FACTORS AFFECTING IMPROVEMENT OF RURAL LECTRIFICATION IN DEVELOPING COUNTRIES: A CASE OF TANZANIA

VIOLA E. NKINI

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF PROJECT PLANNING MANAGEMENT OF OPEN UNIVERSITY OF TANZANIA

2017

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for the acceptance by the Open University of Tanzania a research paper entitled; “Factors affecting improvement of rural electrification in Developing countries, a case of Tanzania” in partial fulfillment of the requirement for the award of Master of Project Planning Management of Open University of Tanzania.

……..

Dr. Salvio Macha

(Supervisor)

……

Date

COPYRIGHT

DECLARATION

I, Viola E. Nkini, do hereby declare that this dissertation is my own original work and that it has not been submitted for any award in any other University for a similar or any other degree award.

……..……

Signature

……..……

Date

DEDICATION

I dedicate this research to my Parents, Mr. Elisante & Eng. Elizabeth Nkini, Yvonne Nkini, Denis Nkini, Kenneth Nkini, Paulina Nkini, my nephew and nieces and my Fiancé Elia Athanas.

ACKNOWLEDGEMENT

The completion of this undertaking could not have been possible without the participation and assistance of so many people whose names not all may be enumerated. Their contributions are sincerely appreciated and gratefully acknowledged. First and foremost, I extend my gratitude to the Almighty God for the opportunity and his undying blessings.

I appreciate the kind of patronage, inspiration and timely guidance of my supervisor Dr. Salvio Macha who never got tired of my presence in search of good remarks, Course coordinators (Business Management), Class representative Mr. Augustine Kitulo for always keeping me updated, Mr. Shamdas - REA official who helped in initiating filling of the questionnaires, Engineers and other colleagues from Hegy Engineering (T) Limited who supported me every time I asked for assistances especially those I delegated most of my works to in pursue of my studies, my Boss Eng. George Goda who let me go through the journey. It has been an amazing journey in deed.

Lastly, my big fans; my family and friends who kept encouraging me whenever I felt down or discouraged. They never afforded to see me fail. My love for you is beyond human nature explanations.

ABSTRACT

Energy is the single most important resource that underlies the development of a given country. However, the most affordable sources of energy today are not only ignored in use but also generated in scarcity. The objective of the study was to find factors affecting rural electrification in Tanzania specific objectives being; analyising influence of demand in rural electrification, to determine if REA has sufficient fund to finance the immense demand for modern energy services and determining how alternative energy sources can improve rural electrification. Questionnaire and interview were methods used for data collection with the expected population size of 200 individuals with the stratum sampling being the technique used to find the sample size. A case study design approach was used to enable an in depth data collection. Among factors affecting rural electrification observed were lacks of finance in electrification agency, low income from consumers, cost of alternative sources of energy and population density. For that reason, the researcher recommended other researchers to look at other alternative sources of energy such as geothermal, natural gas, coal, uranium and renewable energies to improve rural electrification but also would appreciate if these renewable energies “green energy” were given a priority for the sake of community health, affordability and environmental conservation.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BADEA	Arab Bank for Economic Development in Africa
CBOs	Community Based Organizations
EAPP	Eastern Africa Power Pool
EACPP	East Africa Community Power Pool
ESMAP	Energy Sector Management Assistance Program
EWURA	Energy and Water Utilities Regulatory Authority
EU	European Union
GoT	Government of Tanzania
IEA	International Energy Agency
IEG	International Energy Group
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
MEM	Ministry of Energy and Minerals
MKUKUTA	Mkakati wa kukuza Uchumi na Kupunguza Umasikini.
NEMC	National Environmental Management Council
NEPP	National Electrification Program Prospectus
NGOs	Non-Governmental Organizations
NORAD	Norwegian Agency for Development Cooperation
NSGPR	National Strategy for Growth and Reduction of Poverty
OFID	OPEC Fund for International Development
REA	Rural Energy Agency
REB	Rural Energy Board
SIDA	Swedish International Development Cooperation

SSA	Sub-Saharan Africa
SAPP	Southern Africa Power Pool
TA	Trust Agent
TANESCO	Tanzania Electric Supply Company
TTB	Tanzania Tourism Board
TV	Television
UNDP	United Nations Development Program
WHO	World Health Organization

CHAPTER ONE

1.0 OVERVIEW OF THE STUDY

1.1 Background to the Study

Rural electrification is the process of bringing electrical power to rural and remote areas. At least a billion people worldwide still lack household electric power, a population equal to that of the entire world in the early 19th Century. As of the mid 2010s an estimated 200 to 300 million people in India (15% to 20% of the total population) lack electricity as well as seven out of eight rural Sub-Saharan Africans. Many more receive only intermittent and poor quality electric power. In 2012, some 23% of people in east Java, Indonesia, a core region, also lack electricity, as surveyed in 2013.

It is estimated that the absolute number of people without power was growing until the late 1980s when rural electrification programs particularly in East Asia, outpaced the growth of human populations. Up from about 1.84 billion in 1970, approximately 2.01 billion (equal to the world population in 1927) people in developing countries still lacked electric power in 1990 about 38% of the World's population at that time, 51% of the population of so called developing countries and 67% of rural parts of the developing world. The IEA estimates that, if current trends do not change, the number of people without electricity will rise to 1.2 billion by the year 2030. Due to high population growth, the number of people without electricity is expected to rise in Sub-Saharan Africa.

According To the International Energy Agency's (IEA) World Energy Outlook (2013), More than 1.2 Million people worldwide did not have access to electricity in

2011. Almost all of them live in developing countries (1,257,000 Out of 1,258,000). The Region most affected by the lack of electrification is Africa, Specifically Sub - Saharan Africa. While The electrification rate in North Africa Reached 99% In 2011, It was not higher than 32% In sub - Saharan countries. These figures are even more alarming when we consider the electrification rates in rural areas. The IEA Reports that only 65.1 Percent of rural areas in developing countries had access to electricity in 2011, while rural electrification rates of transition economies and OECD Countries was 99.7 percent.

In Rural Rwanda, The electrification rate is even considerably lower at 1.3 % (UNDP/WHO 2009). As Part of the efforts to achieve the MDGs It is among the national policy priorities of most countries to improve access to electricity. The National target for Rwanda, For example, is to augment the overall electrification rate to 30 % by 2020 – Six times the rate in 2005. The International donor community joins these efforts and has increased its support to the energy sector in general and electrification projects in particular (IEG 2008).

Rural electrification only makes sense in areas where there is already a demand for electricity-using services such as lighting, television, refrigeration and motive power. In the absence of a grid supply, these services are obtained by spending money on kerosene, LPG, dry-cell batteries, car battery recharging and small power units, all of which are highly expensive per unit of electricity supplied. Recent surveys in regions without electricity in Uganda and Lagos indicate that people spend approximately 5 dollars per month on these energy sources. Private suppliers often find a ready

market for electricity at more than one US dollar per kilowatt hour. Several World Bank Group projects now underway are exploring improved means to provide modern energy services to the more than two billion people in developing countries who remain without access. In remote areas, new technologies for off-grid rural electrification promise environmentally benign access to electricity at a lower cost than conventional technologies (Reiche *et al*, 2000).

The resource used for generating electricity will vary according to village load profile, availability of renewable resources, and fuel transportation costs. In most cases, a diesel generator, a wind-diesel-hybrid, or a small hydropower plant will be least cost, depending on local conditions. In choosing among these or other options, service providers, regulators, and/or rural households need the knowledge and tools to find the least-cost options (on a lifecycle basis) for a given level of service. The best options may also change over time and will continue to invite comparison with grid extension.

Albouy (1983), the least cost decisions will not be taken on basis of the marginal costs of one isolated village, but have to be seen as part of the company's long term investment plans over its whole service area. The energy needs within SSA are dire, especially in the rural areas, where about 68% of residents (World Bank, 2000). According to Karekezi and Kithyoma (2002), SSA is the least electrified region of the World with rural electrification levels that are often below 5%. The main energy demand in rural areas of low income countries is for cooking and the main source of fuel for satisfying this demand comes from fuel-wood, dung and other forms of biomass, which are inefficient and polluting (World Bank, 2000).

(Sahu A *et al*, 2014), In India, the latest census data show that only 53% of the rural population has access to grid electricity and 43% still use kerosene for lighting. Due to this situation, these people cannot use power for mobile charging, fans, TV, irrigation pumps, agriculture machinery, computers at school. This situation is continuing in remote areas, where the power is providing by diesel generator based just enough for lighting one CFL bulb. The primary source of energy in Uganda is hydroelectric power from major plants located on the shores of Lake Victoria, which boarders Uganda to the South. As of 2007, the electric grid only served 2% of the rural population and 5% at the national level (Kaijuka, 2007).

Like most countries in Sub Saharan Africa, one of the most obstacles to modern energy is limited access to electricity for households, particularly in the rural areas. The overall electrification rate in SSA (2000) stand at 23%, with the urban and rural figures standing at 51% and 8% respectively (International Energy Agency (IEA), 2002). However, Kenya has electrification rates below the SSA average with 14% overall connection and a breakdown of 42% and 4% for urban and rural areas respectively (Kenya National Bureau of Statistics (KNBS), 2000). One reason for this low level of electrification in rural areas is the lack of available finance to cover capital and operation cost for generation, transmission and distribution of electricity which are higher than in urban area.

According to REA Annual report for financial year ended June 2011, it states that; REA is the autonomous body under the ministry of Energy and Minerals of United Republic of Tanzania with the role of promoting and facilitating improved access to modern energy services in rural areas of mainland Tanzania. The agency promotes

rural energy by providing grants and subsidies as well as working with key partners and collaborators from private sector NGOs, CBOs and Government agencies to mobilize resources for its work. Nevertheless, REA made a significant contribution to the energy sector by providing technical assistance to various project developers; coordinating capacity building programs for both project developers and staff and providing financial support to rural energy projects. REA also continued to mobilize financial and non-financial resources to implement the activities of the Agency and REF.

The National Energy Policy 2003 set national energy objectives to ensure availability of reliable and affordable energy supplies, and to promote efficient energy use in order to support national development goals. The policy recognizes that, the main thrust has to be based on private initiatives and investments for exploitation of local energy sources. The policy sets an entirely new approach to modern energy in rural areas of Tanzania and the government has committed itself to develop and implement the new strategy to address modern energy needs of over 85% of Tanzanians living in rural areas.

Later on, the Agency provided grants to 82 energy projects worth TZS 129 billion. A recent survey conducted in collaboration with the National Bureau of Statistics revealed that access to electricity in rural areas increased to 6.6 percent in 2011, up from 2.5 percent reported in the National Household Budget Survey 2007. At the end of the 2010/11 financial year, the Agency had more than 80 rural energy projects under its supervision. This includes projects whose implementation spilled over from the previous financial year.

According to REA Annual report for the year ended June 30th 2012/2013, it was reported, access towards electrifying rural areas of Mainland Tanzania has raised to 7% in 2013. Implementation of REA programs for 2012/13 were results oriented with remarkable tangible provisions of modern energy services to rural communities. Furthermore, the pace of electrification has increased to 17% in 2014 (REA Annual report for the year ended June 2013/14). At the present 36.4% of the Tanzanian population have access to electricity services with overall national connectivity rate of 24%. The government plans to increase the connectivity level to 30% in 2015, 50% in 2025, and 75% 2033 (National Energy Policy, 2015).

1.2 Statement of the Problem

Despite of the establishment of REA the pace for rural electrification hasn't been satisfactory since it has only increased form 2% in 2006 to 41% in 2015. Government has targeted to have the electrification rate of 50% by 2020. Under the conditions, the electrification rate is 64% in 2025, 76% in 2030, and 90% in 2035 (Power System Master Plan, 2016). Chaurey *et al* (2004) argued that, a strong correlation exists between rural poverty and access to electricity because electricity is a pre-requisite for productive activities.

REA Annual reports, (2014) to (2015) argued that, factors such as resource unavailability (such as; funds, increase costs of construction and unavailability of line materials for projects), rising cost of electricity connectivity, long transmission distances and sporadic population densities, slow and insufficient flow of subventions from Government budget, limited number of investors willing to finance rural energy projects, unavailability of sufficient resources to implement the

approved projects low rate of customers to connect and take advantage of electricity availed by completed projects, Low private sector capacity, capability and participation are having an adverse impact on the ability of REA to meet its set objectives.. At the same time incomes in most rural communities in Tanzania are low. Access to modern energy services in rural areas is still a major challenge in Tanzania; moreover the country has one of the lowest per capita energy consumption in the world. This study therefore aimed at finding out the factors affecting improvement of rural electrification in Tanzania.

1.3 Research Objective

1.3.1 General Objective

To determine factors affecting improvement of rural electrification in developing countries.

1.3.2 Specific Objective

i. To analyze influence of demand for electrification in rural area in Tanzania.
ii. To determine if Rural Energy Agency has sufficient fund finance the immense demand for modern energy services in rural areas in Tanzania.
iii. To determine how alternative energy sources can improve rural electrification in Tanzania.

1.4 Research Question

1.4.1 General Question

What are factors affecting improvement of rural electrification in Tanzania?

1.4.2 Specific Questions

i. How does demand influence electrification in rural areas in Tanzania?

ii. Does rural energy agency have sufficient fund to finance immense demand for modern energy services in rural areas in Tanzania?

iii. How do alternative energy sources improve rural electrification in Tanzania?

1.5 Significance of the Study

The study aimed at addressing factors affecting improvement of rural electrification and draw lessons from programs in countries that had begun to tackle the problem. The results were expected to help rural communities to afford modern energy services into their remote areas for social and economic development, encouraging private sector participation that will contribute significantly in improvement of the livelihoods of the rural population and the attainment of sustainable economic growth nevertheless, open minds of different stakeholders, both direct and indirect who are investors and financers in energy sector not only for rural development but also perceiving high benefits of investing in rural areas. At the heart of the challenge is the fact that large investment capital is required. Nevertheless, to help the Government of Tanzania put more emphasis in alternative sources of energy since these energies are inexhaustible and easily accessible.

Moreover, the study was expected to lead to a better understanding of the existing challenges, as it paves a way to other researchers on further research on improving rural electrification in Tanzania and other developing countries. The researcher, as it was a partial fulfillment for the award of Master of Project Planning Management of the Open University of Tanzania.

1.6 Organization of the Proposal

The study proposal was organized in three chapters; where by each chapter stated its contents. However; all contents found in each chapter had significant relationship to each other. Chapter one was centered on background to the study, statement of the problem, research objectives and research questions, significance of the study, and organization of the proposal. Chapter two covered literature review, which provided theoretical bases to the study, empirical studies comprised of previous international and regional studies, Research gap and conceptual framework for the study. Chapter three was concerned with research methodology showing research Paradigms, design, type of measurement, data collection method, sample and sample size, sampling procedure, area of the study, Reliability and Validity of data, Management of data and analysis techniques and limitations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents theoretical and empirical literature reviews. It also provides the conceptual framework and measurement of study variables.

2.2 Theoretical Literature Review

2.2.1 Definitions of the Key Terms

Annual report means the report of the operation of the Agency and Fund submitted by the director general to the board on an annual basis, and, once approved by the board, submitted to the minister (Rural Energy Act, 2005).

Fund means the Rural Energy Fund established under section 17 of Rural Energy Act and includes financial resources set aside for rural energy development (Rural Energy Act, 2005).

Grant means an award of money by the fund to a qualified developer for the purpose of developing and implementing a project (Rural Energy Act, 2005).

Modern Energy means energy that is based on petroleum, electricity or any other energy forms that have commercialized market channels, a higher heating or energy content value than traditional biomass fuel, and that which might be easily transported, stored and utilized (Rural Energy Act, 2005).

Sub-Saharan Africa countries these are countries that lie south of Sahara such as, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Brazzaville and Democratic), Cote

d'lvoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea-Bissau, Kenya, Uganda, Tanzania, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Reunion, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Western Sahara, Zambia and Zimbabwe.

Off-Grid electrification is an approach to access electricity used in countries and areas with little access to electricity due to scattered or distant population. Typically, to provide smaller communities with electricity.

Demand for Electricity this is the act of strongly asking for electricity and with determination to be connected as a right, based on people's need and awareness, as well as their ability and willingness to pay.

Alternative Energy sources these are such as, solar energy, wind energy, biomass energy, geothermal energy and tidal energy. They do not need one to be connected to the grid.

2.2.2 Theories

2.2.2.1 Modernization Theory

Kendall (2007), urbanization accompanied modernization and the rapid process of industrialization. Historians link modernization to the processes of urbanization and industrialization and the spread of education. When modernization increases within a society, the individual becomes increasingly important, eventually replacing the family or community as the fundamental unit of society. Modernization refers to a model of a progressive transition from a pre-

modern or traditional to a modern society. Modernization theory originated from the ideas of German sociologist Max Weber (1864–1920). The theory looks at the internal factors of a country while assuming that with assistance, "traditional" countries can be brought to development in the same manner more developed countries have been.

Modernization theory stresses not only the process of change but also the responses to that change. It also looks at internal dynamics while referring to social and cultural structures and the adaptation of new technologies. Modernization theory maintains that traditional societies will develop as they adopt more modern practices. Proponents of modernization theory claim that modern states are wealthier and more powerful and that their citizens are freer to enjoy a higher standard of living. Developments such as new data technology and the need to update traditional methods in transport, communication and production, it is argued, make modernization necessary or at least preferable to the status quo. That view makes critique of modernization difficult since it implies that such developments control the limits of human interaction, not vice versa. It also implies that human agency controls the speed and severity of modernization. Supposedly, instead of being dominated by tradition, societies undergoing the process of modernization typically arrive at forms of governance dictated by abstract principles. Traditional religious beliefs and cultural traits, according to the theory, usually become less important as modernization takes hold.

Modernization of the energy sector of developing nations recognizes that transitioning from traditional to modern is not merely the advancement in technology

and the introduction of western practices, implementing modern energy requires the reorganization of political agenda and, in turn, an increase in funding by feeders and resources towards electrification. Modernization theorists often saw traditions as obstacles to economic growth. According to Seymour Martin Lipset, economic conditions are heavily determined by the cultural, social values present in that given society. Furthermore, while modernization might deliver violent, radical change for traditional societies, it was thought worth the price.

Critics insist that traditional societies were often destroyed without ever gaining the promised advantages if, among other things, the economic gap between advanced societies and such societies actually increased. From the 1960s, modernization theory has been criticized by numerous scholars, including Andre Gunder Frank from 1929 to 2005 and Immanuel Waller stein (born 1930). In this model, the modernization of a society required the destruction of the indigenous culture and its replacement by a more Westernized one. By one definition, modern simply refers to the present, and any society still in existence is therefore modern.

2.2.2.2 The User Value of Electrification Theory

Hirmer and Cruickshank, (2014), creating value for the end-user is particularly important for project acceptance and the sustainability of a scheme once it has been handed over to the local community. User-value is a determining factor for product acceptance in product design. It is important that rural electrification projects incorporate the value perception of the end-user and extend their success beyond the commonly used criteria of financial value, the appropriateness of the technology,

capacity building and technology uptake. The theory talks of five pillars of user value applied to rural electrification which are;

i. Functional Value: In line with Drucker (2002), the functional value is concerned with "customers pay(ing) only for what is of use to them and gives them value. In the words of Broekhuizen (2006), this can be understood as the "utility derived from the product quality and product performance. The utility is the price and the quality, coined as the 'worth'.

ii. Social Significant Value*:* According to Holbrook (1999), "value resides not in the product purchased, not in the brand chosen, not in the object possessed, but rather in the consumption experience(s). However, a person may accept a rural electrification project because of 'conspicuous consumption' rather than need.

iii. Epistemic Value: According to Sheth et al. (1991), Electrification schemes in rural remote areas can be seen as a novelty to replace traditional fuels and consequently people may strive for it.

iv. Emotional Value: The applicability to rural electrification, there are four main characteristics that can be linked to emotional value. These are: association, fun, memorability, and safety. Association may refer to one's sense of connectivity towards a different class, culture, or people that use electricity. Fun can be with the family (or on your own), and through the ability to socialize with peers into the late evening hours. This in turn may lead to memorable moments. Additionally, electricity may provide a sense of security through improved lighting and lower risk of fuel shortage.

v. Cultural Value: According to OED (2013) culture can be defined as "the distinctive ideas, customs, social behavior, products, or way of life of a particular

nation, society, people, or period". In line with this the cultural value applicable to rural electrification covers the following three value streams: tradition, religion and spirituality.

2.3 Objectives of REA

The aim of Rural Energy Agency is to implement Board's strategies and decisions in fulfilling the mandate of the board and facilitate the provision of technical assistance, research and development, training and other forms of capacity building to qualified developers by suitably qualified experts related to the planning and preparation of a project prior to an application for a grant (Rural Energy Act, 2005 sect 15).

2.4 Principle of Rural Energy Development

According to Rural Energy Act 2005 sect 4, the follows are recognized as principles of Rural Energy Development;

i. Modern energy supply to rural areas promotes growth in economic production and productivity as well as social welfare.

ii. Sustainable development shall be achieved when modern energy services in rural areas are promoted, facilitated and supported through private and community initiative and involvement.

iii. The role of Government in rural energy service provisions is of that facilitator of activities and investments made by private and community entities.

iv. The fulfilment of Government's role shall be best managed through an institution that is independent of, but accountable to, the central organs

of government.

v. The institution designed to facilitate rural energy service provision shall have a small core administrative capacity, and shall rely on the technical and financial capacity of qualified private sector entities and

vi. Facilitation of rural energy service provision shall take the form of financial support for the capital costs of investments, technical assistance to project preparation, training and other forms of capacity building.

Funding Modern Energy:

The use of public funds for rural electrification often leads to political interference at national and local levels. The politicians regard public funding as giving them rights to interfere, but experience shows that nothing is more damaging. Once technical and financial decision-making in the implementing agency becomes based on political string pulling, professional discipline is destroyed and the organizational structure is undermined. Waste of resources, low staff morale and operational ineffectiveness are the characteristics of rural electrification programs suffering from a high degree of political interference. Sometimes this can be turned into a positive force as in Thailand where local politicians were encourage to raise and contribute funds, so that their constituents could receive electricity before the planned time. It is even more important to ensure that rural electrification planning is open and objective. Successful programs use clearly defined criteria to rank areas in order of priority for electrification, so that the decision-making is clearly seen by all to be fair (Barnes and Foley, 2004).

Rural Energy Act (2005 sec 17), there shall be established a fund to be known as the Rural Energy Fund for the purpose of providing grants to qualified developers of projects. The fund shall provide resources for; grants towards the capita costs of projects implemented by private and public entities, co-operatives, and local community organizations, the provision of technical assistance, training and other forms of capacity building to qualified developers by qualified experts related to the planning and preparation of a project prior to an application for a grant and the provision of financial assistance (Rural Energy Act 2005 sect 18). The Rural Energy Fund provides capital subsidies disbursed through a Trust Agent for the development of rural energy projects. Funding from REF is intended to buy-down the capital investment in rural energy projects. Grants are given to eligible projects to co-finance the investors' equity contributions, loans from financial institutions and donors.

Development Partners supporting the energy sector in Mainland Tanzania are African Development Bank, Arab Bank for Economic Development in Africa (BADEA), Denmark, The European Union, Finland, Norwegian Agency for Development Cooperation (NORAD), Norway Opec Fund for International Development (OFID), Russia, Swedish International Development Agency (Sida,) United Kingdom, United States of America, World Bank. However, as part of sensitizing and promoting private sector participation of modern energy services in rural areas, since year 2010, the Agency organized lighting Rural Tanzania Competition Program where grants are provided to support innovative business ideas in various energy technologies in rural areas (REA Act of 2005 sect 19 (3)).

2.5 Benefits of Rural Electrification

i. Improvement of agricultural production through irrigation schemes achieved by using electric water pumps. E.g. Mtakuja village in Moshi, Kilimanjaro that was a direct support from REA.

ii. Improvement of education system by enabling students to increase their general knowledge base through watching television and accessing educational materials from the internet.

iii. Facilitates Income generating activities such as welding workshops, milling machines, carpentry, barber shops, stationeries, battery charging centers and SMEs. Self-employment of rural women in tailoring, saloons, groceries and restaurant owners and edibles for sale like buns, samosas and bread at night.

iv. Availability of electricity in the remote rural areas has improved provision of essential community services like health, education and security also reduced costs of buying kerosene for lighting hence contributing to poverty reduction.

2.6 Empirical Literature Review

In this section the researcher looked at the work done by other researchers (empirical literature review) which relate to the topic under investigation. It basically aimed at relating theoretical literature review with finding of other researchers.

2.6.1 Local Studies

There is no doubt that the country's economic and social development depends greatly on meeting the rapidly growing energy needs of present and future populations. Currently Tanzania mostly depends on hydropower for its electricity supply. However, the generation of hydroelectric power is very costly and it is also

dependent on the natural availability of water. But with rural communities where incomes are very low and water supply sporadic, this gets even more challenging.

REA Annual report, 2010 states that, The National Strategy for Growth and Reduction of Poverty (NSGRP) commonly known as MKUKUTA (its acronym) acknowledges that the levels and quality of energy services are a major constraint to economic growth. Energy is singled out as a crucial component for the attainment of MKUKUTA and the Millennium Development Goals (MDGs). MKUKUTA also states that the use of natural resources that includes the reckless felling of trees for charcoal production is unsustainable. Inadequate investments in the energy sector and affordable alternative energy technology are major constraints

Despite of the country to be mostly dependent to hydroelectric power, Ministry of Energy and Mineral reveals that, the energy balance is dominated by biomass-based fuels particularly fuel-wood (charcoal and firewood), which are the main source of energy to both urban and rural areas. Biomass-based fuel accounts for more than 90% of primary energy supply. Commercial energy sources i.e., petroleum and electricity, account for about 8% and 1.2%, respectively, of the primary energy used. Coal, solar and wind account for less than 1% of energy used though electricity generation is mainly hydro-based.

85% of the total energy is consumed in the rural areas where the majority of Tanzanians live. Biomass, particularly wood-fuel, constitutes 90% of rural energy consumption, which has significant impact on the process of environmental degradation. Access to electricity in rural Tanzania is only about 1%.

The National Energy Policy of 2003 recognizes that improved energy supply in the rural areas through public and private sector participation, will contribute significantly to the improvement of the welfare of the rural population and to the attainment of sustainable economic growth. For these reasons, the Rural Energy Agency (REA) was established and entrusted with the role of promoting, stimulating and facilitating improved access to modern energy services in rural areas where more than 85% of Tanzanians live, through empowering both public and private sector initiatives in rural energy, (Rural Energy Act, 2005).

According to National Energy Policy (2015), Energy sector play a critical role in the socio-economic development of a country. All productive sectors of the economy are driven by an adequate, reliable, affordable and sustainable energy supply. At the present, affordable, reliable and accessible electricity is identified consistently as a major constraint in achieving desired socio-economic transformation in Tanzania.

National Energy Policy, (2015) major barriers toward improving rural electricity connectivity include: absence of national grid in large part of the country, high cost of delivering electricity to rural areas, high upfront investment costs; scattered settlements in the rural areas leading to long and costly distribution lines. Other challenges are harsh terrains and inaccessibility due to underdeveloped infrastructure leading to high cost of rural electrification projects; high operating costs of grids in rural areas due to low population density; acquisition of way-leaves due to high land compensation demands and vandalism of power infrastructure; underdeveloped markets due to low purchasing power, limited technical and financial capacity of indigenous entrepreneurs; and low awareness among key stakeholders on

opportunities of investing in rural areas.

2.6.2 International Studies

The argument for rural electrification often have centered on the transformative effect that it can have for rural households. At the micro level, the effect of rural electrification on a household can be substantial. At the macro level, the arguments for rural electrification have revolved around the productive work that can be done in rural areas with electricity. Although literature indicates that rural electrification is a global phenomenon, 1.3 billion people in the world do not have access to electricity, representing 18% of the global population, many of them live in Africa and South Asia, (IEA, 2013).

According to the International Energy Agency's (IEA) World Energy Outlook (2013),more than 1.2 million people worldwide did not have access to electricity in 2011. Almost all of them live in developing countries (1,257,000 out of 1,258,000). The IE A reports that only 65.1 percent of rural areas in developing countries had access to e lectricity in 2011, while rural electrification rates of transition economies and OECD countries was 99.7 percent.

The empirical evidence that does exist suggests that the direct effect of rural electrification for rural households, especially over the short term, may worsen the rural inequality. The poor are not totally excluded, but in just about all countries, the poor adopt electricity at a lower rate than do more wealthy households. For instance in 1980 in the Philippines, it was estimated that households below the poverty level could not afford electricity (Mandel et al, 1980). However, a more recent Philippines

survey found that, whereas households above the poverty line adopt electricity at a much higher rate, nevertheless, the poor households that are below the poverty level do adopt electricity (World Bank 2002b) based on the scenario, the countries with extremely low incomes or poor records of income distribution, the poor will not be able to afford electricity at first. In fact, those wealthy households that can afford electricity will be able to purchase more appliances, thus potentially widening the gap between the rich and the poor. The good news is that for those households that adopt electricity, their quality overall quantity are enhanced compared to no electrified households, and to some extent the gap between the middle and wealthy households is narrowed.

Concerning rural areas, Khandker *et al*, (2009) claim that lack of access to energy and more precisely to electricity is one of the major impediments to economi c development. Despite of the factor that Rural electrification pace goes slowly in developing countries, more effort need to be exerted in rural areas to ensure other sources of energy such as kerosene are eradicated for community health and socio-economic development. Approximately 2.8 billion people worldwide rely on solid fuels for cooking, lighting, and heating. These fuels are usually burned inefficiently, both as biofuels for cooking and kerosene lighting, which results in substantial emiss ions of air pollutants that affect human mortality and morbidity rates.

Kerosene has received less attention, despite being used to light approximately 300 million households worldwide. Kerosene emissions include carbon monoxide (CO), nitric oxides (NOX), and sulfur dioxide (SO2).Kerosene burning devices can impair

lung function and increase cancer risks as well as incidence of infectious illness and asthma. There is extensive evidence that indoor air pollution is strongly linked to human health, especially among children, and that the presence of pollutant s related to kerosene in the environment is also related to human health. In addition, kerosene lamps have important environmental consequences. It is estimated that thes e devices are responsible for 7 percent of annual global black carbon emissions.

Chaurey *et al* (2004), argue that a strong correlation exists between rural poverty and access to electricity because electricity is a pre - Requisite for productive activities. In Addition to improving productivity by giving access to more efficient means of production, access to an electrical grid and better electricity services could also lead to household time savings and allow them to work more hours by increasing their access to markets (Bernard And Torero, 2011).

The provision of electric services to rural and remote communities in the developing countries world is a financial challenge. Assuming all current rural and remote communities in the developing world would be electrified with a grid base modest services, hundreds of billions US$ would be needed to cover the costs of the associated generation, transmission and distribution systems. To a large extent the investment has to come from utilities, governments and private investors. Though the multilateral development banks and donors are influential, they are relatively modest investors in rural electrification. However, the provision of electricity services is only one of the rural development challenges facing developing world: clean water, sanitation, health services and safety could be higher on the priority

ladder, but access to electricity facilitates these activities. (Zomers and Dagbjartson, CIGRE's report, 2008)

Access to electricity can improve socio - Economic conditions in developing countries through its influence on key components of poverty, namely health, education, income and environment (Kanagawa and Nakata, 2008). Concerning rural areas, Khandker *et al* (2009) Claim that lack of access to energy and more precisely to electricity is one of the major impediments to economic development. Sahu *et al* (2014), in the coming few years, developing countries will need more commercial fuels and will have to explore and develop all of their conventional resources to meet their growing demands from urban and suburban areas and from their industrial sectors. Renewable energy system appears to be viable in locations, where electrical grid supply has not yet reached, where commercial fuels are scarce due to their cost or unavailability or both and where even small amounts of energy can make a considerable impact on the living environment of local people.

2.7 Research Gap

The literature study showed that, there had been extensive work done highlighting difficulties rural electrification is faced with. Presence of such factors had led to the failure of social and economic development in rural areas. Saying so, the researcher observed that, among other factors, Tanzania is faced with limited use of energy resources. Tanzania has abundant and diverse indigenous energy resources which are yet to be fully exploited such as hydropower, natural gas, coal, uranium, wind, geothermal and solar while Tanzania is based on biomass and hydroelectric power over other sources. The researcher recommends further researches on these other

sources of energy especially renewable "green energy" to be looked on the second eye. This might increase investors in Energy market in Tanzania, Private Sector participation and increasing accessibility to rural communities by lowering costs.

2.8 Conceptual Framework

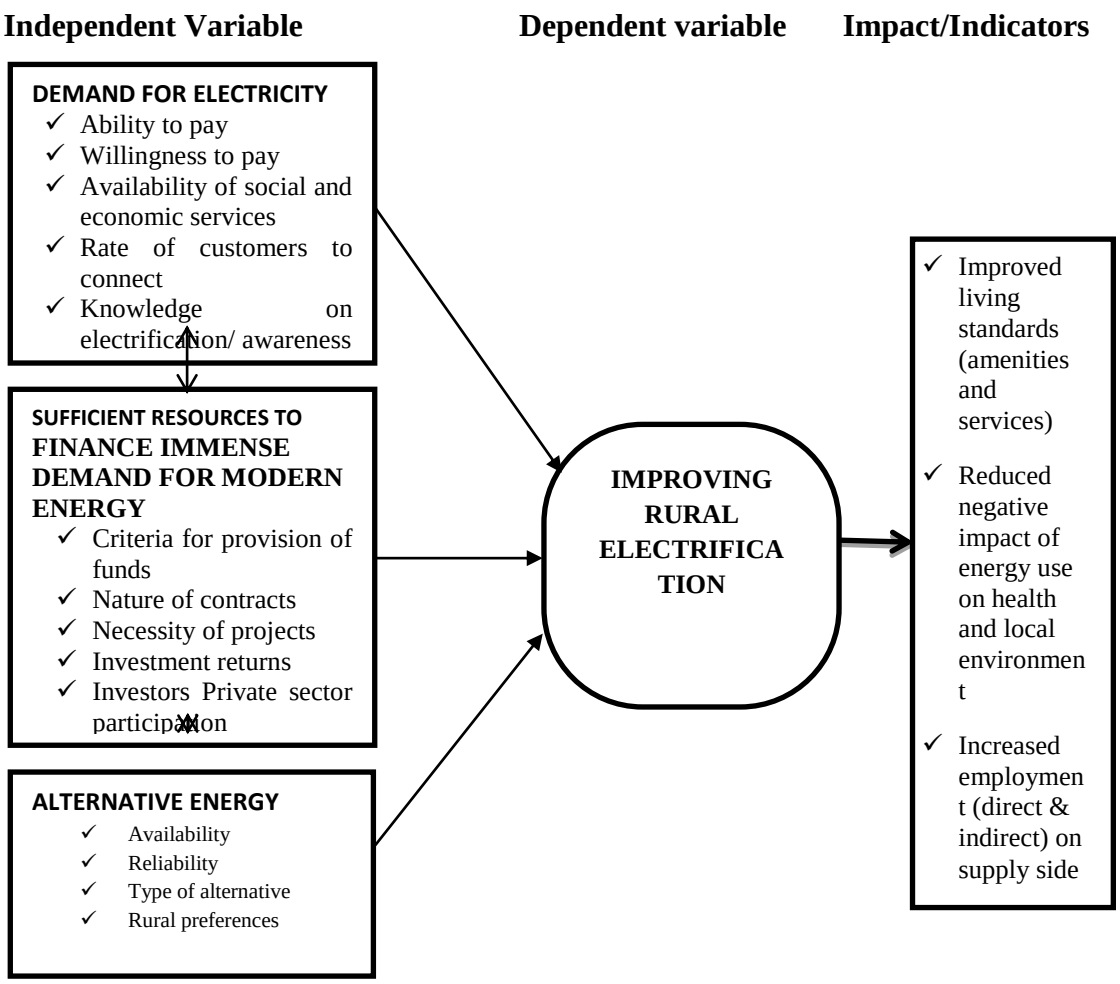

Figure 2.1: Relationship of Variables

Source: Compiled by the Researcher (2017)

This study attempted to establish factors affecting improvement of rural electrification in Tanzania. Independent variable is the variable that is varied or manipulated by the researcher and dependent variable is the response that is measured (Kothari, 2003) Conceptual framework is a relationship between variables

and in this study, improving rural electrification is a dependent variable while Sufficient resources to finance immense demand for modern energy, level of private sector participation in Rural projects and ability of rural communities to pay for energy services are independent variables. As shown in the figure 2.1, the extent of performance of independent variables results into dependent variable. And as for independent variable, they both have effect upon each other. One factor influences the other.

2.9 Measurement of Variables

Measurement of variables implies assigning numbers to research variables using standard set of rules. This facilitates comparisons and interpretation of such variables. During this study data were captured and measured using both nominal and ordinal scales. Nominal scale- simply represents qualitative difference in the variable measured, can only tell us that a difference exists without the possibility telling the direction or magnitude of the difference e.g. race, gender(male/female), occupation, teenagers/adults are examples of nominal scaling. The purpose of the scale was just for identification. For ordinal scale-the categories that make up an ordinal scale form an ordered sequence, provides a rank order. It can only tell us the direction of the difference but not the magnitude. Because this study dealt with non-parametric measurements; both scales will be used to measure the variables to ensure validity and reliability of data.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This part covers the methodology which the researcher used to collect data and information. It covered the research design, description of the study area, data collection method, sample size and sampling techniques, expected result and limitation of the study.

3.2 Research Paradigm

A research paradigm is the set of common beliefs and agreements shared between scientists about how problems should be understood and addressed (Kuhn, 1962).

According to Guba (1990), research paradigms can be characterized through their: ontology; what is reality, epistemology; how do you know something, methodology how do you go about finding it out. In this study, researcher will use constructivism where the researcher believes that there is no single reality or truth, and therefore reality needs to be interpreted, however, it is more likely to use qualitative methods to get those multiple realities. Constructivism is built upon the premise of a social construction of reality. One of the advantages of this approach is the close collaboration between the researcher and the participant, while enabling participants to tell their stories (Crabtree & Miller, 1999).

3.3 Research Design

The study utilized the case study design approach in combination with mixed methodologies combining both qualitative and quantitative research methods to enable an in-depth investigation into the subject matter studied.

3.4 Population Size

This study encountered 163 respondents out of 200 that were expected. Participants were expected to be REA officials and rural communities simply to give a clear picture of what was supposed to be done, what has been done and what is expected to be done.

3.5 Research Measurement

Non-parametric measurements will be used under this research study. The use of non-parametric method is necessary because number of parameters grow with the amount of training data. It covers techniques that do not assume that the structure of a model is fixed. Typically, the model grows in size to accommodate the complexity of the data. In these techniques, individual variables are typically assumed to belong to parametric distributions, and assumptions about the types of connections among variables are also made.

3.6 Sampling Techniques

Probability sampling techniques are primarily used in quantitatively oriented studies and involve ‘‘selecting a relatively large number of units from a population, or from specific subgroups (strata) of a population, in a random manner where the probability of inclusion for every member of the population is determinable’’ (Tashakkori & Teddlie, 2003a,p. 713). A researcher used Stratified probability sampling technique in collecting data because it first identifies the relevant stratums and their actual representation in the population. A stratum is a subset of the population that shares at least one common characteristic. It observes existing relationships between two or more subgroups. For example;

Stratum	A	B	C
Population Size	60	40	300
Sampling Fraction	½	½	½
Final Sample Size	30	20	150

3.7 Sample Size

Table 3.1: Distribution of Respondents to be Studied

Respondent	**Number of respondents**	**Percentage (%)**
REA Officials	30	15
Stakeholders	20	10
Rural Communities	150	75
Total	**200**	**100**

Source: Compiled by the Researcher (2017)

From table 3.1, researcher expected to collect data through questionnaire to not less than 200 REA officials, rural communities and stakeholders regarding the issue under study.

3.8 Types of Data and Collection Method

Both primary and secondary data were collected. Researcher used questionnaire data collection tool based on both open and closed ended questions and Interview. It included check lists, attitude scales, projective techniques, rating scales and a variety of other research methods. As an important research instrument and a tool for data collection, a questionnaire has its main function as measurement (Oppenheim 100). It was the main data collection method in surveys and yield to quantitative data. Also, due to provision for open endedness, the instrument may be used to generate qualitative and exploratory data (Ododa and Ong'anya, 2009). Nevertheless, Interview data collection tool was used by a researcher where necessary for areas

that need clarification but also to rural communities who in one way or another are the reason for conducting the study.

3.8 Reliability and Validity of Data

3.8.1 Reliability

Kirk (2005); describe reliability as referring to whether the instrument/ index is measuring consistently the phenomena. This is producing the same results in various measurements. To ensure reliability of data various methods were employed under this research study.

3.8.2 Validity

Janny (2005), describe validity as referring to whether the index/instrument is describing what is intended to be described or measured. It is the ability to which the results of a study can be verified against the stated objectives. The validity of this study was ensured by matching research objectives with actual observation/results.

3.9 Data Analysis

Descriptive statistics was used to analyze data that was collected. The use of Microsoft Excel helped in analyzing data, and producing figures and tables, and simple percentage so as to establish challenges affecting improvent of rural electrification in developing countries and Tanzania.

CHAPTER FOUR

4.0 DATA ANALYSIS

4.1 Introduction

This chapter includes presentation and analysis of data to assess factors affecting improving of rural electrification, a case of Tanzania. Data were collected using different methods where primary data were collected through questionnaires and interview while secondary data were collected from annual reports, journals and articles prepared by REA and documentary review. Data were examined in both numerical and non-numerical where tables, charts, figures and percentages were used by a researcher, therefore, this chapter analyses the responses obtained by a researcher in the course of collecting data. It will also address the research gap discovered by the researcher that we will show on later chapter on the recommendations made.

4.2 Data Presentation

4.2.1 Characteristics of the Study Respondents

The study was expected to comprise 200 respondents where 30 questionnaires were expected to be distributed to Rea Communities, 20 to stakeholders and 150 to rural communities. Luckily, researcher failed to get the expected number due to unavailability of respondents. For this reason, researcher managed to distribute 102 questionnaires and performed interviews to 61 respondents which make a total of 163 population size. 20/102 respondents were REA officials, 10/102 stakeholders (contractors, investors and donors) and 72/102 rural communities. Of 61 interviews, 3/61 respondents were Rea officials, 3/61 respondents were stakeholders while 55/61 were rural communities.

4.2.1.1 Questionnaire Distribution and Response

Kothari, (2004), questionnaire is the method of collecting primary data by sending questions to the respondents with the request to complete and return them to the researcher and it consists of a number of questions printed or typed in a defined order on a form or set of forms. The researcher distributed 20 (100%) questionnaires to REA officials where 18 (90%) questionnaires were completely answered and had no fault, 1 (5%) questionnaire were not filled by respondents and 1 (5%) questionnaire was never returned.

Out of 10 (100%) stakeholders respondents, 7 (70%) fully participated while 3 (30%) respondent was not willing to participate for fear of being known or maybe exposed on the researchers report. All of 72 (100%) rural communities' respondents willingly wanted to participate in the questionnaires giving their views on electrification. Unfortunately, 29/72 questionnaires were found not effective at the time of distributing to respondents where, 17/29 damaged by rain water which resulted to fainting ink as they were been taken to the rural community and 12/29 were incomplete.

4.2.1.2 Interview Response

A set of questions similar to the ones presented on the questionnaire were presented to different individuals 61 individual from Dar Es Salaam Region, Kilosa, Rombo-Kilimanjaro, Ludilu-Njombe and Mafinga. Researcher used the help of site Engineers, technicians and drivers who willingly participated in the interview process on behalf to collect data for a researcher to the areas the researcher couldn't reach, say a researcher temporary team. This aimed at emphasizing on the major

issue under discussion but also finding validity of the data and see if they could be relied on.

Table 4.1: Distribution of Questionnaires to Respondents

Respondents	Distribution to Respondents	Reached to Respondents	Complete	Incomplete and Non Desponden ce	% of effective sample (drawn from Complete)
REA Officials	15	20	18	2	26.5
Stakeholders (Contractors, Investors and Donors)	10	10	7	3	10.3
Rural Communities	25	72	43	29	63.2
Total	**50**	**102**	**68**	**34**	**100**

Source: Compiled by the Researcher, (2017)

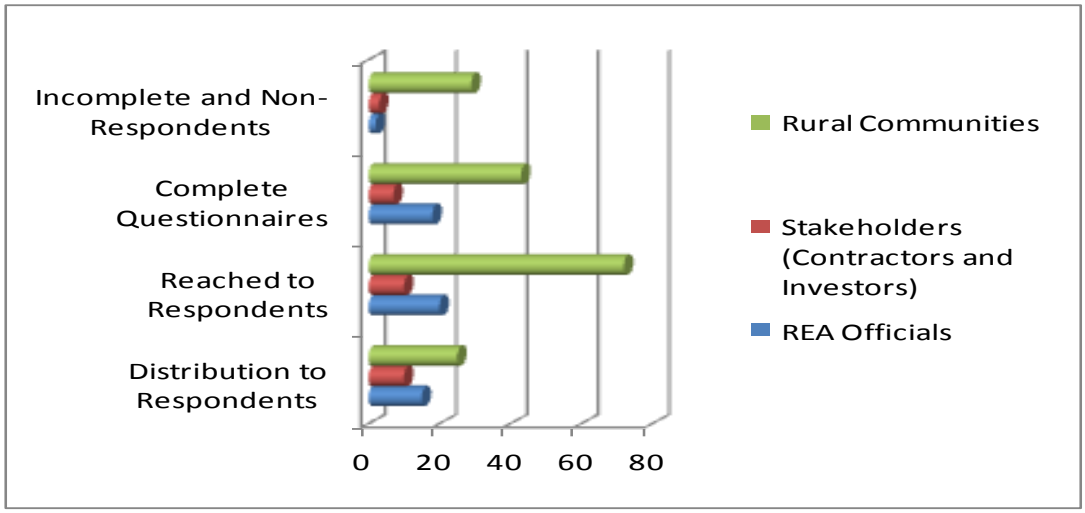

Figure 4.1: Distribution of Questionnaires to Respondents

Source: Compiled by the Researcher, (2017)

Interview was one of the most important data collection methods the researcher used especially for rural communities and stakeholders. Since some of them had poor understanding and not satisfying writing skills. The researcher team decided to

engage in translating the written questions from written to spoken. The process was a bit challenging but worth undergone. Of 61 respondents, 3/61 was Rea Officials, other 3/61 were Stakeholders and 55/61 were rural communities.

4.3 Reliability and Validity of Data

Reliability test is reliable if it is consistent over time and within itself (Nunnally, 1978) while Validity test usually determines whether the research truly measures what it was intended to measure in the study population (Saunders *et* al, 2007). Giving questionnaire and interviewing a single respondent at a time and carrying on discussions with the respondent was a way of maintaining validity.

4.4. Gender of the Respondents

According to findings, 96 (74.4%) of the respondents were male while 33 (25.6%) were female. Researcher discovered that, gender difference in accomplishing the questionnaires and Interviews was based on the accessibility and presence of these genders in their respective areas i.e. for Rea Officials, male outweighs female in number hence created a difference. The table below shows results of both questionnaires and interview on gender response;

Table 4.2: Gender of the Respondents

Gender	Respondents	Percentage (%)
Male	96	74.4
Female	33	25.6
Total	**129**	**100.0**

Source: Compiled by the Researcher, (2017)

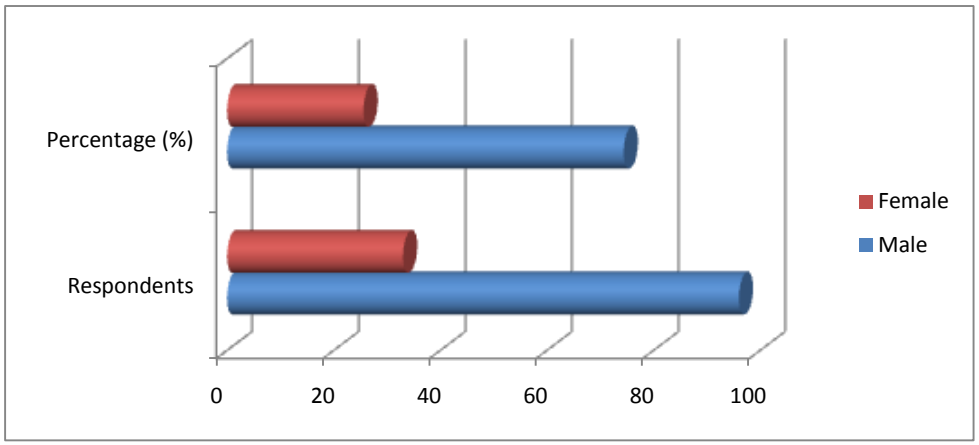

Figure 4.2: Gender of the Respondents

Source: Compiled by the Researcher, (2017)

4.5 Age of the Respondents

Out of 129 respondents, researcher found out that, 16 (12.4%) respondents were above 40 years, 91 (70.5%) respondents were between 20-40 years of age and 22 (17.1%) respondents were below 20 years. This brought a good indication to researcher since a big number of people that are expected to rely on electricity in the performance of work and their daily routine had a big turn up hence their information can be relied on. The above data is summarized in the table below;

Table 4.3: Age of the Respondents

Age	**Questionnaire Respondents**	**Questionnaire Percentage (%)**	**Interview Percentage (%)**	**Interview Respondents**
Below 20 years	9	13.2	13	21.3
Between 20-40 years	49	72.1	42	68.9
Above 40 years	10	14.7	6	9.8
Total	**68**	**100**	**61**	**100**

Source: Compiled by the Researcher, (2017)

From Table 4.3, for stakeholders, only male gender were available and as for rural communities, women rarely participated and those who tried seemed to had little knowledge or say little cared about electrification (addicted to traditional sources of energy).

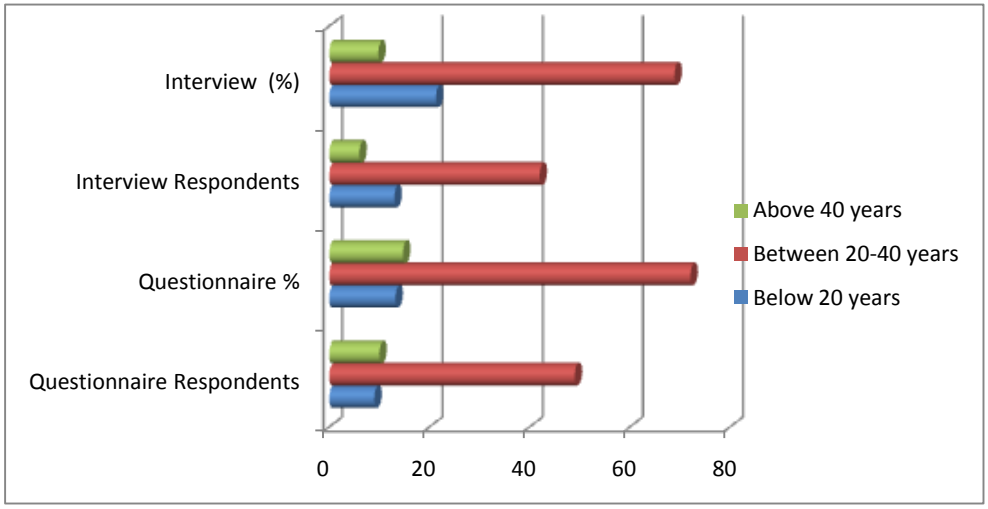

Figure 4.3: Age of the Respondents

Source: Compiled by the Researcher, (2017)

4.6 Academic Qualification

Of 129 respondents, it was discovered that, 8/68 (11.7%) questionnaire respondents and 7/61 (11.5%) interview respondents have certificate level of education, 3/68 (4.4%) questionnaire respondents have Advanced secondary education, 21/68 (30.9%) questionnaire respondents and 22/61 (36%) interview respondents have Ordinary level of education, 11/68 (16.2%) questionnaire respondents and 15/61 (24.6%) interview respondents have diploma level of education, 20/68 (29.4%) questionnaire respondents and 10/61 (16.4%) interview respondents have first degree education, 5/68 (7.4%) questionnaires respondents and 4/61 (6.6%) interview

respondents have master's degree education while 3/61(4.9%) interview respondents have primary education.

Table 4.4: Academic Qualification

Age	Questionnaire Respondents	Questionnaire Percentage (%)	Interview Percentage (%)	Interview Respondents
Primary Education	0	0	3	4.9
Ordinary level education	21	30.9	22	36
Advance level education	3	4.4	0	0
Certificate Education	8	11.7	7	11.5
Diploma level of Education	11	16.2	15	24.6
First degree Education	20	29.4	10	16.4
Master' degree	5	7.4	4	6.6
Total	**68**	**100**	**61**	**100**

Source: Compiled by the Researcher, (2017)

Through the above ratios, the researcher was able to determine level of electrification as information given was satisfactory since it was collected from respondents of different caliba with regards to their academic qualifications.

4.7 Working period with Rural Energy Agency

Since the study aimed at knowing factors affecting rural electrification improvement, it was important to get the results from those who have been in the sector for quite some time in order to see if this data can be relied on. The above data is summarised in the Table 4.5

Table 4.5: REA Officials working Experience

Age	Respondents	Percentage (%)
0-1 year	0	0
2-5 years	11	52.4
6-10 years	7	33.3
Above 10 years	3	14.3
Total	**21**	**100**

Source: Compiled by the Researcher, (2017)

From the table 4.5, of 21 REA officials respondents, (as a sum of both questionnaires and interview respondents), 11 (52.4%) respondents have 2-5 years working experience, 7 (33.3%) respondents have 6-10 years' experience and 3 (14.3%) respondents have above 10 years working experience.

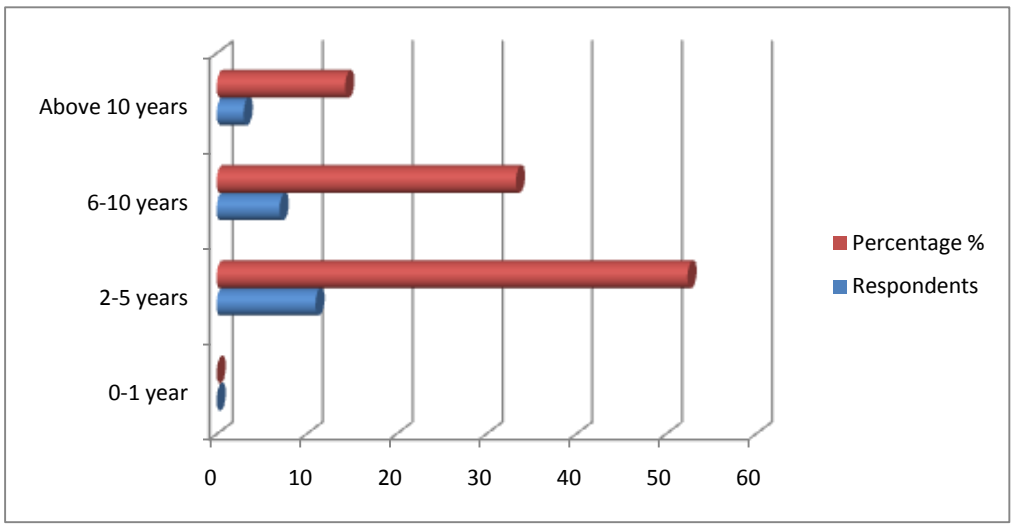

Figure 4.4: REA Officials working Experience

Source: Compiled by the Researcher, (2017)

4.8 Financing the Immense Demand for Modern Energy

Among the objectives of the study the researcher underlined is to determine if REA has sufficient resources to finance the immerse demand of modern energy in rural areas/ communities. From a simple definition, resource is a stock or supply of money, materials, staff, and other assets that can be drawn on by a person or organization in order to function effectively. In this area, the researcher aimed at looking on the following areas;

i. Criteria for provision of funds
ii. Nature of contracts
iii. Necessity of projects
iv. Investment returns and
v. Investors' private sector participation.

Qn. 5 stated "Are there sufficient resources to finance the immense demand for modern energy services in rural areas in Tanzania?" this was followed by the question which stated "If not, why?"

This question was specifically directed to REA officials to who most of the decisions on whether the projects should or should not be executed are made from. 21 (100%) respondents agreed that there are no sufficient resources to finance the immense demand for modern energy services in rural areas in Tanzania. The same respondents again stressed on one main factor stating that the main resource that affects to reach out the immense demand for modern energy services is "lack of finances from both internal and external donors and government"

The REB's major function is to oversee the activities of the REA, and to oversee the disbursement of funds from the REF. REA serves as the executive of the REB. It produces annual operational plans, and other plans and sectorial strategies which the board debates and approves. It also identifies and prepares papers on projects for financing through REF. after all that process, REB reviews these proposals, and instruct REA on the modes for disbursement of finances from REF in the most efficient and effective manner, and in a way that guarantees well-balanced (geographic, sectorial, etc.) access to REF.

Funds from REF are used to "draw down" the capital costs of investment in modern rural energy projects. "Smart subsidies" (grants) will be made to eligible projects to co-finance the investors' equity contributions, and finance from commercial banks and other investors including donors. These will help to reduce investor risk and improve their returns on modern rural energy investments, on the one hand, while also reducing the final cost of energy delivered to rural consumers, on the other. When the researcher wanted to know as to why there are no sufficient resources that is (lack of finances as respondents respondent), it was discovered that, there are terms that are put forward, say it criteria that need the project generators to manage for fund to be available. In line with that; Qn.6b. States that *"are there criteria for obtaining these finances?"*

Since fund is among the most crucial factor in achieving rural projects, normally donors or investors prefer to set terms or criteria that bind both giver and receiver but also that ensure the fund given or those financed meet the targeted goal(s). In this context, All 21 (100%) respondents agreed that there are specific criteria that

funds/finances are given out for the implementation of rural projects. According to "Performance Grant Provision' article lay down by REA, among many other criteria agreed for acquiring fund from investors or donors underlined are ;

1. Application form
2. Confirmation of legal registration of project champion/stakeholder.
3. Business/project plan including:
    i. cash flow projections
    ii. financial and technical justification of project
    iii. project costs and financing
    iv. list of goods and services to be financed
    v. timetable for implementation
    vi. economic and social benefits
4. Letter of intent from Tanesco for interconnection with Tanesco grid, when required
5. EWURA license for franchise for serving consumers in mini-grid area
6. All required (central and local) government approvals
7. EWURA license/permit for power generation when required
8. Adequate insurance of subproject assets
9. Proof of technical, procurement and financial management capacity of company/organization
10. Confirmation of compliance with IDA procurement requirements/proof of efficiency and transparency and adequate due diligence in appraisal
11. Evidence of financial capability, (e.g. audited financial statements, evidence of financial closure).

12. Evidence of full compliance with the Environmental and Social Assessment Framework
13. Proof of compliance of power supply systems with good utility practice and as appropriate specific mini-grid network specifications issued by REA or EWURA.

Allocations of funds to project developers follow guidelines as approved by the REB. These two types of allocations are;

To priority projects as identified and developed by the REA: In this criteria; REB competitively select a project developer for each priority project. This process provide opportunity for a variety of national and international developers to be first short-listed and thereafter to submit a technical and financial proposal.

To project developers who have proposed a project to the REF: In this criteria; allocation to projects is made on the basis of maximising the development impact for the minimum subsidy. Projects applying for funds should be seen to compete among one another for resources. REB drafts clear guidelines for the allocation of resources, and make decisions consistent with these guidelines.

However, Qn. 16 wanted a reveal as to *"what strategies are used to ensure funds are obtained at the right time?"*

Out of 21(100%), 15 (71.4%) claimed that, the best strategy that is normally taken is to have the best coordination with the ministry of Finance and Planning. This is mostly achieved if REB reports annually to ensure accountability to its stakeholders.

It reports annually to the Minister of Finance, the Minister of Energy and Minerals and an open meeting of stakeholders, where the REB accounts for all funds allocated and demonstrates that activities are fulfilling its designated.

4.9 Expected Investment Return

Qn. 9 needed a clarification on whether finances provided are based on the expected investment returns.

According to Investopedia on marketing, Investment return or Return on investment (ROI) is performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. ROI measures the amount of return on an investment relative to the investment's cost. To calculate ROI, the benefit (or return) of an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio. The return on investment formula:

$$\textbf{RIO} = \frac{(\text{Gain from Investment} - \text{Cost of Investment})}{\text{Cost of Investment}}$$

OR

$$\textbf{ROI} = \frac{\textbf{Net Profit}}{\textbf{Total Investment}} \times 100$$

In the above formula, "Gain from Investment" refers to the proceeds obtained from the sale of the investment of interest. Because ROI is measured as a percentage, it can be easily compared with returns from other investments, allowing one to measure a variety of types of investments against one another. Out of 129(100%)

respondents from questionnaires and Interview respondents, 83 (64.4%) said yes donors and investors expect something in return from the underlined projects, 23 (17.8%) of them said No, they do not expect anything in return while other 23 (17.8%) respondents replied that they have no idea of the whole system works regarding return on investment.

4.10 Private Sector Participation

In question 10, respondents were asked if they think private sectors are aware of rural electrification. Out of 129 (100%) respondents, 79 (61.2%) respondents agreed that private sectors are aware of rural electrification, 30(23.3%) respondents disagreed while 20 (15.5%) respondents beyond reasonable doubt have no clue if private sectors are even aware of rural electrification. On the other hand, respondents were asked if they thing private sectors are willing to participate and the results were, 99 (76.7%) respondents were certainly sure if private sectors were involved, they would be willing to participate, 13 (10.1%) respondents were convinced that there is no way these private sectors will participate and 17 (13.2) have no clue that whether aske or told to participate, they will be willing to participate.

Meanwhile in Qn. 11, respondents were asked to what extent do private sector participate in rural energy projects and Out of 31 (100%) respondents that involved REA Officials and stakeholders, 17 (54.8%) respondents agreed that private sector participate in rural energy projects more 90%, 11 (35.6%) respondents strongly insisted that private sector participation is between 50% - 90% while the rest 3 (9.6%) of the respondents said private level participation is below 50%.

4.11 Ability of Rural Communities to Pay for Energy Services

The researcher needed to know if rural community have the ability of paying for these services. Of 129(100%) respondent, 117 (90.7%) respondent raised their concern by admitting that rural community have no the ability to pay for energy services while the reminder 12 (9.3%) said they have the ability to pay for energy services. It was revealed that, households with salaried were connected to electricity sources at 67.8% followed by those wage labourer in forest products heads households by 62.2% and households headed by transport owners by 56.8% compared to households in other sectors.

Furthermore the researcher wanted to know the reasons behind failure to pay for the service. Among the reasons mentioned are;

i. Lack of income.

   In rural area, between 25% and 40% earning 400,000 were connected to electricity. The 2016 Energy Access Situation survey collected information on accessibility of grid electricity at community level. Findings showed that, rural had access to grid electricity by 49.3%. Furthermore, he findings showed that, about 8/10 (82.6%) of working persons in rural areas are agricultural, fishery, elementary occupations and shop sales workers. It also depicted, there are more salaried male than female counterparts. On the other hand, female workers are more equipped in vending or wholesale trade.

   i. Lack of awareness on Modern Energy

   ii. Culture diversity

   iii. Mode of payment

Table 4.6: Percentage Distribution of Working Persons by Nature of Main Economic Activities

Nature of Activity	Rural		
	Male	Female	Total
Wage labour (farm/livestock)	9.3	6.9	8.2
Wage labour (Non-farm/Non-livestock)	2.9	1.9	2.5
Salaried Employee	3.9	2.3	3.2
Self-Employed (Farm/Livestock)	68.2	76.1	71.5
Employed Enterprise	1.5	1.1	1.3
Transport owner/Business	0.6	0.1	0.4
Self Employed-Fishing	1.8	0.1	1.1
Wage labour forest products	0.0	0.0	0.0
Hawker/wholesaler/Vendor	3.3	5.9	4.4
Carpentry	2.8	0.0	1.6
Electrician/repair work	0.1	0.0	0.1
Wage labour (bodaboda)	0.4	0.0	0.2
Domestic help	0.2	0.3	0.3
Other	4.6	5.2	4.8
Total	**100.0**	**100.0**	**100.0**

Source: Adapted from Energy Access Situation Report, 2016

It was discovered that, before year 2000, almost all households (95.6%) were connected after paying less than 100,000 Tanzania Shillings. In 2016, 31.5% which had electricity connections paid less than 100,000 Tanzania Shillings, 23.8% paid between 100,000 and 299,999 Tanzania shillings for electricity connections and 31.4% paid between 300,000 and 499,999 Tanzania shillings. Less than 1% paid more than 1 million Tanzania Shillings.

i. Billing System i.e. LUKU or meter billing

In rural and urban areas, the proportions of households connected with meters are quite few compared to those who have LUKU. Before year 2000, 17.3% were connected to meters while dropping to 4.5% in 2016. This has also increased large number of need for electricity in rural areas to drop since cost of paying and

affording electricity has raised since the billing system has changed.

i. Literacy level

Education is the mean of achieving economic development, as the below table shows, the more household head is educated, the more the household is connected to electricity.

Table 4.7: Literacy Level

Level of Education	Rural	
	Connected	**Not Connected**
Nursery Education	0.0	68.1
Primary Education	12.7	58.5
Course after Primary	19.0	52.6
Secondary Education (O level)	10.3	25.1
Course after Secondary	17.8	27.9
Secondary Education (A level)	9.2	22.3
Training after high school education	26.2	7.6
Other Certified training	30.9	24.8
Higher Learning	7.3	9.4
Adult Education	10.0	81.1
Never gone to school	6.6	78.0

Source: Compiled by the Researcher, (2017)

4.11 Factors affecting Rural Electrification

This is the essential part of the study as topic requires. Here the researcher needed to know crucial factors that affect rural electrification be internal or external factors. According to the respondents, below were the factors analysed;

ii. Finance - This effect is observed when funds are not released on time from investors, donors or government to allow performance of projects.

iii. Low income customers – as observed in 4.10 and table No. 4.6, Majority of

the customers are minimum and medium wage earners which lead to failure in paying for modern energy.

iv. Lack of awareness of modern energy/electrification – majority of rural communities is not aware of the whole electrification process and the importance of modern energy in their societies. Since most of them use biomass and charcoal in performance of their daily activities, it's hard to get to familiarize with modern energy.

v. Population density – most of rural areas have scattered settlements, compared to urban areas. E.g. Arusha where Maasai people reside. The higher the population, the higher the electrification chances. This also increase other costs i.e. transportation of materials.

vi. Social services – absence of social services such as education, health, offices , financial (banks and other related), religious services, water pumping, industry/manufacturing services affect improvement of rural electrification since among the most categories to be considered in electrification is where public institutions have reached.

vii. Economic activities – nature of economic activities and availability of such activities determine rural electrification. It was observed, in most of the rural areas, economic activities existing are agricultural and fishery, where female workers are more pronounced in rural areas. Absence of economic activities such as industrial activities affects the whole process of rural electrification to some extent.

viii. Culture diversity – with reference to the theories discussed in earlier chapter, User Value Theory stated that; creating value for the end-user is particularly

important for project acceptance. It was observed that, rural electrification had no functional and social value to them, furthermore with regard to modernization theory; some fear the transition from tradition to modernization.

ix. Cost of alternative sources of energy – these are such as solar, wind, hydroelectric and geothermal others being biogas, generators and windmill equipment. It was discovered that, rural communities are so much aware and can afford some energies which are charcoal, firewood and kerosene.

x. Below is the drawing that shows distribution of alternative sources of energy in rural areas.

Table 4.8: Distribution of Sources of Energy in Rural Areas

Sources of Alternative Energy	**Rural area out of 100%**
Wind mills equipment	1.4
Generator	20.0
Biogas	6.0
Hydropower	6.3
Solar Panel	32.3
Motorcycle battery	33.7
Car battery	20.4
Torch battery	95.4
Crop residual	31.2
Wood dust	23.2
Firewood	78.2
Charcoal	73.8
Kerosene	69.4

Source*:* Compiled by the Researcher, (2017)

4.12 Projects and Projects Implementation

The researcher needed to know how many projects are presented in a year and how many are executed in average.

The more economic activities increase, the more demand for power increases. In

other words, economic activities result into increase demand for power. According to respondents, it was hard to site number of projects presented in a year since these projects are broken into smaller projects. But as for the year 2015/2016, a total number of 118 electrification projects were successful implemented. This is the cumulative number of projects presented in different years. Never the less, the researcher needed to know what factors influences REA to consider rural areas for electrification? And respondents came with the below listings;

i. Distance from the existing Network
ii. Level of demand – the higher the demand, the higher the increase of power.
iii. Number of population/household – availability of users.
iv. Available social services
v. Presence of Economic activities
vi. Public institutions i.e. schools, hospitals, offices, financial

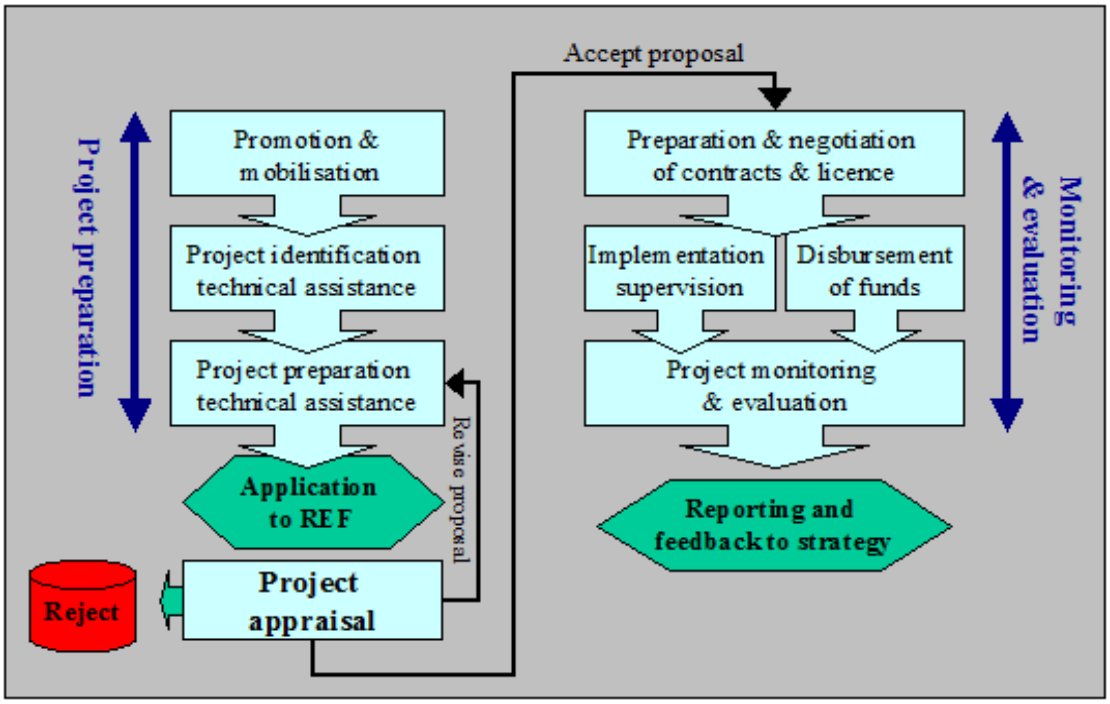

Figure 4.5: Project Cycle

Adapted from Concept Paper REA/REF, (2016)

4.13 Alternative Sources of Energy

In Qn. 21, it stated that, "has REA invested in alternative sources of Energy?' If Yes, what are those? And how successful are they? Out of 21(100%), respondents all of them agreed that REA has invested in the alternative source of energy. And the sources mentioned are Biogas, Solar Energy, wind and geothermal.

According to Tanzania Electricity Supply Industry Reform strategy and Roadmap, (2012), Tanzania is endowed with diverse forms of energy resources including natural gas, hydro, coal, biomass, geothermal, solar, wind and uranium which have not been optimally utilised. As of May 2014, Tanzania's total installed generation capacity was 1,583 MW composed of hydro 561 MW (35%), natural gas power plants of 527 MW (34%) and liquid fuel power plants of 495 MW (31%). TANESCO also imports power from Uganda (10 MW), Zambia (5 MW) and Kenya (1MW). Due to traditional dependence on hydropower, the droughts that occurred in 2010 resulted in power supply shortages in the country. To bridge the electricity supply gap in the country, in 2011, TANESCO contracted Emergency Power Producers (EPP) which is relatively expensive.

Saying so to improve the security of supply, the GoT has planned to diversify the sources of electricity generation to include natural gas, coal, hydro, uranium and renewable energies (green energy). It also intends to participate effectively in the Eastern Africa Power Pool (EAPP)- established in 2005 by seven countries; Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda and Sudan with the aim of development of energy resources in the region and to ease the access to electricity power supply through regional power interconnections, East Africa

Community Power Pool (EACPP) as well as the Southern Africa Power Pool (SAPP)-established in 1995 for the formation of an electric power pool in the regions under SADC. Envisaged growth in generation is shown in the Table 4.9.

Table 4.9: Present and Projected Installed Capacity by year 2025 Source Current Capacity

Source	Current Capacity	Additional Capacity (2015-2025)	Capacity by 2025
Hydro (MV)	561	1,529.00	2,090.84
Natural Gas (MV)	527	3,968.00	4,469.00
Coal (MV) 2,900.00	-	2,900.00	
Wind (MV)	-	200.00	200.00
Solar (MV) 100.00	-	100.00	
Geothermal (MV)	-	200.00	200.00
Total (MV)	**1,088.00**	**9,297.00**	**10,359.84**

Adapted from Power System Master Plan, (2016)

Per capita income of USD 640 to at least USD 3,000 by 2025 is expected to be raised in order for individual to have the ability to afford these energies. After all, the population is expected to increase to at least 69.5 million by 2025.

CHAPTER FIVE

5.0 DISCUSSION AND FINDINGS

5.1 Introduction

This chapter presents discussion of the findings and comparison with other studies. The study aimed to explore factors affecting improving of rural electrification. Discussion and findings were based on research objectives and questions basing on collected data. With this regard, the researcher confidentiality and ethics were observed.

5.2 Influence of Demand for Electricity in Rural Areas in Tanzania

Researcher sought to find out the influence to which others are connected while others aren't. These influences were drawn by the researcher through research questions where they based on Ability to pay, willingness to pay, availability of social and economic services, rate of customers to connect, knowledge/awareness and operational costs. When a government policy seeks to promote access to renewable energy sources, it needs to influence factors such as: affordability, disposable income, availability and high quality of modern sources. (Barnes et al. 2005).

In the case of the residential sector, affordability is particularly considered to be one of the main obstacles to the adoption of modern energy. According to the findings, over 90.7% of respondents strongly admitted that most of rural communities have no ability to pay for these services where only 9.3% are said to be able to pay for services. This gives a gap of about 81.4% of people struggling with the electrification services in rural areas. The researcher further showed, only 25% to

40% salaried have access to electricity leaving other groups of people who waged labour or self-employed in darkness, it also depicted that, mode or the billing system has changed from metering to LUKU for about 4.5% from 17.3% as presented by Energy Access Situation Report (2016). This seems to have brought a lot of impact to rural areas since LUKU are not easily affordable. Rural households in Ethiopian not only have limited access to modern energy sources, but also incur high expenditures on traditional fuel sources, (Kebede 2006).

According to the study conducted by Lars and Nils on cost effective in Wino village south west Tanzania, (2002), it stated, one reason for a relatively slow expansion rate of electricity to remote and rural areas is the associated high cost of rural electric power generation and distribution. In rural areas in developing countries the demand for electricity production is in general small. This is because people do not have money to pay for connection, or purchase electric appliances or machines in any larger scale. It was discovered that, after a slow expansion rate in the first years, it comes a major increase in the use of electrical equipment when people have learned how to use the electricity then after a while comes a period of saturation when people realize that they don't have money to buy everything they wish.

Presence of social services and economic activities has high influence in the electrification services in rural areas in Tanzania. Since most of economic activities existing are agricultural services and fishery (mostly in lake zones), this has brought so much impact in electrification. Absence of processing and manufacturing industries, health services and other public institutions, since are the most priorities from electrification, lower the improvement of this process. However, nature of

population distribution determines electrification priority in rural community with regard to REA official respondents, it was found out, most of rural areas have dispersed and linear population distribution which makes it hard from electrification Agency to electrify the areas. Some of these areas mentioned by a researcher are Arusha in Maasai areas.

Nevertheless, It was observed by a researcher, out of 90.7% of people who cannot afford electricity, 25% are not aware of modern energy. These are the slaves of biomass, charcoal and firewood in which they result into social, economic and Environmental impact to the present and future generation. Among the objectives REA outreach plan 2011, creating awareness about the REA supported projects and programs to local, regional, national and international level, providing education and training both to project developers but also to rural communities exposed to new and alternative technologies and organizational models through the REA supported programs, facilitating community involvement and foster a culture of co-responsibility of the projects developed with support from the REA and building consensus about the REA approach to project development across all levels of society were salient features put into consideration. The higher the level of awareness, the higher the number of connected individuals.

5.3 Sufficient Resources to Finance the Immense Demand for Modern Energy Services in Rural Areas in Tanzania

Researcher sought to find out if there are sufficient resources to finance the immense demand for improving rural electrification. Factors such as criteria for provision of funds, nature of contracts, and necessity of projects, investment returns and private

sector participation were scrutinized. According to the findings, it was observed that, there are no sufficient resources to finance these modern energy services something in which 100% of the REA officials as respondents agreed to. The main resource that was pinpointed was fund.

Renz, (2010), there is a high dependency of donors and a tendency to shift interventions to match donor priorities. Many of REA projects are dependent on donors for their accomplishments which lead to failure or delay in finishing these projects and amongst many other factors, criteria set forward by donors or investors for giving out funds are mostly not met or take time to accomplish hence delay or failure of projects. Until the end of financial year 2012/2013, the Government of Sweden through SIDA had been the only donor which injected fund into REF. in financial year 2013/2014, the Government of Norway joined SIDA, (NEPP, 2014). (Rural Energy Act, 2005), other sources of funds include 3% from electricity levy, (5% as maximum set by the act), 0.04% of the fob value of petroleum product imports known as pre-destination inspection levy introduced in 2011 and 50TZS per liter drawn from fuel levy introduced in 2013. These funds are not only directed to projects implementation only but also to technical assistance, training and other forms of capacity building to qualified developers prior to application of grants.

However, respondents showed that private sectors participation is very crucial in electrification projects. 54.8% of the respondents showed that private sectors participate in rural electrification while 45.8% do no second the fact. From these data, it shows, there is a pull in and pull out factors that lead to poor participation in electrification projects in rural areas. (NEPP, 2014), there are three necessary that

would make private sectors to participate in rural electrification which are; A low risk losses, providing access to loans (credit line facility needs to be increased) and establishing a loan guarantee scheme (commercial banks do not grant loan without a guarantee and private developers have problems providing guarantee) although the last two points might be subjected to changes. Private sector participation is important because government capital is very limited, there is efficiency which is driven by competition and contestability, accountability to customers, performance measures specified and management flexibility.

5.4 Alternative Source of Energy Vs. Improving rural Electrification

These were mentioned to be natural gas, hydropower, coal, biomass, geothermal, solar, wind and uranium. According to the findings, 100% of the respondents who were REA officials, agreed that Tanzania has invested in alternative sources of energy such as Biogas, Solar energy, Wind Energy and Geothermal although Ministry of Energy and Minerals argued that Biomass based fuel accounts for over 90% while the rest of the energy accounts for 1%. This shows that, Tanzania has yet to utilize these sources even quarter of them. This is the most crucial factor that even the researcher highlighted as a research gap. Since Tanzania intends to get to 50% of electrification in 2020, 64% in 2025, 76% in 2030 to 90% in 2035, the best way is to utilize effectively what it has to meet its country's need. It will be easy for rural communities to access electricity since most of these sources are located in rural areas and normally, what comes from your farm shall benefit you first.

Rea Annual report (2016) stated that, 25.1% of households in Tanzania Mainland use electricity as one of the sources of energy for lighting meanwhile 54.4% in rural

areas use re-chargeable lights and 24.3% use kerosene and 12.1%. The National Energy Policy of 2003 sets national energy objectives to ensure availability of reliable and affordable energy supplies, and to promote efficient energy use in order to support national development goals. As it is seen below, demand for electricity is expected to rise each year. This should rise an alert to the organ responsible to increase electricity projects and also implement those in line.

Table 5.1: Power Demand Forecasts

Unit GWh

Year	High	Base	Low
2015	6,310	6,310	6,310
2016	7,870	7,820	7,640
2017	9,070	8,970	8,650
2018	10,460	10,270	9,780
2019	12,040	11,740	11,060
2020	13,840	13,440	12,470
2025	24,640	22,430	19,450
2030	45,270	36,000	29,250
2035	82,830	57,340	43,660
2040	145,470	87,890	63,090
2040/2015	13.4%	11.1%	9.6%

Adapted from Power System Master Plan, (2016)

Energy is the single most important resource that underlies the development of a given country, however, the most affordable sources of energy today. In most developed countries, a lot of energies are put into consideration especially those which are “Green Energy”. These are those energies which are environmental friendly (non-fossil fuels) or renewable. (Boyle 2004) Renewable energy sources are generally considered to be those that are replaceable on a human time scale and that have manageable environmental impacts. The conventional classification system for

renewable energy is by source: solar, biomass, water, and wind (Energy Information Administration 2009b).

5.5 Other Important Factor that could improve Rural Electrification

5.5.1 Partnership

The establishment and enhancement of partnerships with local, regional and national government, including Ministries, NEMC, EWURA, TIC, TTB, TEA, NBS and TBS, corporate, financial, academic and media sectors as well as non-governmental organizations offers an opportunity for the REA to develop more effective outreach tools to increase its communication with stakeholders. Public support on regulatory and financing issues can be enhanced through partnerships, by increasing the understanding of the REA approach and the regulatory and financing process involved in the development and implementation of REA supported projects. Partnerships can bring together people and organizations with different backgrounds, experiences, and perspectives. This can be used to create an environment of support that is conducive to developing a wide range options and opportunities for solutions to complex rural energy access problems or issues.

5.6 Conclusion

Initiating awareness and training efforts will act as a catalyst in transforming the way rural energy services are developed, financed and deployed in Tanzania, there is an inherent need for inclusion of technologies, concepts and business models that may be known elsewhere but may be novel in the rural context. Thus, an important component is conducting community-based awareness and education efforts. Key REA staff should also be given the opportunity to offer to give presentations and

keynote speeches at important events to also convey the REA messages to selected academic, professional and political audiences that can act as champions for the REA programs to key community leaders, influential decision makers and opinion leaders

As advised by REA Outreach plan guideline, (2011) The REA should, where possible and feasible, use partnerships with dedicated educational or community outreach organizations to both ensure that material is suited to the target audience and to leverage the geographical reach of such institutions as this is probably wider than the current REA reach.

The REA, being a public agency using public funds, needs to be cost-conscious and conservative in all its activities, and there is thus a limit to the level of effort and resources that can be put into outreach activities. On the other hand, due to the nature of the REA programs, successfully implemented outreach activities are critical to the success of most REA-supported projects and thus need to be considered as an integral part of the operational budget. Certain costs associated with the outreach plan can be shared with project developers. For example, informational material produced by the REA can be distributed to the communities by project developers, significantly reducing costs.

As power system master plan suggested and showed the available capacity in the coming years, alternative sources of energy should be introduced. Rural areas can be equipped with solar and wind energy equipment since these are forever available resources as other permanent energy projects are worked on. Every energy

introduced be it not or environmental friendly should be treated in a way that it benefits people both socially and economically.

Appropriate pricing for energy services, fair and equitable pricing regime is important for the sustainability of the Energy Sector performance. Challenges in energy pricing include affordability on consumers' side, fluctuations of foreign exchange rates, inflation and performance of service providers should be dealt on or even put into consideration before services are taken to communities. The Government shall ensure the pricing structure provides incentives for promoting investments while sustaining supply and demand for energy, enhance mechanisms towards achieving affordable prices for energy ensure an appropriate pricing structure is in place to encourage economic use of the system capacities in the petroleum value chain, ensure prudent procurement of energy projects through competitive bidding processes; and ensure timely implementation of energy projects in accordance with Power System Master Plan 2016.

Rural electrification has so many benefits socially, economically and politically. Some of such benefits are;

i. Availability of advanced social services i.e.
    a. Hospitals,
    b. Clean water services,
    c. Advanced education centers,
    d. Reduced walking distance to find services
    e. Literacy
    f. Communication

g. Modern Lighting

ii. Economic services such as;

a. Manufacturing and processing Industries

b. Movement of villagers products to urban areas hence increase of per capita income

c. Employment opportunities

iii. Political benefits;

a. Peace

b. Indication of level of development

The figure below illustrates the theory of steps from electricity supply to poverty reduction.

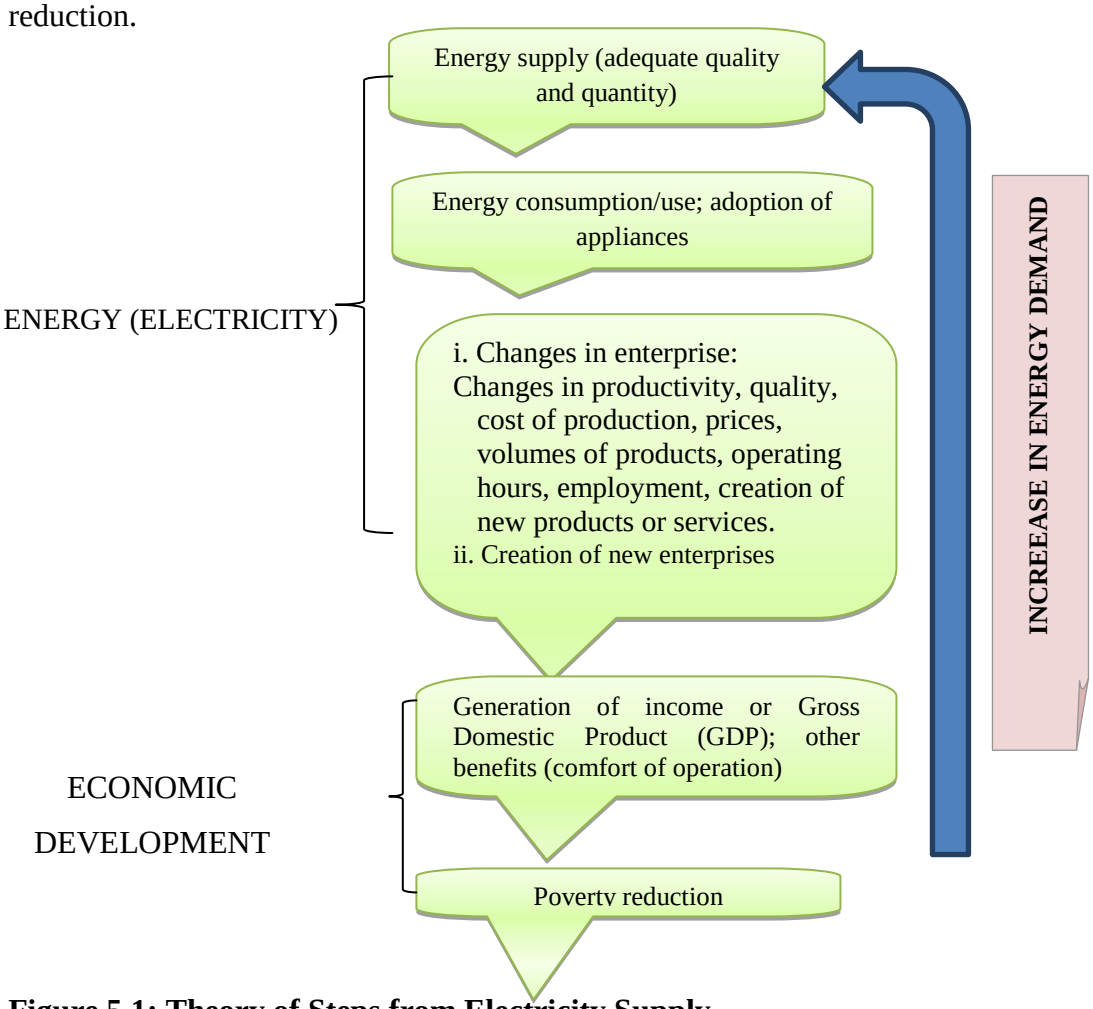

Figure 5.1: Theory of Steps from Electricity Supply
Source: Power System Master Plan, (2016)

5.5 Recommendations to Further Researchers

The study was so concerned with rural communities welfare, for that reason, the researcher argues other researchers to dig deeper in the study as a way of raising awareness to both responsible bodies and rural communities on rural electrification. Any Countries' development both social and economic is dependent to electrification. Alternative sources of energy especially the green energy should be well addressed and worked on to not only reduce cost to those who cannot afford the available ones but to also create alternatives to individuals and offer employment opportunities to rural communities.

If we want to go further, we should go together.

REFERENCES

Albouy, Y. (1983): *Analisis de Costos Marginales y Diseño de Tarifas de Electricidad y Agua.* Washington, DC: IDB.

Barnes, D. William H. F. and Krutilla, K. (2005). The urban household energy transition: social and environmental Impacts in the developing world, Resources for the future, Washington, DC.

Bhattacharyya, S. C. (2013). Electrification experience from Sub-Saharan Africa, in S. Bhattacharyya (Ed.), Rural Electrification through Decentralized Off-grid Systems in Developing Countries, Springer, London.

Broekhuizen, T. (2006). Understanding channel purchase intentions: measuring online and offline shopping value perceptions. Groningen, Netherlands.

Covarrubias, A. and Reiche K. (2000). Renewable Energy Based Electricity for the Dispersed Rural Population in Argentina: *Energy and Development Report 2000.* Washington DC: World Bank

Drucker, P. (2002). *Managing in the next society*, Butterworth-Heinemann, Oxford.

ESMAP, (2000c). *Energy Services for the World's Poor. Energy and Development Report 2000*. ESMAP Report. Washington DC: World Bank.

Hirmer, S. and Cruickshank, H. (2014). Making the deployment of Pico-PV more sustainable along the value chain, *Renew Sustain Energy Rev* 2014; 30:401–11.

Hirmer, S. and Cruickshank, H. (2014). The User-Value of Rural Electrification, *An Analysis of Existing Models and Theories*, Volume 34, Pages 145-154. UK, Available at URL

Holbrook, M. B. (1999). *Consumer value: a framework for analysis and research*.

London: Rout ledge.

Karekezi, S. and Kithyoma, W. (2001). Modern Energy for the Rural Poor in Africa, *Renewable Energy Strategies for Rural Africa,*

Kebede, B. (2006). Energy subsidies and costs in urban Ethiopia: *Renewable Energy,* 31, 2140-2151.

Kothari, C. R. (2004). *Research Methodology, (methods and techniques, 2nd Edition.* New Age International Publisher Ltd, India

Larson, L. and Ronnback, N. (2002). Cost effective, rural electrification Tanzania, Karlstad, Sweden.

Martinot, E. (2016). Grid Integration of Renewable Energy: flexibility, Innovation and Experience, *Annual Review of Environment and Resources 2016*, vol. 41, pp. 223-251.

Martinot, E. and Reiche, K. (1999). Regulatory Approaches to Off-Grid Electrification and Renewable Energy: Case Studies from Developing Countries. World Bank discussion draft. Washington, DC: World Bank.

Mwihaki, E. (2015). *Factors affecting accessibility of Rural electrification in Kenya*, University of Nairobi.

REA, (2011). Annual report, retrieved on 24th July 2017 from http://www.rea.go.tz/Resources/E-Library/tabid/132/Default.aspx

REA, (2012). Annual report, retrieved on 24th July 2017 from http://www.rea.go.tz/Resources/E-Library/tabid/132/Default.aspx

REA, (2013). Annual report, retrieved on 24th July 2017 from http://www.rea.go.tz/Resources/E-Library/tabid/132/Default.aspx

REA, (2014). Annual report, retrieved on 24th July 2017 from

http://www.rea.go.tz/Resources/E-Library/tabid/132/Default.aspx

REA, (2015). Annual report, retrieved on 24th July 2017 from http://www.rea.go.tz/Resources/E-Library/tabid/132/Default.aspx

Sahu, A. Shandilya, A. and Bhardwaj, S. (2014). International Journal of Emerging Technology and Advance Engineering, *Rural Electrification Issues and Challenges of Sustainable Development*, 4(8), 240-246.

Seth, J. Newman, B. and Gross, B. (1991). Why We Buy What We Buy; *A Theory of Consumption Values*; pp 159-170. Available At (https://www.researchgate.net/publication/4965989_Why_We_Buy_What_We_Buy_A_Theory_of_Consumption_Values).

Ministry of Energy and Minerals, (2008). Electricity Act, Dar es Salaam, Tanzania.

Rural Energy Agency, (2014). National Electrification Program Prospectus, Dar es Salaam, Tanzania.

Rural Energy Agency, (2011). Outreach Plan Guidelines, Dar es Salaam, Tanzania.

Ministry of Energy and Minerals, (2016). Power System Master Plan, Dar es Salaam, Tanzania.

Ministry of Energy and Minerals, (2008). The National Energy Policy, Dar es Salaam, Tanzania.

Ministry of Energy and Minerals, (2015). The National Energy Policy, Dar es Salaam, Tanzania.

Rural Energy Agency, (2005). The Rural Energy Act, Dar es Salaam, Tanzania.

Yadoo, A. (2012). Delivery models for decentralized rural electrification Report, London: IIED.

Yadoo, A. (2012). Delivery models for decentralized rural electrification case studies

in Nepal, Peru and Kenya. London.

Yadoo, A. and Cruickshank, H. (2010). The value of cooperatives in rural electrification, *Energy Policy*; 38, 2941–7.

APPENDIX

QUESTIONAIRES FOR RURAL ELECTRIFICATION STAFF

Dear respondent;

My name is **Viola E. Nkini**, undertaking research study as a partial fulfillment for the award of Master of Project Planning Management offered by Open University of Tanzania (OUT). The purpose of this questionnaire is to gather data on challenges affecting improving of rural electrification in Tanzania. The data collected will solely be used for academic purpose and be assured that whatever information provided will be treated with a great confidentiality and anonymity. I will be grateful if you could spare your time in answering these questions objectively.

Thank you in advance

Part A: Background Information

Please for multiple choices questions, circle the answer and fill in the blanks where appropriate

1. What is your gender?
    a) Male
    b) Female
2. In which age group do you belong?
    a) Below 20 years
    b) Between (20-40) years
    c) Above 40 years
3. In which group of education level do you belong?
    a) Primary education

b) "O" level secondary education

c) Advanced secondary education

d) Certificate level of education

e) Diploma level of education

f) First degree education

g) Master's degree education

h) Other education level (specify)…….

4. How long have you worked in this institution?

a) 0-1 year

b) 2-5 years

c) 6-10 years

d) Above 10 years

Part B: Specific Research Questions

5. Are there sufficient resources to finance the immense demand for modern energy services in rural areas in Tanzania?

a) Yes

b) No

6. If not why?

.....

Are there any criteria for obtaining these finances?

a) Yes

b) No

7. If yes, name not less than five?

.....

8. If criteria are not met, what are the effects to the projects?

……

9. Are the finances provided basing on the expected investment returns (do investors/donor fund the projects expecting to get something in return? Business wise)?

   a) Yes

   b) No

   c) No Idea?

10. To what level do private sectors participate in rural energy projects in Tanzania?

   a) Below 50%

   b) Between 50%-90%

   c) Above 90%

11. A) Are private sectors aware of rural electrification Yes/No/No Idea?

   B) Are they willing to participate? Yes/No/No idea?

   (Circle the answer)

12. Do rural communities have ability to pay for energy services?

   a) Yes

   b) No.

13. If No, what are the reasons behind failure to pay for the service? (name five)

.....

14. What are other major challenges affecting rural electrification? (name five)

…….....

15. What problems face the management of the contract?

…….....

16. What strategies are used to ensure funds are obtained at the right time?

……

17. How many projects are presented in a year in average? How many are executed in average? ……

18. On what base does the team decide to select un-electrified areas for electrification? (why a first and not b)

…….

19. To your experience, what influences demand for electrification in rural areas?

……

20. Has REA invested in alternative sources of energy?

    a) Yes

    b) No

21. If no, do you think REA should invest in alternative sources of Energy?

    a) Yes

    b) No

22. If no, what sources has it invested in?

……

23. How successful are the alternative sources mentioned in 23 in improving rural electrification?