was to establish the influence of demand for electricity on the implementation of rural electrification programme in Kieni East Sub County, percentages and standard deviation were used. The quantitative findings were presented using tables, figures and discussions. Qualitative data was analyzed using content analysis where the data was grouped into themes based on the objectives of the study. The data was presented in prose form.

Multiple regression was used for inferential statistics analysis.

The regression model adopted is captured below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

Y=REP

X₁ = Funding

X₂ = Cost of electricity

X₃= Alternative source of power

X₄ = Demand

β₁, β₂,β₃and β₄ are the variable coefficients

ε is the error term

3.9 Ethical Considerations

Bryman and Bell (2007) states that it is the responsibility of the researcher to carefully assess the possibility of harm to research participants and the extent that is possible. As an ethical process the study took into consideration drastic measures to ensure that respondents' dignity was upheld. An introduction letter to all the participants was given to assure them that the respondents know the researcher and what she came to do. All chiefs of the respective villages were also informed. Throughout the data collection period, voluntary participation was emphasized. Confidentiality was also highly emphasized and none of the respondents had his/her name appear on the questionnaire. An assurance was also given that the data will only be used for academic purposes only.

3.10 Operationalization of Variables

Table 0.1: Operationalization of variables of the study

Objectives	Independent Variable	Indicators	Measurement	Measurement Scale	Data Collection Method	Data Analysis
1.To establish the influence of funding on the implementation of rural electrification programme	Influence of funding	1.Availability of funding 2.Timeliness of funding 3.Community contributions	1.Sources of funding of 2.Duration of payment	Nominal Scale and Interval Scale	Questionnaire and REA Reports	Descriptive Statistics and frequency distribution tables
2.To assess the influence of cost of electricity on the implementation of rural electrification programme	Influence of cost of electricity	1.Wiring cost 2.Connection cost 3.Monthly charges	1.Cost of wiring 2.Economic activities of the people 3.Amount of monthly charges	Ordinal Scale and Interval Scale	Questionnaire	Descriptive Statistics
3.To determine the influence of alternative sources of power on the implementation of rural electrification programme	Influence of alternative sources of power	1.Availability 2.Affordability 3.Reliability	1.What alternatives sources of power are available 2.Are they affordable 3.Are they reliable	Ordinal Scale and Interval Scale	Questionnaire	Descriptive Statistics
4.To establish the influence of demand for electricity on the implementation of rural electrification programme	Influence of demand for electricity	1.Ability to pay 2.Attitude 3.Benefits	1.Peoples level of income 2.People’s awareness on the need for electricity 3.People awareness of various uses of electricity	Nominal Scale and Interval Scale	Questionnaire	Descriptive Statistics and frequency distribution tables

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter involved data analysis, presentation and discussion of the findings. The study sought to determine the factors influencing implementation of rural electrification programme in Kieni East Sub County, Nyeri County, Kenya. The study targeted households and REA Officials in Kieni East.

4.2 Response rate

The study sampled 94 households and 5 REA Officials who were issued with questionnaires. Out of the 94 households and 5 REA Officials sampled, 85 households and 5 REA Officials respondents filled and returned the questionnaires. This gave a response rate of 90.9%. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good and a response rate of 70% and over is excellent. Based on the assertion, the response rate was considered excellent for this study.

4.3 General Information

The study sought to find out respondents' gender. From the findings as shown in the table 4.1, 62.4% of the respondents indicated their gender as female whereas 37.6% indicated that they were male.

Table 4.1: Gender of the Respondents

Gender	Frequency	Percent
Male	32	37.6%
Female	53	62.4%
Total	85	100.0

The study sought to find out respondents age. From the study findings as shown in table 4.2, 41.2% of the respondents indicated that they were aged 51-70 years, 32.9% indicated 31-50

years, 15.3% indicated above 70 years, 5.9% indicated 21-30 years whereas 4.7% indicated below 20 years.

Table 4.2: Age of the respondents in years

Age in years	Frequency	Percent
Above 70 years	13	15.3%
51-70 years	35	41.2%
31-50 years	28	32.9%
21-30 years	5	5.9%
Below 20 years	4	4.7%
Total	85	100.0

The study sought to find out the respondent's highest education level. From the findings in table 4.3, most of the respondents as shown by 45.9% indicated their highest education as secondary, 25.9% indicated primary, 20% indicated post-secondary whereas 8.2% had no education.

Table 4.3: Respondents' highest level of education

Level of education	Frequency	Percent
Post Secondary	17	20
Secondary	39	45.9
Primary	22	25.9
No Education	7	8.2
Total	85	100

The study sought to establish the length of time the respondents had lived in the area. From the findings in table 4.4, 48.2% of the respondents indicated that they had lived in the area for 6-10 years, 36.5% indicated more than 10 years, 11.8% indicated 2-5 years whereas 3.5% indicated less than 2 years.

Table 4.4: Length of time lived in the area

Years	Percent
More than 10 years	36.5
6-10 years	48.2
2-5 years	11.8
Less than 2 years	3.5
Total	100.0

The study sought to establish the marital status of the respondents. From the findings in table 4.5, 56.5% of the respondents indicated that they were married, 27.1% indicated that they were single, 8.2% indicated widowed, 5.9% indicated separated whereas 2.4% indicated that they were divorced.

Table 4.5: Marital Status of Respondents

Marital Status	Frequency	Percent
Widowed	7	8.2
Separated	5	5.9
Divorced	2	2.4
Married	48	56.5
Single	23	27.1
Total	85	100.0

4.4 Funding and implementation of REP

The study sought to establish the level of agreement that funding influences the implementation of REP in Kieni East. From the study findings in table 4.6, majority of the respondents as shown by 70.6% agreed to the statement, 12.9% strongly agreed, 7.1% disagreed, 5.9% were neutral while 3.5% strongly disagreed.

Table 4.6: Funding affect REP implementation

Level of agreement	Frequency	Percent
Strongly agree	11	12.9
Agree	60	70.6
Neutral	5	5.9
Disagree	6	7.1
Strongly disagree	3	3.5
Total	85	100.0

The study sought to find out the extent to which funding affect implementation of the REP. From table 4.7, majority of the respondents as shown by 61.2% indicated that funding affected implementation of the REP to a great extent, 14.1% indicated to a very great extent, 11.8% indicated to a low extent, 8.2% indicated to a moderate extent while 4.7% indicated to a very low extent.

Table 4.7: Funding affect on the implementation of REP

Extent	Frequency	Percent
Very great	12	14.1
Great	52	61.2
Moderate	7	8.2
Low	10	11.8
Very low	4	4.7
Total	85	100.0

The study sought to find out the sources of funds for the households in Kieni East. From table 4.8, 84.7% of the respondents indicated that they sourced their funds from bank loans, 71.8% indicated family and friends, 69.4% indicated own savings, 41.2% indicated government subsidies whereas 36.5% indicated other sources like SACCOs and grants.

Table 4.8: Sources of funding

Source	Percent
Bank loans	84.7
Government subsidies	41.2
Own savings	69.4
Family and friends	71.8
Others	36.5

The study sought to establish the level of agreement on statements relating to funding and implementation of REP in Kieni East. The findings as tabulated in table 4.9 established that the respondents agreed that the government funded the REP in Kieni East as shown by a mean of 4.1529, Kieni East enjoyed funding from devolved funds for county REP implementation as shown by mean of 4.0000, ring fencing of REP funds from other infrastructural projects enhances rural electrification as shown by means of 3.9412 and that Donor support enhances rural electrification as shown by means of 3.5412. However, the respondents disagreed that subsidies were given to the residents in Kieni East for electricity connectivity as shown by means of 2.4353 and that a consumer levies were given to the residents of Kieni East as shown by means of 2.3059.

Table 4.9: Level of agreement on statements relating to funding

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
Subsidies are given to the residents in Kieni East for electricity connectivity	13	38	20	12	2	2.4353	0.3419
A consumer levy is given the residents of Kieni East	16	43	15	6	5	2.3059	0.3325
Donor support enhances rural electrification	1	14	17	44	9	3.5412	0.7950
The government funds the REP in Kieni East	0	2	4	58	21	4.1529	1.1778
Kieni East enjoys funding from devolved funds for county REP implementation	0	2	14	51	18	4.0000	0.9909
Ring fencing of REP funds from other infrastructural projects enhances rural electrification	2	6	12	40	25	3.9412	0.8365

4.5 Cost of electricity and implementation of REP

The study sought to find out whether the cost of electricity affected the implementation of REP in Kieni East. From the findings in Table 4.10, majority of the respondents as shown by 81.2% indicated that cost of electricity affected the implementation of REP while 18.8% were of the contrary opinion.

Table 4.10: Whether cost of electricity affect REP

Opinion	Frequency	Percent
Yes	69	81.2
No	16	18.8
Total	85	100.0

The study sought to find out the extent to which cost of electricity affected implementation of the REP in Kieni East. From table 4.11, majority of the respondents as shown by 71.8% indicated that cost of electricity affected implementation of the REP to a great extent, 12.9% indicated to a very great extent, 8.2% indicated to a moderate extent, 4.7% indicated to a low extent while 2.4% indicated to a very low extent.

Table 4.11: Extent to which cost of electricity affect the implementation of REP

Extent	Frequency	Percent
Very great	11	12.9
Great	61	71.8
Moderate	7	8.2
Low	4	4.7
Very low	2	2.4
Total	85	100.0

The study sought to establish the level of agreement on statements relating to cost of electricity and implementation of REP in Kieni East. The findings as tabulated in table 4.12 established that the respondents agreed that cost of wiring Kieni East is high as shown by a mean of 4.2471, the cost of electrification was high in Kieni East as shown by mean of

4.1765, cost of electric lighting appliances was high in Kieni East as shown by means of 4.0941, connection costs was very high for the households in Kieni East as shown by mean of 4.0353, the cost of electrification had created a challenge to the implementation of the REP in Kieni East as shown by mean of 3.9647 and that periodic payments to Kenya power had increased the cost of electricity in Kieni East as shown by mean of 3.9176. However, the respondents disagreed that the government had given subsidies to residents of Kieni East in connection to the main grid as shown by means of 2.4118.

Table 4.12: Level of agreement on statements related to cost of electricity

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
Cost of wiring Kieni East is high	1	3	5	41	35	4.2471	1.0476
Connection costs is very high for the households in Kieni East	0	5	9	49	22	4.0353	0.9811
Periodic payments to Kenya power has increased the cost of electricity in Kieni East	2	6	16	34	27	3.9176	0.7669
The government has given subsidies to residents of Kieni East in connection to the main grid	11	45	15	11	3	2.4118	0.3721
The cost of electrification is high in Kieni East	0	2	6	52	25	4.1765	1.0850
The cost of electrification has created a challenge to the implementation of the REP in Kieni East	1	4	8	56	16	3.9647	1.0926
Cost of electric lighting appliances is high in Kieni East	3	2	5	49	26	4.0941	1.0414

4.6 Alternative Sources of Power and implementation of REP

The study sought to find out the sources of power for the households in Kieni East. From table 4.13, 78.8% of the respondents indicated that they sourced their power from charcoal, 69.4% indicated firewood, 56.5% indicated paraffin, 45.9% indicated biogas, 43.5% indicated solar, whereas 41.2% indicated other sources like plastics, banana trees, and grass.

Table 4.13: Sources of power

Extent	Percent
Charcoal	78.8
Firewood	69.4
Paraffin	56.5
Solar	43.5
Biogas	45.9
Others	41.2

The study sought to find out whether the availability of alternative power affect the implementation of REP in Kieni East. From table 4.14, majority of the respondents as shown by 81.2% indicated that alternative power affected the implementation of REP while 18.8% were of the contrary opinion.

Table 4.14: Whether alternative power affect the implementation of REP

Opinion	Frequency	Percent
Yes	69	81.2
No	16	18.8
Total	85	100.0

The study sought to find out the extent to which alternative power affected implementation of the REP in Kieni East. From table 4.15, majority of the respondents as shown by 56.5% indicated that alternative power affected implementation of the REP to a great extent, 28.2% indicated to a moderate extent while 14.1% indicated to a low extent.

Table 4.15: Extent to which alternative power influence implementation of REP

Extent	Frequency	Percent
Great	48	56.5
Moderate	24	28.2
Low	12	14.1
Total	85	100.0

The study sought to establish the level of agreement on statements relating to alternative power and implementation of REP in Kieni East. The findings as tabulated in table 4.16 established that the respondents agreed that there was sufficient awareness of other available power sources in Kieni East apart from rural electrification as shown by a mean of 4.3647, alternatives were cheaper to install compared to the cost of connecting to the national grid as shown by mean of 4.2118, the alternative sources were more reliable compared to rural electrification as shown by means of 4.2118, the affordability of the alternative sources of power was linked to the economic income of the people of Kieni East as shown by mean of 3.8353 and that the reliability of the alternative sources of power was based on the individual source of power as shown by mean of 3.7765. However, the respondents disagreed that alternative sources of electricity were more expensive to install compared to rural electrification as shown by means of 2.0588.

Table 4.16 Level of agreement on statement relating to alternative sources of power

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
Awareness of other available power sources	0	1	3	45	36	4.3647	1.1369
Alternatives are cheaper to install	1	2	7	43	32	4.2118	1.0190
Alternative sources are more reliable	2	1	7	42	33	4.2118	1.0233
Alternative sources are more expensive to install	22	49	4	7	3	2.0588	0.4207
Affordability and economic income	1	7	8	58	11	3.8353	1.1218
Reliability is based on the individual source of power	2	8	11	50	14	3.7765	0.9419

4.7 Demand for electricity and implementation of REP

The study sought to find out whether the demand for electricity affect the implementation of REP in Kieni East. From table 4.17, majority of the respondents as shown by 75.3% indicated that demand for electricity affected the implementation of REP while 24.7% were of the contrary opinion.

Table 4.17: Whether demand for electricity affect the implementation of REP

Opinion	Frequency	Percent
Yes	64	75.3
No	21	24.7
Total	85	100.0

The study sought to find out the extent to which demand for electricity affect implementation of the REP in Kieni East. From table 4.18, most of the respondents as shown by 38.8% indicated that demand for electricity affected implementation of the REP to a great extent, 29.4% indicated to a moderate extent, 25.9% indicated to a great extent, 4.7% indicated to a very low extent while 1.2% indicated to a very low extent.

Table 4.18: Demand for electricity influence on implementation of REP

Extent	Frequency	Percent
Very great	22	25.9
Great	33	38.8
Moderate	25	29.4
Low	1	1.2
Very low	4	4.7
Total	85	100.0

The study sought to establish the level of agreement on statements relating to a demand for electricity and implementation of REP in Kieni East. The findings as tabulated in table 4.19 established that the respondents agreed that people's level of income was a major factor that influenced electricity connectivity and their ability to pay for the service as shown by a mean

of 3.9765, there were many businesses requiring electricity in Kieni East as shown by mean of 3.9294, people had a positive attitude towards electrification and saw it as part of development as shown by mean of 3.9176 and that economic activities influenced rural electrification in Kieni East as shown by mean of 3.9059. However, the respondents disagreed that there was adequate awareness on the need for power as shown by mean of 2.2941 and that there was adequate community participation in the governance of REPs to ensure successful completion of projects as shown by mean 1.7765.

Table 4.19: Level of agreement on statements related to demand for electricity

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
Income is a major factor influencing connectivity	2	4	10	47	22	3.9765	0.9405
Economic activities influence rural electrification	1	5	11	52	16	3.9059	0.9984
There is adequate awareness	16	43	14	9	3	2.2941	0.3395
People have a positive attitude towards electrification	2	1	18	45	19	3.9176	0.8759
There is adequate community participation	32	44	6	2	1	1.7765	0.3999
There are many businesses requiring electricity	2	4	10	51	18	3.9294	0.9908

4.8 Implementation of REP

The study sought to establish the time the REP has been in operation in the area. From table 4.20, 51.8% of the respondents indicated that the REP had existed in their area for 1-5 years, 28.2% indicated less than 1 year, 11.8% indicated 6-10 years whereas 8.2% indicated more than 10 years.

Table 4.20: Existence of REP

Period	Frequency	Percent
Less than 1 year	24	28.2
1-5 years	44	51.8
6-10 years	10	11.8
More than 10 years	7	8.2
Total	85	100.0

The study sought to find out the extent to REP in Kieni East has been implemented. From table 4.21, majority of the respondents as shown by 50.6% indicated that REP had been implemented in their areas to a low extent, 25.9% indicated to a moderate extent, 14.1% indicated to a very low extent, 7.1% indicated to a great extent while 2.4% indicated to a very great extent.

Table 4.21: Extent to which REP has been implemented

Extent	Frequency	Percent
Very great	2	2.4
Great	6	7.1
Moderate	22	25.9
Low	43	50.6
Very low	12	14.1
Total	85	100.0

The study sought to establish the level of agreement on statements relating to implementation of REP in Kieni East. The findings as tabulated in table 4.22 established that the respondents agreed that the distance of their houses from the grid was long in Kieni East as shown by a

mean of 4.0824, the connectivity to electricity in Kieni East had been increasing in the last three years as shown by mean of 3.9294 and that they consumed limited units of power in their homes as shown by mean of 3.8235. However, the respondents disagreed that transformers were close to their houses as shown by mean of 2.4235 and that there was frequent maintenance of electrical facilities in Kieni East as shown by mean 2.1412.

Table 4.22: Statements relating implementation of rural electrification programme

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Standard deviation
The connectivity to electricity in Kieni East has been increasing in the last three years	2	3	13	48	19	3.9294	0.9327
The distance of my house from the grid is long in Kieni East	0	2	15	42	26	4.0824	0.8937
I consume limited units of power in my house	3	6	16	38	22	3.8235	0.7564
There is frequent maintenance of electrical facilities in Kieni East	25	37	12	8	3	2.1412	0.2645
The transformer is close to my house	16	38	14	13	4	2.4235	0.2889

The study sought to establish for how long REA have worked in the implementation of REP in Kieni East. From the study findings on table 4:23, 2 of the respondents have been in the project for a period above 5 years, 2 respondent have been in the project for a period of between 2-5 years and lastly 1 REA has been in the project for just one year .

Table 4.23: Period under which REA has worked in REP

No of Years	Frequency	Percent
5 years and above	2	40.0
2-5 years	2	40.0
2 years below	1	20.0
Total	5	100.0

The study sought to find out from REA whether funding given to REP in Kieni East is adequate. From table 4.24, below none of the respondents agreed, 1 respondent was neutral on adequacy of funds on REP while 4 of the respondent totally disagreed on the adequacy of fund for implementation of REP in Kieni East

Table 4.24: Is funding given to REP adequate

Extent	Frequency	Percent
Agree	0	0
Neutral	1	20.0
Disagree	4	80.0
Total	5	100.0

The study sought to find out from REA the extent to which cost of electricity affected implementation of the REP in Kieni East. From table 4.25, 3 of the respondents as shown by 60.0% indicated that cost of electricity affected implementation of the REP to a great extent ,1 respondent as shown by 20.0% indicated to a moderate extent and 1 respondent indicated to a low extent of 20.0%.

Table 4.25: Extent to which cost of electricity affect the implementation of REP

Extent	Frequency	Percent
Great	3	60.0
Moderate	1	20.0
Low	1	20.0
Total	5	100.0

The study sought to find out from REA the extent to which alternative sources of power are used in Kieni East. From table 4.26, charcoal is the most common followed by firewood, paraffin, solar and lastly biogas.

Table 4.26: Usage of alternative Sources of power

Extent	Type of power
Very great	Charcoal
Great	Firewood
Moderate	Paraffin
Low	Solar
Very low	Biogas

The study sought to find out from REA the extent to which alternative source of electricity affected implementation of the REP in Kieni East. From table 4.27, 3 of the respondents as shown by 60.0% indicated that alternative source of electricity affected implementation of the REP to a great extent ,1 respondent as shown by 20.0% indicated to a great extent and 1 respondent indicated to a moderate extent of 20.0% .

Table 4.27: Extent to which other sources of power other than electricity affected the implementation of REP

Extent	Frequency	Percent
Very great	3	60.0
Great	1	20.0
Moderate	1	20.0
Total	5	100.0

The study sought to find out from REA the extent to which demand for electricity affected implementation of the REP in Kieni East. From table 4.28, 3 of the respondents indicated that demand for electricity affected implementation of the REP to a great extent, 2 respondents indicated to a moderate extent and none of the respondent indicated to a low extent.

Table 4.28: Extent to which demand for electricity affects implementation of REP

Extent	Frequency	Percent
Great	3	60.0
Moderate	2	40.0
Low	0	0
Total	5	100

The study sought to find out from REA the extent to which REP have been implemented in Kieni East. From table 4.29, 1 of the respondents indicated that implementation of the REP

was to a great extent, 2 respondents indicated to a moderate extent and 2 respondent indicated that implementation of REP was to a low extent .

Table 4.29: Extent to which REP been implemented

Extent	Frequency	Percent
Great	1	20.0
Moderate	2	40.0
Low	2	40.0
Total	5	100.0

The study sought to find out whether REA faces challenges in implementation of the REP in Kieni East. From table 4.30, 2 of the respondents as shown by 40.0% indicated that challenges in implementation of the REP was to a great extent ,1 respondents as shown by 20.0% indicated a moderate extent and 2 respondent indicated to a low extent of 40.0%.

Table 4.30: Extent of challenges in the implementation of REP in Kieni East

Extent	Frequency	Percent
Great	2	40.0
Moderate	1	20.0
Low	2	40.0
Total	5	100.0

4.9 Regression Analysis

Multiple regression analysis was used in predicting the implementation of Rural Electrification Programme in Kenya and also determines the direction and magnitude of the relationship between the study variables and the results are shown in the table below;

Table 4.31: Summary Table

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843 ^a	.711	.696	.29

a. Predictors: (Constant), Funding, Cost of Electricity, Alternative Sources of Power, Demand.

The summary table shows R, R², Adjusted R-Square and the standard error of the estimates. R represents multiple correlation coefficients while R-Squared represents the proportion of variance in the dependent variables that can be explained by the independent variables while Adjusted R-Square is a modified version of R-Squared for the number predictors in a model.

From the regression results above, the R value was 0.843 indicating that there is a strong positive relationship on factors influencing rural electrification and implementation. The R-squared (R²) value of 0.711 shows that 71.1 percent of rural electrification implementation can be explained by funding, cost of electricity, alternative sources of power and demand for electricity while 28.9 percent can be explained by other factors beyond the scope of this study. The value of adjusted R squared was 0.696 an indication that there was variation of 69.6% on rural electrification implementation due to funding, cost of electricity, alternative sources of power and demand for electricity at 95% confidence interval. Multi-regression analysis was used to measure the nature of the relationship between implementation of REP and funding, cost of electricity, alternative source of power and demand. The model which was adopted for this study is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where:- Y= Implementation of rural electrification programme, β_0 = Constant, X_1 = Funding, X_2 =Cost of electricity, X_3 =Alternative source of power, X_4 =Demand and e =Error term of the model and β_1 =Coefficient of independent variables.

4.10 Coefficients

This shows the slope of the linear relationship between the criterion variable and the part of a predictor variable that is independent of all other predictor variable. The beta values indicate the direction of the relationship.

Table 4.32: Regression Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.231	.141	2.131	4.023	.025
	Funding	.962	.056	.176	2.332	.022
	Cost of electricity	.473	.064	.341	3.564	.036
	Alternative sources of power	.312	.141	.216	4.217	.017
	Demand	.824	.211	.371	2.578	.023

a. Dependent variable: Implementation of REP

The regression coefficients table indicates the slope of both the standardized and unstandardized coefficients of the variables. Table above presented results on coefficients, betas and p-values. Thus, the regression function above on extraction becomes

$$Y = 2.231 + 0.962X_1 + 0.473X_2 + 0.312X_3 + 0.824X_4$$

The above regression equation implies that by taking all the independent constant rural electrification programme implementation will change by 2.231. The findings also indicated that by taking a unit increase in funding leads to an increase in REP implementation by 0.962 all other factors held constant; a unit increase in cost of electricity leads to an increase in REP implementation by 0.473 all other factors held constant, a unit increase in alternative sources of power leads to an increase in REP implementation by 0.312 all other factors held constant and a unit increase in demand for electricity leads to an increase in REP implementation by 0.824 all other factors held constant.

The significant values (P-value) under sig. column indicate the significance of the effect of each factor component on implementation of REP. A p-value of less than 0.05 is recommended as it implies a high degree of significance. A value above 0.05 indicates a statistically significant relationship. Funding had p-value of .022 which is less than 0.05 hence was found to be significant in predicting the implementation REP. Cost of electricity had p-value of .036 which is less than 0.05 hence was found to be significant in predicting the implementation REP. Alternative sources of power had p-value of .017 which is less than

0.05 thus was found to be significant in predicting the implementation of REP. Demand had a p-value of .023 which is less than 0.05 hence was found to be significant in predicting the implementation REP. From the p-value results above, it was evident that at 95% confidence level, all the variables produced statistically significant values with $p\text{-value} < 0.05$ thus they were statistically significant in predicting the implementation of REP.

4.11 ANOVA

This is used to test differences between two or more means by analyzing variance.

Table 4.33: ANOVA

Model	Sum of Square	df	Mean Square	F	Sig.
Regression	24.327	4	6.211	9.343	.036 ^b
Residue	67.230	48	1.314		
Total	91.557				

a. Dependent Variable: Implementation of REP

b. Predictors: (Constant), funding, cost of electricity, alternative source of power and demand

The ANOVA model tells us whether the overall regression model is a good fit for the data and if the independent variables predict the dependent variable by interpreting the p-value in the table above. The model was significant with the F ratio = 9.343 and p value $0.036 < 0.05$. Since P is less than 0.05. This indicated that the regression model is a good fit in prediction of implementation of REP.

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter presents a summary of the findings, conclusions and recommendations on the study.

5.2 Summary of the findings and discussion

Data after being analysed brought various aspects from descriptive statistics to inferential statistics. The first objective of the study was to determine the influence of funding on implementation of REP on rural areas. From the study findings, majority of the respondents agreed that funding influenced the implementation of REP in their rural areas to a great extent. Majority indicated that they sourced their funds from bank loans, family and friends, own savings, government subsidies and lastly other sources like SACCOs and grants. The respondents also agreed that the government was involved in funding the REP in Kieni East. Kieni East enjoyed funding from devolved funds for county REP implementation, ring fencing of REP, funds from other infrastructural projects enhanced rural electrification and that donor support enhanced rural electrification. However, the respondents disagreed that subsidies were given to the residents in Kieni East for electricity connectivity and that a consumer levies were given to the residents of Kieni East. This study is in line with a study done by Kemausuor et al (2014) on importance of funding from central, county and other stakeholders. Thus, the study revealed that funding is of great significance on REP implying that its increase leads to an increase in REP in Kieni East.

From the findings majority of the respondents indicated that cost of electricity affected the implementation of REP to a great extent. The respondents agreed that cost of wiring in Kieni East was high, cost of electrification was high in Kieni East, cost of electric lighting appliances is high, connection costs was also high for the households and the cost of electrification had created a challenge to the implementation of the REP in Kieni East. Also periodic payments to Kenya power had increased the cost of electricity in Kieni East.

However, the respondents disagreed that the government had given subsidies to residents of Kieni East in connection to the main grid.

The third objective was to determine the influence of alternative sources of power on the implementation of REP in Kieni East. The study findings indicated majority of the respondents sourced their power from charcoal, firewood and paraffin, while few indicated biogas, solar and other sources like plastics, banana trees and grass. Majority of the respondents indicated that alternative power affected the implementation of REP to a great extent. The respondents agreed that there was sufficient awareness of other available power sources in Kieni East apart from rural electrification, alternatives were cheaper to install compared to the cost of connecting to the national grid, the alternative sources were also more reliable compared to rural electrification and the affordability of the alternative sources of power was linked to the economic income of the people of Kieni East and that the reliability of the alternative sources of power was based on the individual source of power. However, the respondents disagreed that alternative sources of electricity were more expensive to install compared to rural electrification. The study conformed to study done by Pellegrin and Tasciotti (2012) on the influence of electrification programme implementation.

The fourth objective was on demand and majority of the respondents indicated that demand for electricity affected the implementation of REP to a great extent. The respondents agreed that people's level of income was a major factor that influenced electricity connectivity and their ability to pay for the service, there were many businesses requiring electricity in Kieni East, people had a positive attitude towards electrification and saw it as part of development and that economic activities influenced rural electrification in Kieni East. However, the respondents disagreed that there was adequate awareness on the need for power and that there was adequate community participation in the governance of REPs to ensure successful completion of projects. This study conforms to a study done by Alexander (2010) that demand is very high in most African Countries compared to the Asian countries.

Majority of the respondents indicated that the REP had existed in their area for 1-5 years and implemented to a low extent. The respondents agreed that the distance of their houses from the grid was long in Kieni East, the connectivity to electricity in Kieni East had been

increasing in the last three years and that they consumed limited units of power in their homes. However, the respondents disagreed that transformers were close to their houses and that there was frequent maintenance of electrical facilities in Kieni East.

5.3 Conclusions

The study concludes that funding is very important since it influence the implementation of REP in Kieni East to a great extent. Since the main source of funds in Kieni East was bank loans then the government and banks should come up with policies and programmes to make loans accessible to all despite their income. Resident should also be encouraged to do personal savings as a source of funding or saving in groups for implementation of REP in Kieni East. The government has done a lot in funding REP in Kieni East and the programme has been enhanced by donor support for effective implementation. But as for subsidies and consumer levies they were not given to the residents of Kieni East and this should be looked on especially to the low income earners group.

The cost of electricity affect the implementation of REP in Kieni East to a great extent. The cost of electricity in Kieni East is high and reflected in connection costs, cost of electric lighting appliances, cost of electrification and periodic payments to Kenya power. The above cost affects the whole programme of REP and the government should do a lot in lowering cost of connection, wiring, appliance etc so as to make it affordable to majority of rural resident. Despite there being various sources of power in Kieni East, charcoal is the main source. Alternative power affect the implementation of REP in Kieni East to a great extent and this shows that these alternatives do hold water when it comes to REP implementation. The researcher further concludes that there is sufficient awareness on the alternative sources of power to electricity in Kieni East and the households in Kieni East use other sources of power as they are accessible, cheaper and more reliable compared to electricity.

The demand for electricity affected the implementation of REP in Kieni East to a great extent. Although, there is low level of community participation in REP in Kieni East with inadequate awareness, but the attitude towards electrical power and the need for electricity

remains positive and high. The demand for electricity in Kieni East is high with many households and businesses not connected to electricity.

The REP has existed in Kieni East for less than 10 years. However, the REP in Kieni East has been implemented to a low extent. Despite the increased connectivity, poor maintenance of electrical facilities together with the distance from the main grid has hindered the implementation of the REP in Kieni East.

5.4 Recommendations

The study recommends that the Government should subsidize on the consumer connections cost, domestic house wiring material cost and the unit cost of energy. In order to create a sense of ownership and ensure sustainability of the REPs, project implementers need to build in community participation in their project designs, implementation and other decision-making processes.

The government needs to support and provide incentives for investments in alternative power sources. These needs to be seen as complementing REA's efforts to improve and increase accessibility while at the same time promoting the use of renewable energy as opposed to fossil generated electricity.

The study further recommends that the Government should allocate sufficient funds and ensure timely disbursement for implementation of grid extension and generation projects in a coordinated manner. Therefore, more programme funders should be identified.

5.5 Suggestions for Further Studies

Based on the findings, the study suggests that further studies should be carried out on the influence of institutional factors on the implementation of rural electrification programs in Kenya.

REFERENCES

- Abdullah, S., & Markandya, A. (2007). *Electrification projects in Rural Kenya: evaluation study*. U. K.: Department of Economics, University of Bath.
- Abdullah, S., & Markandya, A. (2012). Rural electrification programmes in Kenya: Policy conclusions from a valuation study. *Journal of Energy for Sustainable Development*, 16(1), 103-110.
- Ahlborg, H., & Hammar, L. (2014). Drivers and barriers to rural electrification in Tanzania and Mozambique—grid extension, off-grid and renewable energy sources. In World Renewable Energy Congress. *Annual Review of Environment and Resources*, 32, 169-203.
- Alexander, N. (2010). *Comparative Study on Rural Electrification Policies in Emerging Economies: Key to Successful Policies*. International Energy Agency Ambisisi
- Ayieko, Z. O. (2011). *Rural Electrification Programme in Kenya*. Paper presented at the AEI Practitioners Workshop- Dakar, Senegal 2011
- Barkat A. (2010). *Rural electrification and poverty reduction: case of Bangladesh. Presented at NRECA Int. Conf., Sustain. Rural Electrification in Developing Countries: Is it Possible*, Arlington, VA.
- Barnes, D., & Foley, G. (2009). *Rural Electrification In: The Developing World: A summary of lessons from successful programs*. UNDP/World Bank Energy Sector Management Assistance Programme (ESMAP), World Bank, Washington, DC.
- Barnes, D. F., & Floor, W.M. (2006). *Rural Energy in Developing Countries: A Challenge for Economic Development. Annual Review of Energy and the Environment*, 21, 497-530.
- Bekker, B., Eberhard, A., Gaunt, T., & Marquand, A. (2014). South Africa's rapid electrification programme: Policy, institutional, planning, financing and technical innovations. *Energy Policy*, 36(8), 3125-3137.
- Brian, M. (2013). *Analyzes of Electricity Transformer vandalism in Nakuru and Murang'a Counties*. Masinde Muliro University.
- Bryman, A., & Bell, E. (2007). *Research Designs: Business Research Methods*. New York. Oxford University Press.
- Cecelski, E., & Ounalli, A. (2012). Low-cost Electricity and Multisector Development in Rural Tunisia. *Sub-Saharan Africa: Introducing Low-cost Methods in Electricity Distribution Networks*, 183.
- Cook, P. (2013). *Rural Electrification and Rural Development*. University of Manchester.

- Dufe, E. M. (2015). *Factors influencing accessibility of rural electrification in Kenya: a case of Naivasha constituency* (Unpublished Thesis). University of Nairobi, Kenya.
- Eberhard, A., & Gratwick, K. (2005). *The Kenyan IPP experience*. Kenya Working Paper No. 49, management programme in infrastructure reform and regulation, Graduate School of Business, University of Cape Town.
- Fisher, A., Laing, J., & Stoeckel, J. (1983). *A handbook for research design*. New York: The population Council.
- Goldratt, E. M. (2001). *Essays on the Theory of Constraints*. Great Barrington, MA, North River Press.
- International Energy Agency (2015). *Electricity Access in 2014—Regional Aggregates*. Retrieved from IEA: <http://www.iea.org/weo/electricity.asp> Accessed 14 June 2016.
- International Energy Agency. (2013). *South East Asia Energy Outlook*. World Energy Outlook Special Report. IEA, Paris Cedex.
- International Energy Agency (2012). *World Energy Outlook*. International Energy Agency.
- IEG. (2008). *The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits*. Washington, The Independent Evaluation Group, The World Bank Group.
- Jacobson, A. (2004). *Connective Power: Solar Electrification and Social Change in Kenya* (Ph.D. Dissertation). Energy and Resources Group, University of California, Berkeley.
- Karekezi, S., Kimani, J., Mutiga, A., & Ameyia, S. (2011). *The Impact of Power Sector Reforms on the Poor in Eastern Africa*, AFREPREN/FWD Secretariat working paper 317.
- Karekezi, S. & Kithyoma, W. (2003). *Operationalizing the NEPAD Energy Initiative*. Paper presented at a Workshop for African Energy Experts-Dakar, Senegal
- Kariuki, D. (2014). *Rural electrification and micro enterprises performance: some lessons from Muranga county Kenya* (Unpublished Thesis).
- Katie, A. (2010). *Rural Electrification in Oregon 1930-1955*. (Thesis). Department of History Linfield College.
- Kemauor, F., Brew-Hammond, A., Obeng, G. Y., Duker, A., Annor, F. O., Boamah, F., & Ladzagla, D. (2014). *GIS-based Support for Implementing Policies and Plans to Increase Access to Energy Services in Ghana*.
- KIPPRA (2007). *A comprehensive study and analysis on energy consumption patterns in Kenya*. A synopsis of the draft final report for the Energy Regulatory Commission (ERC). Kenya Institute for Public Policy Research and Analysis.

- Kirsi, A. (2010). *Stakeholder Management in International Projects*. Aalto University, doctoral dissertation series 2010/13.
- Kothari, C. R. (2004). *Research Methodology: Methods and Techniques (2nd ed.)*. Nairobi, Kenya: New Age International Publishers.
- Lynda, B. (2006). *Project Relationships and the Stakeholder Circle*. Proceeding of PMI research conference. Centre Mont-Royal, Montreal Canada 16th-19th July 2006.
- Ministry of Energy. (2013). *Rural Electrification in Kenya*. Sessional Paper No. 4 on Energy.
- Ministry of Energy (2012). *Kenya National Energy Policy*. Government Printers, Nairobi.
- Mugenda and Mugenda (2003). *Research design and Methodology*. Acts Press, Nairobi.
- Muturi, P. (2015). A Review of Nyeri County –Kenya Strategic Plan 2013-2017. *International Journal of Economics, Commerce and Management*. 3(5), 1234-1249.
- Mwangi, C. I., & Ngugi, K. (2014). Determinant of Regulations on Growth of Electricity Projects in Kenya: A Case Study of Rural Electrification Authority. *European Journal of Business Management*, 1 (11), 336-352.
- Mwiti, A. M. (2014). *Influence of rural electrification on poverty eradication: a case of Tigania West Constituency, Meru County, Kenya*. Unpublished Thesis, University of Nairobi, Nairobi, Kenya.
- Ogalo, K. (2011). *Factors influencing electricity distribution in Nyamarambe Division; Kisii County, Kenya* (Unpublished Thesis). University of Nairobi, Kenya.
- Pellegrini, L., & Tasciotti, P. (2012). *Rural Electrification now and then: Comparing contemporary challenges in developing countries to the USA's experience in retrospect*. Forum for Development Studies, 1-24.
- Philpott, J., & Clark, A. (2002). *South Africa: Electricity Reform with a Human Face*. In Dubash Navroz K. (eds). World Resources Institute. Washington DC, USA.
- Republic of Kenya (2013). *Energy Sector Strategy*. Rural Energy Task Force Final Report, Nairobi.
- Ruhl, J. (1996). An Introduction to the Theory of Constraints. *Journal of Cost Management*, 3(5), 43-48.
- Rural Electrification Authority (2014). *Section 66 of the Energy Act, 2006*.
- Sanghvi, A., & Barnes, D. (2011). *Rural electrification: Lessons learned. World Bank Findings: Operational Quality and Knowledge Services, Africa Region Infrastructure*. World Bank, Washington, DC.

- Schillebeeckx, S. J., Priti, P., Rahul, B. & Gerard, G. (2013). *An Integrated Framework for Rural Electrification. Adopting a User-Centric Approach to Business Model Development*. London: Imperial College London, South Kensington Campus.
- Scott, J. (eds). Rational Choice Theory. Edited by G. Browning, A. Halcli, and F. Webster (2010), *Understanding Contemporary Society: Theories of The Present*. Sage Publications.
- Scott, J. (2000). *Rational Choice Theory*. Sage Publications.
- Sebastiano, L., & Ragnhild, K. (2014). *Constraint-Shattering Practices and Creative Action in Organizations*. *Organization Studies*, 35(4), 587-611.
- SEI (2001). *Rural Energy Service Companies—Experiences from Zambia*. Stockholm Environment Institute, Stockholm, Sweden.
- UNDP (2009). *Energizing the Millennium Development Goals, A Guide to Energy's Role in Reducing Poverty*. New York, UNDP.
- Wamukonya, N. (2003). *Power Sector Reforms in Developing Countries*. Roskilde;UNEP Riso Centre.
- World Bank (2010). *Addressing Electricity Access Gap*. World Bank.
- Zhang, X., & Kumar, A. (2011). Evaluating renewable energy-based rural electrification program in western China: Emerging problems and possible scenarios. *Journal on Renewable and Sustainable Energy Reviews*, 15(1), 773-779.

APPENDICES

Appendix I: Letter of Introduction

P.O. Box 71 – 10105,

Naro-moru

Tel: 0700649142

To whom it may Concern.

Dear Respondent,

RE: REQUEST TO CONDUCT RESEARCH

I am a Master of Arts Degree Student at the University of Nairobi. I am undertaking a study with an aim of understanding more on the factors affecting the implementation of rural electrification programme in Kieni East Sub County in Nyeri County. I am kindly requesting you to assist in filling the questionnaire for this study. Kindly note that the information that you give will be treated with utmost confidentiality and will not be shared with anyone except for the purpose of the study alone unless you are consulted. Kindly feel free to consult me on telephone number 0700649142 for any clarifications.

Yours faithfully,

Rosemary Nyambura Kareithi

Reg No: L50/76201/2014

Appendix II: Questionnaire for households

Section I: General Information

1. What is your gender?
Male Female
2. What is your age in years?
Below 20 years 21-30 years 31-50 years 51-70 years
Above 70 years
3. What is your highest level of education?
No education Primary Secondary Post-secondary
4. How long have you been living in Kieni East?
Less than 2 years 2-5 years 6-10 years More than 10 years
5. What is your marital status?
Single Married Divorced Separated Widowed

Section II: Funding and implementation of REP

6. What is your level of agreement that ‘the cost of electricity affects the implementation of rural electrification programme in Kieni East’?
Strongly agree Agree Neutral Disagree
Strongly disagree
7. To what extent does funding affect the implementation of rural electrification in your area?
To a very great extent
To a great extent
To a moderate extent
To a low extent
To a very low extent
8. Which of the following sources of funds are used by residents of Kieni East?
Bank loans
Government subsidies
Own savings
Family and friends

Others.....

9. Indicate your level of agreement with the following statement related to funding and implementation of rural electrification programme (Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5-strongly agree).

Statement	1	2	3	4	5
Subsidies are given to the residents in Kieni East for electricity connectivity					
A consumer levy is given the residents of Kieni East					
Donor support enhances rural electrification					
The government funds the REP in Kieni East					
Kieni East enjoys funding from devolved funds for county REP implementation					
Ring fencing of REP funds from other infrastructural projects enhances rural electrification					

Section III: Cost of electricity and implementation of REP

10. In your opinion does the cost of electricity affect the implementation of rural electrification programme in your area?

Yes [] No []

11. To what extent does the cost of electricity affect the implementation of rural electrification in your area?

To a very great extent []

To a great extent []

To a moderate extent []

To a low extent []

To a very low extent []

12. Indicate your level of agreement with the following statement related to cost of electricity and implementation of rural electrification programme (Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5-strongly agree).

Statement	1	2	3	4	5
Cost of wiring Kieni East is high					
Connection costs is very high for the households in Kieni East					
Periodic payments to Kenya power has increased the cost of electricity in Kieni East					
The government has given subsidies to residents of Kieni East in connection to the main grid					
The cost of electrification is high in Kieni East					
The cost of electrification has created a challenge to the implementation of the REP in Kieni East					
Cost of electric lighting appliances is high in Kieni East					

Section IV: Alternative sources of Power and implementation of REP

13. Which of the following sources of power do you use?

Charcoal []

Firewood []

Paraffin []

Solar []

Biogas []

Wind []

Others

14. In your opinion does an alternative source of power affect the implementation of rural electrification programme in your area?

Yes [] No []

15. To what extent do the alternative power sources influence implementation of the rural electrification programme in your area?

To a very great extent []

To a great extent []

To a moderate extent []

To a low extent []

To a very low extent []

16. Indicate your level of agreement with the following statement related to alternative sources of power and their influence on implementation of rural electrification programme. Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5-strongly agree.

Statement	1	2	3	4	5
There is sufficient awareness of other available power sources in Kieni East apart from rural electrification					
These alternatives are cheaper to install compared to the cost of connecting to the national grid					
The alternative sources are more reliable compared to rural electrification					
Alternative sources of electricity are more expensive to install compared to rural electrification					
The affordability of the alternative sources of power is linked to the economic income of the people of Kieni East					
The reliability of the alternative sources of power is based on the individual source of power					

Section V: Demand for electricity and implementation of REP

17. Do you think demand for electricity affect the implementation of rural electrification programme in your area?

Yes [] No []

18. To what extent does the demand for electricity influence implementation of the rural electrification programme in your area?

To a very great extent []

To a great extent []

To a moderate extent []

To a low extent []

To a very low extent []

19. Indicate your level of agreement with the following statement related to demand for electricity and implementation of rural electrification programme (Use a scale of 1-5, where 1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5-strongly agree).

Statement	1	2	3	4	5
People's level of income is a major factor that influences electricity connectivity and their ability to pay for the service					
Economic activities influence rural electrification in Kieni East					
There is adequate awareness on the need for power					
People have a positive attitude towards electrification and see it as part of development					
There is adequate community participation in the governance of REPs to ensure successful completion of projects					
There are many businesses requiring electricity in Kieni East					

Section VI: Implementation of REP

20. How long has the REP been in existent in your area?

- Less than 1 year ago []
- 1-5 years ago []
- 6-10 years ago []
- More than 10 years ago []

21. To what extent has the REP been implemented in your area?

- To a very great extent []
- To a great extent []
- To a moderate extent []
- To a low extent []
- To a very low extent []

22. Indicate your level of agreement with the following statement related implementation of rural electrification programme (1- strongly disagree, 2- disagree, 3- neutral, 4- agree, 5- strongly agree).

Statement	1	2	3	4	5
The connectivity to electricity in Kieni East has been increasing in the last three years					
The distance of my house from the grid is long in Kieni East					
I consume limited units of power in my house					
There is frequent maintenance of electrical facilities in Kieni East					
The transformer is close to my house					

Thank You

Appendix III: Interview Schedule for REA officials

1. What is your position in REA?

2. What is your age?

3. What is your highest level of education?

4. For how long have you worked with the REP in Kieni East?

5. Is the funding given to REA in Kieni East adequate?

6. How has funding of REP affected its implementation in Kieni East?

7. Do you think the cost of electricity has affected the implementation of the REP in Kieni East?

8. How has the cost of electricity affected the implementation of the REP in Kieni East?

9. Which are the alternative sources of power to electricity in Kieni East?

10. How has the use of other sources of power other than electricity affected the implementation of the REP in Kieni East?

11. How is the demand for electricity in Kieni East?

12. How has the demand for electricity affected the implementation of the REP Kieni East?

13. To what extent has the REP been implemented in Kieni East?

14. Do you face challenges in the implementation of REP in Kieni East?

15. What do you think should be done to facilitate implementation of REP in Kieni East?

Appendix IV: Research permit



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2211471,
2241349,3110571,2219429
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

9th Floor, Urdit House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No:

Date:

NACOSTI/P/16/26225/13992

31st October, 2016

Rosemary Nyambura Kareithi
University of Nairobi
P.O. Box 30197-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on "*Factors influencing implementation of rural electrification programme in Kenya: A case of Kieni East Sub County, Nyeri County,*" I am pleased to inform you that you have been authorized to undertake research in **Nyeri County** for the period ending **28th October, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Nyeri County** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.


BONIFACE WANYAMA
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nyeri County.

The County Director of Education
Nyeri County.

National Commission for Science, Technology and Innovation (NACOSTI) ISO 9001:2008 Certified


THIS IS TO CERTIFY THAT:
MISS. ROSEMARY NYAMBURA KAREITHI
of UNIVERSITY OF NAIROBI, 71-10105
NARO-MORU, has been permitted to
conduct research in Nyeri County

on the topic: FACTORS INFLUENCING
IMPLEMENTATION OF RURAL
ELECTRIFICATION PROGRAMME IN
KENYA: A CASE OF KIENI EAST SUB
COUNTY, NYERI COUNTY

for the period ending:
28th October, 2017

Applicant's
Signature

Permit No : NACOSTI/P/16/26225/13992
Date Of Issue : 31st October, 2016
Fee Received :Ksh 1000



Smmmbf
Director General
National Commission for Science,
Technology & Innovation