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**ASSESSING IMPACTS OF RURAL ELECTRIFICATION PROGRAM ON
NARROWING GENDER GAP AMONG RURAL FARMERS IN SOUTH EAST
TANZANIA; A Case Study of Gairo Village**

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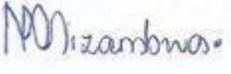
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DECLARATION

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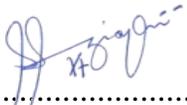
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ABSTRACT

The majority of rural population in Tanzania is not served with modern energy; an improved energy supply in the rural areas will ensure improvement in the livelihood of the rural population and the attainment of sustainable economic growth though men and women depend equally on electricity access but in many communities women suffer tremendously when energy is short in supply. With access to electricity women will improve and save time that is much spent on cooking and food processing. This study seeks to assess the impacts of rural electrification program on narrowing gender gap among rural farmers in south east Tanzania, a case study of Gairo Village. Objectives of this study were to identify business activities as a result of rural electrification program, to establish impacts of rural electrification program on time saving in individual productivity and to analyze the gender gap situation at the study area before and after the implementation of rural electrification program. The study adopted the triangulation research design for data collection. Questionnaires, Interview guide, focus group discussion and observation were the techniques for primary data collection and documentary review checklist was used to collect secondary information. The target population was 2349 households; 327 questionnaires to household heads were distributed whereas tools returned were 294 making the response rate of 89%, the village has 12 government administrators and all of them were interviewed. Data were analyzed using statistical package for social sciences and presented through tables showing frequencies, percentages. From the study findings, majority of the households are headed by men at 71.4%, 59.5% of the household heads were adults of age between 31-50 years who 57.8% have attended secondary level education. Majority of households use electricity for domestic appliances whereas lighting and cell phone charging being 100%. Most of respondents admitted that rural electrification program has a huge impact in their lives by increasing their productivity as well as narrowing gender gap. Before implementation of this program women were forced to submit to their husbands as they contributed to the family income but with electricity present they can also contribute to the family income

by doing small business activities. From the study it has been observed that communities living along the main road have easy access of this program than those in the interior. It is therefore recommended that the government should also supply electricity to the interior villages also these beneficial programs should not take many years to commence as people depend on electricity for socio-economic development.

RESUME

La majorité de la population rurale en Tanzanie n'est pas desservie par l'énergie moderne; une amélioration de l'approvisionnement en énergie dans les zones rurales assurera une amélioration des moyens de subsistance des populations rurales et une croissance économique durable, même si les hommes et les femmes dépendent également de l'accès à l'électricité. Avec l'accès à l'électricité, les femmes amélioreront et gagneront du temps qui est consacré à la cuisine et à la transformation des aliments. Cette étude vise à évaluer les impacts du programme d'électrification rurale sur la réduction de l'écart entre les sexes parmi les agriculteurs ruraux du sud-est de la Tanzanie, une étude de cas du village de Gairo. Les objectifs de cette étude étaient d'identifier les activités du programme d'électrification rurale, d'établir les impacts du programme d'électrification rurale sur l'économie de temps dans la productivité individuelle et d'analyser les disparités entre les sexes avant et après le programme d'électrification rurale. . L'étude a adopté le modèle de recherche de triangulation pour la collecte de données. Les questionnaires, le guide d'entretien, la discussion de groupe et l'observation étaient les techniques utilisées pour la collecte des données primaires et la liste de contrôle de la revue documentaire a été utilisée pour recueillir des informations secondaires. La population cible était 2349 ménages; 327 questionnaires adressés aux chefs de ménage ont été distribués, tandis que les outils retournés ont rapporté 294, soit un taux de réponse de 89%. Le village compte 12 administrateurs et tous ont été interrogés. Les données ont été analysées à l'aide d'un ensemble de statistiques pour les sciences sociales et présentées sous forme de tableaux indiquant les fréquences et les pourcentages. D'après les résultats de l'étude, la majorité des ménages sont dirigés par des hommes à 71,4%, 59,5% des chefs de ménage étaient âgés de 31 à 50 ans et 57,8% ont suivi des études secondaires. La majorité des ménages utilisent l'électricité pour les appareils ménagers, tandis que l'éclairage et la recharge des téléphones portables sont de 100%. La plupart des répondants ont admis que le programme d'électrification rurale avait un impact énorme sur leur vie en augmentant leur productivité et en réduisant l'écart

entre les sexes. Avant la mise en œuvre de ce programme, les femmes étaient obligées de se soumettre à leur mari car elles contribuaient au revenu familial, mais avec l'électricité, elles pouvaient également contribuer au revenu familial en menant des activités commerciales. L'étude a montré que les communautés vivant le long de la route principale ont un accès facile à ce programme par rapport à celles de l'intérieur. Il est donc recommandé que le gouvernement fournisse également de l'électricité aux villages de l'intérieur, en outre, ces programmes bénéfiques ne devraient pas prendre beaucoup d'années pour commencer sachant que les populations dépendent de l'électricité pour leur développement socioéconomique.

DEDICATION

I wish to dedicate this report to my loving son Braham without his never ending patience this work would have never been done.

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My sincere gratitude goes to our Almighty God for many blessings I have received from the start to the end of this master program; He has been my help from the very first day I set foot in this world. Special thanks go to my supervisor, Dr. Peter Mbabazize for his tireless encouragement and constructive advice at all stages of this study.

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LIST OF ABBREVIATIONS

CVR – Content Validity Ratio

EDPG – Energy Development Partner Group

EU – European Union

EWURA – Energy and Water Utilities Regulatory Authority

IEA – International Energy Agency

MEM – Ministry of Energy and Minerals

NA – Not Applicable

NEP – National Energy Policy

PAUWES – Pan African University Institute for Water and Energy Sciences

REA – Rural Electrification Agency

REF – Rural Electrification Fund

SPSS – Statistical Package of Social Science

TANESCO – Tanzania Electricity Supply Company

TASAF – Tanzania Social Action Fund

UNDP – United National Development Programme

UNEP – United National Environmental Programme

URT – United Republic of Tanzania

VICOBA – Village Community Bank

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DEFINITION OF OPERATIONAL TERMS

Rural Electrification Program: is the program conducted in Tanzania under the Rural Electrification Agency that provides electricity to areas that were not supplied with grid electricity especially in rural areas. These areas normally have low demand compared to urban areas and the customers are highly dispersed.

Rural Energy Agency (REA): is a self regulatory body under the Ministry of Energy and Minerals (MEM) of the United Republic of Tanzania, with main role of providing modern energy and improving energy access in rural areas of Tanzania mainland.

Gender Gap: refers to the difference that exists between males and females in access to some social good or benefit based on their difference in gender, this difference is always in favor of men.

Narrowing Gender Gap: is the way of reducing difference that exists between male and female in access to some social goods or benefits.

In this study the gap that has been discussed is the way men are favored more than women for example in land owning and access of loans and grants,

CHAPTER ONE

INTRODUCTION

1.1 Background

Over 1.4 billion people worldwide lack access to electricity and those who have access are supplied with intermittent and unreliable electric power. Roughly 85% of these people live in rural areas and a large proportion are in Africa. Until today, many production and supply utilities have failed to sustain the electricity demand of many rural areas communities, little electricity that is produced has been focused to supply only highly populated and major industrialized cities. (Barnes, 2012)

Reliable electricity provision has the highest potential of improving lives of people. Shortage of electricity access limits essential needs to most communities in the world; such needs include lighting, food processing and water pumping, operating machines for small and medium sized businesses, transportation, communication and information. (ENERGIA, 2017)

Most African countries accelerate their rise and integration in the world economy by intensifying investment on rural electrification. Building on a strong agricultural base and on vast natural resources, industrialization and the service sector are generating jobs and welfare for the people in developing countries. This would be impossible without access to affordable and reliable energy. Energy is the pre-requisite for local economic growth such as small companies, local industrialization and agricultural up scaling. Adding to these positive economic effects, human development is aided by electrification through improved water supply, health care and education. (Kanangawa and Nakata, 2008)

Rural electrification is defined as the provision of electricity to areas of Low demand and highly dispersed potential consumers. Electricity can be supplied to such

areas through small-scale auto-generation, local independent grids, or a central regional or national grid. In this study, "rural electrification" will usually refer to the small off grid and mini grid systems because most rural electrification projects conducted in Tanzania are based on off grid and mini grid systems therefore all data that will be collected will come from those systems. (Kihwele, 2012)

The majority of rural population in Tanzania is not served with modern energy, including electricity supplies and access to safer and more sustainable energy for public services. After the adoption of the National Energy Policy in 2003, the Government of Tanzania reinforced its commitment to develop and implement rural energy strategies to address the modern energy needs of over 80% of Tanzania's population. (NEP, 2003)

An improved energy supply in the rural areas will ensure improvement in the livelihood of the rural population and the attainment of sustainable economic growth. It was recognized, that modern energy, including electricity (both grid-based and non-grid based), modern biomass technology, and other alternative modern energy sources, must be harnessed to promote rural productive uses. In short, Tanzania's rural economy will be transformed when agriculture, agro-business, small and medium industries and enterprises, and commercial establishments in the rural sector have access to and use modern energy. This will increase significantly the value added to rural production, and will stimulate investment, job-creation, narrow the gender gap and revenue generation throughout the rural sector. (Maleko, 2005)

The Government of Tanzania has taken some steps towards distribution of Rural Electrification services through establishment of Rural Energy Agency (REA) and Rural Energy Fund (REF) as well as encouraging the Private Sector to invest in Renewable Energy (Aslam, 2012). The National Energy Policy (URT, 2003) intends to facilitate increased availability of energy services, including grid and non-grid electrification to rural areas. Energy services have an impact on all rural economic activities, including agriculture, business, social services, gender equality and poverty. Therefore, improved

energy supply in the rural areas will ensure improvement of the welfare of the rural population and the attainment of sustainable economic growth.

Access to energy is a critical element to empower people. The absence of electricity supply in schools or offices (for light, use of computers), clinics (refrigeration of medicine, disinfection of tools), for water supply facilities, for engines in workshops, for telephone chargers, televisions, radios and household appliances, can render daily life challenging (Collings, 2011)

For almost a decade now, the EU has joined forces with Tanzania to fight against energy poverty. It has promoted the introduction of innovative approaches for decentralized solutions to energy supply based on renewable sources, as well as grid development and new connections in rural areas. Support has also entailed activities to strengthen capacities of key stakeholders in the sector, in rural electrification planning and policy, as well as regulatory reforms. The EU continues to work closely with the Ministry of Energy and Minerals (MEM), the Rural Energy Agency (REA), the regulatory authority EWURA and the power utility TANESCO (Kihwele, 2012).

Both men and women depend equally on electricity access but in many communities women suffer tremendously when there is no electricity. With access to electricity women will improve and save time that is much spent on cooking and food processing such as grain grinding. It will also improve their security because there will be no need of travelling longer distances in search for fire woods as well as a girl child will have enough time for studies and performance will get better as most of them accompany their mothers in this task. Communities will witness the improvement of maternal health with the access of reliable electricity also increase in employment opportunities from small and medium sized businesses. (ENERGIA, 2017)

1.2 Problem Statement

In spite of the efforts made by Tanzania to attain development, still there are a number of factors that hinders its full development. The shortage of electricity remains the main challenge, without reliable and sufficient electricity services there is no possibility for industries to work full time and hence production becomes low. There is still existence of gender gap between men and women on the use and dependence of electricity as women suffer more to the shortage of reliable and affordable electricity access. Most Tanzanian communities rely on women to provide to their families but with the shortage of electricity increases the difficulty for them to perform domestic activities such as food processing and preparation.

Rural areas continue to be the home to majority of the population in Tanzania and also the hub of small and medium enterprises. The lack of electricity supply affects close to eighty seven percent of the population (World Bank, 2010). The government of Tanzania in collaboration with other partners and donors has played a crucial role in the provision of electricity to rural areas in a bid to spur human, social and economic development in the country.

This study therefore sought to assess impacts rural electrification program on narrowing gender gap among rural farmers on south east Tanzania. To a large extent, empirical evidence on the impacts of rural electrification on narrowing gender gap was still lacking yet there was a compelling factor that electricity service has very huge impact on narrowing gender gap.

1.3 Research Objectives

1.3.1 Main objective

The main objective was to assess impacts of rural electrification program on narrowing gender gap among rural farmers on south east Tanzania.

1.3.2 Specific objectives

- i. To identify business activities as a result of rural electrification program.
- ii. To establish impacts of rural electrification program on time saving in individual productivity.
- iii. To analyze the gender gap situation at the study area before and after the implementation of rural electrification program.

1.4 Research Questions

- i. What are the business activities as a result of rural electrification program?
- ii. What are the impacts of rural electrification program on time saving in individual productivity?
- iii. How was the gender gap situation at the study area before and after the implementation of rural electrification program?

1.5 Relevance of the study

This study will help to bring forward the impact of rural electrification program on narrowing gender gap among rural farmers on south east Tanzania. This study will help decision makers and donors on things to do so that to improve the implementation of rural electrification program as it might have impact to developing countries especially Tanzania. Also citizens who are the beneficiaries will be urged to take this kind of programs very serious as it increase their productivity and foster development as well as Researchers who wish to conduct the very same study can draw information from the findings that will be obtained from this study.

1.6 Scope of the study

1.6.1 Geographical scope

This study was conducted in Morogoro region that is in Tanzania, this region has been selected because it is easily accessible for this study and among other regions in

Tanzania rural electrification program has been implemented where by more than 15 villages have access of electricity as in December 2016.

1.6.2 Time scope

The study covered the period from 2011 to 2017, taking into account the situation of the village three years before the implementation of the program and two years after the program implementation. The initiation of the first phase of rural electrification program was in 2013 to 2015; therefore the period of seven years is enough to anticipate impacts of this program on development and narrowing gender gap in this village.

1.6.3 Content scope

This study drew its focus on impacts of rural electrification program on narrowing gender gap in Tanzania. These impacts were assessed by identifying business activities established as a result of rural electrification program, then established impacts of rural electrification program on time saving in individual productivity and last was to analyze the gender gap situation at the study area before and after the implementation of rural electrification program this helped in getting the clear picture of how behind the study area was before implementation of this program.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focused on literature review made from studies, journals, internet and reports from various organizations about impacts of rural electrification program narrowing gender gap among rural farmers in south east Tanzania. It identified the theoretical review based on the study then the conceptual framework was drawn according to the study objectives, after the conceptual framework followed by empirical review on objectives and last was the research gap was shown.

2.2 Theoretical Review

2.2.1 Development as Freedom Theory by Armatya Sen

Amartya Sen in his theory of development as freedom of 1999 argues that freedom of opportunity includes the freedom to access credit that will help one to alleviate the poverty problem. Therefore from his arguments he concludes that for a real and true development to occur there should be high range of freedom among the people for them to excel in whatever they are doing.

This theory conforms with this study as there should be narrowing of gender gap especially to women who are highly marginalized and have no freedom to some of developmental activities due to increase of house work as a result of shortage of electricity. Girl children have no freedom to good and comfortable education as most of girl children have to accompany their mother in search of fire wood.

With the implementation of rural electrification program Gairo women will be relieved of some of their domestic duties and they will be free to perform on other developmental activities such as establishing small and medium business, improvement

of agriculture and more time to rest that will enhance development, reduce poverty and secure food security of Tanzania.

2.2.2 Anthony Giddens' Structuration Theory

Giddens in his book '*New Rules of Sociological Method*' (1976) outlines the Structuration theory. The general idea of this theory is a collaboration of both the roles of structures of society and individual agency in bringing about change. In his paper he suggests that structures alone are not sufficient to bring about the desired change (Giddens, 1976).

A good example is shown on numbers of villages in many rural areas in Tanzania have had access to rural electrification but have not had substantial development on improving food security, poverty reduction as well as narrowing gender gap.

He sees desired change as a product of the duality of structures and actions i.e. both contribute to the desired change. In the context of this study gender gap will have an opportunity to decrease after the implementation of rural electrification program in Gairo village only if the people of Gairo make a willful decision to harness such an opportunity. Willful decision to harness an opportunity cannot exist without the presence of the opportunity that the structures present.

2.3 Conceptual Framework

Rural electrification program is the independent variable that was measured by socio-economic activities whose indicators were rural employment growth, female labor market participation and attendance of girls to school where as individual productivity indicators was agriculture performance and medium and small business. In order to narrow the gender gap of which is the dependent variable the following indicators have to be observed as a result of rural electrification program girls school enrollment number, girls attendance rate to schools, women owning and accessing resources, medium and small business run by women, agriculture production and women time to rest

The conceptual framework that was used in the study is shown in Figure 2.1.

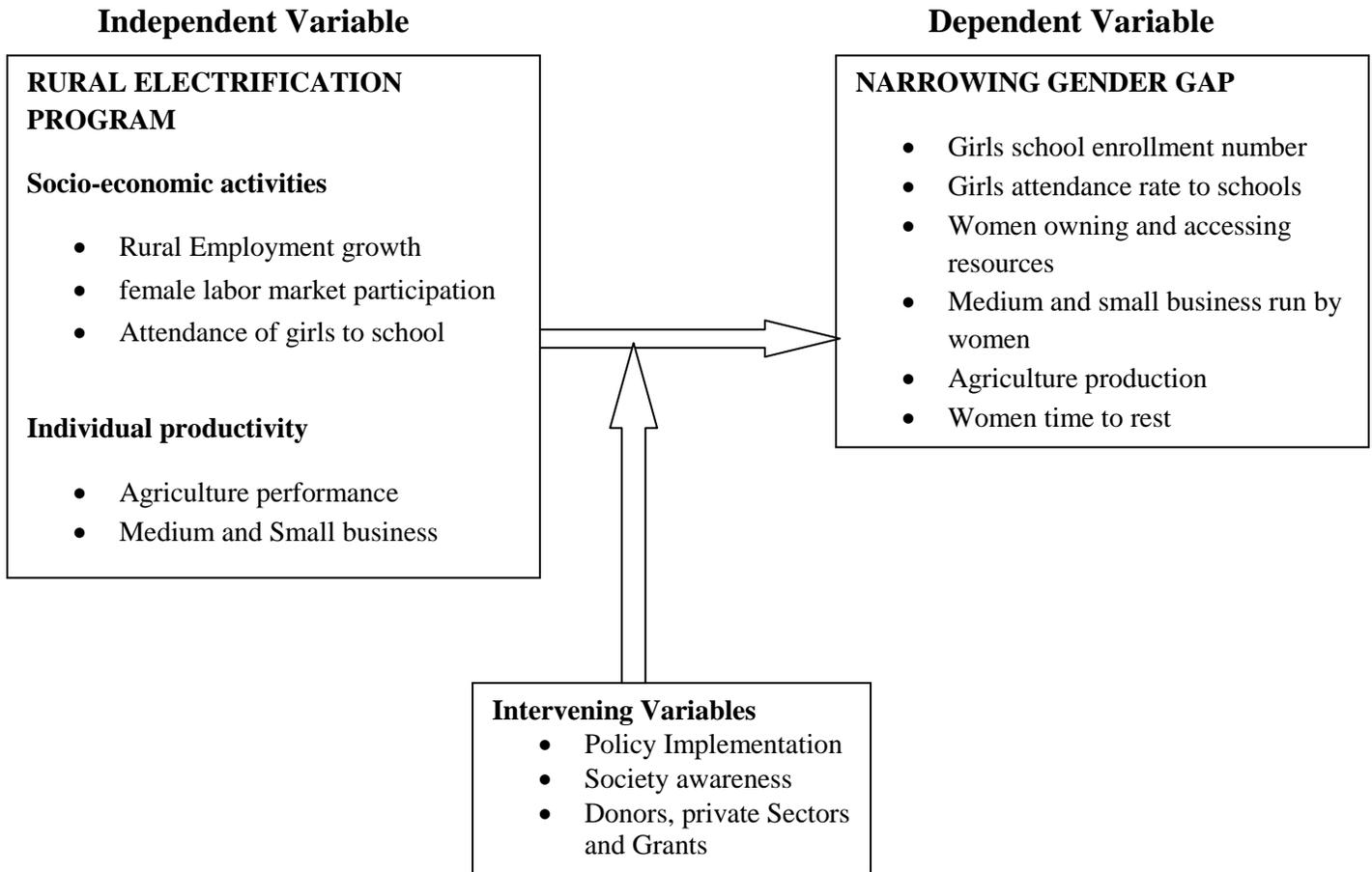


Figure 2.1 The conceptual framework showing the relationship between rural electrification program and narrowing gender gap. Source: the report writer

2.4 Empirical Review

2.4.1 Rural electrification Program Vs Gender Gap

Energy is important in all human basic needs, productive activities and leisure activities. Good quality and quantity of energy supplied increase the efficiency and effectiveness of performing those activities hence life of people will be improved. Both women and men benefit by provision of reliable and affordable supply of energy. However, women and men do not have equal use of the energy provided; the same

energy service may impact women and men differently, leading to different economic and social results to both women and men.

In societies gender are assigned with different roles in households and production energy use, energy poverty is felt differently among men and women. Usually women and girls are the ones who have to travel for a long distance in search of firewood and water for domestic uses. Generally women spend more time on domestic activities than men. The shortage of reliable supply of energy affects women and girls negatively as their time is limited from other production activities such as small business. (Köhlin et al., 2011)

Unavailability of energy for heating, cooking, lighting and food processing hinders production activities and development of men and women within their communities. In many communities women are poorer than men as most of them are normally disadvantaged in owning resources such as land, information, decision making and access to credits and loans at all levels (*Global Gender and Climate Alliance, 2011*)

Majority of Tanzania Mainland citizens who are highly living in rural areas depend on agriculture based economy. It is recognized that rural electrification program will provide extra time for many farmers and hence improving the performance of the agriculture sector which is critical for food security, reduction of poverty and increase students' performance in schools. Generally the labor force between men and women in agricultural cycle shows that women are most active in agriculture activities than men especially on production selling and processing the agricultural harvests.

Agriculture is the largest sector of employment in Tanzania Mainland, with the vast majority of rural women and men employed in agriculture, mostly as self-employed on their own farms. Women in rural areas encounter various difficulties in performing their agriculture activities most of their time is not used on farms as they have to take care of their families in physical food processing and looking for cheap sources of energy

therefore it is hard for them to reduce poverty and enhance food security (UNDP-UNEP PEI, 2015).

The existence of gender gap between men and women particularly in owning resources, information, decision making and access to credits and loans serves as one of the many causes of agriculture underperformance. When women own resources it is normally a very small plot, less livestock than men, they also face restrictions on access to coming advanced trainings and technologies, vocational education, credit and other financial services

2.4.2 Socio-economic activities as a result of rural electrification program.

An interesting paper written in South Africa, the author examined midterm effects of electricity network roll-out on rural employment growth and particularly female labor market participation in South Africa. She observes positive effects on female labor supply in the wake of electrification. The mechanism at work, Dinkelman argues, is a shift away from cooking with wood, which releases female time from home work for other economic activities such as market and agricultural work. In addition she expects home business activities to increase (Dinkelman, 2011).

According to Van de Walle et al. (2013), Indian citizens have engaged themselves on economic activities whereas men shift leisure time from daytime to evening hours and offer more productive work during daytime. Women, in contrast, offer more casual work, which might as well include unpaid domestic work.

Rural electrification also has greater impact on maternal and infants health, having electricity can help reduce some pregnancy complication during delivery; some women need assistance in labor such as operation to remove the baby. Vaccination has also been made easier with the availability of reliable electricity because vaccines can be stored in village hospitals and dispensaries therefore instead of travelling to the regional hospital for vaccination it is now available in the vicinity (GNESD, 2007).

2.4.3 Impacts of rural electrification program on time saving and individual productivity.

In the study conducted under the International Growth Centre interesting findings were obtained where as provision of rural electrification had heterogeneous effects by gender. The findings suggested that though electricity created more time for other things to be done but still men were lenient to engage themselves on second jobs though they increased working hours in their former primary jobs/occupation as a result their earnings remain the same no changes at all.

On the women side it is different; because of the extra time that electricity provided to them those who have access to rural electrification project increased their earnings by 30% compared to men. Time for food processing now was cut by the presence of a village milling machine. Many women engage themselves on second jobs after accessing electricity new economic activities such as small business are opened, there is increase of shops and groceries that are owned by women thus increase their earnings.

Improvement of agriculture performance is also evident in Peru society as women who engage in agriculture have more time to work in their fields and do other economic activities thus improving the food security and reduces poverty in their society. With this evidence it is true that rural electrification program allows women to be more productive on various economic activities that allow them to earn more money. These occupation shifts rarely happen to men that is why their earnings do not increase (Dasso and Fernandez, 2015).

2.5 Research Gap

From the above empirical studies, impacts of rural electrification program on narrowing gender gap in both developed and developing countries are evident. The above literature review, shows a lot have been said and studied from a different angles of the globe about rural electrification program implementation, Tanzania being among them.

From the literature available; the role played by different stakeholders in the implementation of rural electrification program, advantages and challenges have been studied and put well.

However, in Tanzania little has been documented on the impacts of this program in different regions and villages where it was implemented specifically on narrowing gender gap, most studies have talked about socio-economic development in general but not in gender specific. This study therefore addresses this gap focusing on the impacts of Tanzania rural electrification program on narrowing gender gap.

2.6 Chapter Summary

Based on literature review in summary, rural electrification program has impacted positively on narrowing gender gap. Having electricity even development is easily achieved as many people will involve themselves on small business that can increase their income, activities such as hair dressing salon, food vending, milling machines and other agricultural activities like water pumping for irrigation are easily conducted with the access of electricity. Access of electricity has become time saving tool as those activities that took long time can be processed within a very short time hence a lot of time for people to rest and engage themselves on other economic activities. Access of electricity is believed to narrow the gender gap, when women stop to depend their every need from their husband and start to produce their own income it will reduce the submissive action and violence from their husbands. Lastly rural electrification has reduced the burden of women and girls in food processing therefore girl's school attendance rate will increase.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes methodology that was used in the completion of this study. It explains the Research Design, the Total and Target Population, Sample Size and Sample Determination processes, Sampling Frame, Sample and Sampling Techniques, Data Collection Instruments, Data Processing and Analysis, Data Validity and Reliability, Pilot Study and lastly the Ethical Consideration.

3.2 Research Design

This study has adopted the triangulation research design for data collection whereby both Quantitative and Qualitative research approaches were used. Collection of views, opinions and perceptions of site area residents concerning the rural electrification program in their village was conducted to obtain qualitative data. On the other hand quantitative data was obtained from the village council leaders who were interviewed during the study. Lastly the documentary review from The Rural Electrification Agency and Internet were used to collect secondary information relevant to the study.

3.3 Population and Target population

This study was conducted in one village out of 15 villages that have benefited from the rural electrification program in Morogoro region, Tanzania. The village is known as Gairo town, it has total population of 35,638 people and 2349 households according to 2012 national census. Gairo town is one among eight wards of Gairo district. Questionnaires, Interview focus group discussion and observation were conducted to a selected number of village residents for the collection of primary data also government administrators working in the regional council also were interviewed. 12 selected participants were selected for the focus group discussion that was conducted at the ward office.

3.3.1 Sample size and Sample determination

This study has taken into account sampling to obtain data from the village as the village is highly populated; therefore to make the study easier sampling was used. The sample size of this study was determined using the Morgan and Krejcie sampling size table of 1970 as shown in the appendices, whereas it will include 12 Government Administrators and 327 villagers because Morgan and Krejcie sampling size table shows clearly the sample size to be used without any calculations that could mislead the sample taker.

3.3.2 Sampling Frame

Table 3.1; Represents study sample frame.

Category of population	Population Size	Sample size	Sampling Technique
Government Administrators	12	12	Purposive Sampling
Households	2349	327	Random Sampling

3.3.3 Sample and sampling technique

In conducting this study Purposive Sampling was used on two stages, first stage was when selecting the study area, the main criteria was the village must have been among phase one villages of the rural electrification program that took place between 2013-2015 because the period of three years from the completion of the program gave a clear picture of the impacts of this program. The other criterion was it is a village whose main economic activity is agriculture.

The second stage was when collecting information from Government Administrators this is because of knowledge that they have regarding the rural electrification program in their village also they are the one who know better their villagers and the gender gap issues that happen within the village. Households were

picked randomly because the village has many households therefore to minimize sampling bias and making the study easier random sampling will be used, but it was purposely on household heads as they are the ones who know better on the electricity uses in their houses.

3.4 Data collection Instruments

The data collection instruments that were used included; questionnaires, interview guides, focus group discussion, observation and documentary review checklist.

3.4.1 Questionnaires

Questionnaires were used to collect data from villagers of Gairo village. A total of 327 questionnaires were randomly distributed to household heads in the village for villagers to fill them. The study taker walked from one house to another for questionnaires administering and after asking question the house was marked to avoid repetition. For this study questionnaire technique has proved to be feasible to collect a wide range of information from a large number of individuals and households especially when it comes to people like villagers.

The questionnaires are popular because the respondents fill them in at their own convenience and are appropriate for large samples. The questionnaires were designed with both open and closed ended questions (Amin, 2005).

3.4.2 Interview Guide

The interview guide was to gather information from government administrators at Gairo village. Interview guide has been chosen because they are thought to provide in-depth information about a particular research issue or question. Still, an interview make the work easier and enables fully understanding of someone's impressions or experiences, or learn more about their answers as compared to questionnaires.

3.4.3 Focus Group Discussion

A focus group discussion consisting of 12 people was conducted in the village. This discussion included 2 household heads, 2 students, 1 worker from TASAF, 2 social workers, 1 teacher, 2 business men, 1 priest and 1 village administrator. The village chairman helped the interviewer in selecting the discussion participants and by the help of the translator the discussion took place smoothly.

The discussion was mainly for testing the validity of data that were collected from the household heads during questionnaires administering, also it targeted the village members understanding of the village history, understanding different matters such as ways women are perceived in their village and the gender gap that exists within the village. The other purpose was to know the feeling of villagers towards rural electrification program in the village and last was to capture the impacts of electricity in the village, participants believed to have benefited or benefiting from the program especially women and students.

3.4.4 Observation

To get a clear picture of the way gender gap has been narrowed by the implementation of the rural electrification program direct observation was applied. Observation was conducted during focus group discussion and questionnaires administering mainly the way people talk and participate on conversation and discussions. Ways women were given chance to talk their views without interruptions, number of women owning resources and small business in the village also was observed.

3.4.5 Documentary Review Checklist

This technique was used to collect secondary data, whereas different documents, reports, articles and books concerning rural electrification program and its impacts on narrowing gender gap especially in rural farming setting. Most of these documents were obtained from public libraries, Internet, conference papers, Morogoro Municipal Council.

Some documents and data were obtained from Rural Electrification Agency and Tanzania Electricity Supply Company offices in Dar es Salaam.

3.5 Data Processing and Analysis

Primary data collected from Government Administrators and villagers using interview guide and a structured questionnaire were verified, compiled, coded, reorganized and summarized for computer analysis. Primary data obtained were analyzed by using the Statistical Package for Social Science (SPSS) and excel sheet. These statistics were used to generate frequencies, percentages and means to extrapolate the level of rural electrification impact on narrowing gender gap.

Furthermore, secondary data were applied to determine the situation of gender gap before the implementation of rural electrification program and the comparison was made basing on villagers ways to which rural electrification program has affected labor market and individual productivity.

3.6 Pilot Study

The pilot study was conducted two months before commencing the study, this study included one ward of the village and it was mainly to test the feasibility of questionnaires and the checklist that that was prepared. One ward was selected because it was necessary to conduct over a small area first so that to test the workability of objectives and sampling techniques. Whether there was any need of changing or modifying them. Pilot study was also a great help to make the researcher familiar with the possible limitations that were handled accordingly afterwards.

3.7 Data Validity and Reliability

3.7.1 Validity

In this study the Content Validity Ratio (CVR) was used since it focused on the extent to which the content of an instrument corresponded to the content of the theoretical concept that was designed to measure (Amin 2005). A pilot study was also made to test

whether the questionnaire included all the intended variables of the study. Content validity index was calculated as number of experts declared item valid divided by total number of experts.

$$CVR = \left[\frac{\left(E - \binom{N/2}{2} \right)}{\binom{N/2}{2}} \right]$$

Whereas

E = Number of experts who declared the item valid

N = Number of experts (Taylor 2017)

3.7.2 Reliability

Equivalent form of reliability or alternate formed liability Hopkins (Benedict et al, 1998) was used. This involved administering one form of the test to an appropriate group and at the same session or shortly there-after; the second form of the test was administered to the same group. The two sets of scores then were correlated and the results evaluated. The resulting coefficient of equivalence was then checked to be high or low; if high hence test has good equivalent forms of reliability and if low hence the test has no equivalent forms of reliability.

3.8 Ethical considerations

In conducting this study permission was sought from the Pan African University Institute for Water and Energy Sciences (PAUWES) director for introductory letter to Morogoro Municipal Council that allowed conduction of the study in the site. Then there was a letter from the interviewer to the study area to show interest of conducting study to their area that states clearly what was to be conducted and procedures that would have

been taken during the study, lastly the letter of approval was written from Morogoro Municipal Council to grant permission and allow the study to be conducted in their area.

Study participants were guaranteed that the information that they provided remained confidential for the purpose intended for and will never be made available to anyone who was not present during the study and their identity were to remain anonymous throughout the study and even to the interviewer to guarantee privacy. This approach is supported by Bhattacharjee (2012) who identified voluntary participation and harmlessness (informed consent), anonymity and confidentiality (privacy), disclosure, honesty with professional colleagues as important ethical issues to be adhered to by researchers. According to Bhattacharjee (2012) ethical considerations that is how the study was conducted.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1. Introduction

This chapter presents data collected from respondents during site visits. These data were collected from the guidance of the research questions asked and were interpreted according to the effects of rural electrification on narrowing gender gap among rural farmers. Data obtained from the study were analyzed using excel sheets. Results based on the difference of gender gap before rural electrification program and after the implementation of the program.

4.2. Response Rate

Interview and questionnaires were conducted to the villagers of Gairo village who have benefited from the rural electrification program; interview was conducted to village administrators whereas questionnaires were distributed randomly to the villagers.

Table 4.1 Response rate

Tool used	Tools dispatched	Tools returned	Percentage
Questionnaires	327	294	89
Interview	12	12	100

From the study findings in table 4.1, it presents that out of 327 questionnaires, 294 were returned making the response rate of 89% whereas for the 12 village administrators who were interviewed the response rate was 100%

4.3 Household profile features

From the questionnaires distributed the household profile features of the respondents were established. The respondents' household profile features are presented in Table 4.2. These features included gender of the household head, marital status, size of the family, level of education, duration of stay at the village and the income generating activity.

Table 4.2 Gender of the household head

Gender	Frequency	Percentage
Male	210	71.4
Female	84	28.6
Total	294	100%

From table 4.2, It is evident that majority of the households are headed by men at 71.4% while 28.6% are female headed households in Gairo village. Further, the study sought to establish the age profile of the respondents. The results are presented in Table 4.3.

Table 4.3 Age profile of respondents

Age in years	Frequency	Percentage
Below 20	13	4.4
21-30	71	24.1

31-50	175	59.5
51-70	27	9.2
Above 70	8	2.7
Total	294	100

From the findings in Table 4.3, it is evident that majority of the households in Gairo village are headed by people aged between 31-50 years at 66.9% while the least headed households are those with years above 70 at 2.7%

Further, the study sought to establish the marital status of respondents. The results are presented in Table 4.4

Table 4.4 Marital status of household heads

Marital Status	Frequency	Percentage
Married	206	70.1
Single	43	14.6
Divorced	12	4.1
Separated	25	8.5
Widowed	8	2.7

Total	294	100%
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From the Table 4.4, most of the respondents are married at 70.1%, 14.6% are single, 8.5% are separated while 4.1% and 2.7% are divorced and widowed respectively. Further, the study inquired on the family size living in a single household. This is presented in Table 4.5.

Table 4.5 Family size of the households

Number	Frequency	Percentage
1	17	5.8
2-4	35	11.9
5-7	168	57.1
More than 7	74	25.2
Total	294	100%

From the Table 4.5, it is evident that majority of the households in Gairo village are inhabited by 5-7 members with 57.1%, those who are more than 7 are 25.2%, those living 2-4 members are 11.9% whereas 5.8% the minority number is inhabited by those living alone in a household. Further, the study inquired on the level of education for the household heads, this is then presented in Table 4.6.

Table 4.6 level of education for the household heads

Level	Frequency	Percentage
Never attended school	21	7.1
Primary level	68	23.1
Secondary level	170	57.8
Certificate/Diploma/Degree	35	11.9
Total	294	100%

From Table 4.6, majority of the households in Gairo village are headed by those who have attained secondary level of education with 57.8%. 23.1% is for the heads primary level of education, there is quite a number of household heads with level above secondary education and 7.1% of the household heads that have never attended school

In addition, the study sought to investigate the income generating activities of the household heads. This has been presented in Table 4.7.

Table 4.7 Income generating activities

Activity	Frequency	Percentage
Agriculture	228	77.55
Business	47	15.98
Official employed	8	2.7
Causal laborer	11	3.7

Total	294	100
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From table 4.7 it is evident that this community is an agricultural community as 77.55% of household heads income generating activity is agriculture, whereas 15.98% of household heads income generating activity is business, 3.7% is for casual laborers and the small percentage 2.7% is for official employed people.

4.4 Electricity Usage Profile

This section covers the electricity usage among the rural farmers of Gairo village, whereas it consists of home electronic appliances owned by respondents, Main energy for lighting, cooking, charging and listening to radio or watching a television or video and electricity consumption.

For electric appliances owned, respondents were required to put a tick on the appliances they own and uses electricity. The finding on the household appliances ownership are presented in table 4.8

Table 4.8 Electric appliances owned

Appliance owned	Frequency	Percentage	N
Electric Lamps	294	100	294
Electric cooker and microwave oven	11	3.7	294
Television	288	98.0	294
Cell phone	294	100	294

Radio	242	82.3	294
Refrigerator	71	24.2	294
Water pump	15	5.1	294
Water heater	2	0.68	294

From the above Table 4.8, electronic appliances owned vary according to the importance of that appliance. All 294 respondents own electric lamps and cell phones with 100%. 98% of the respondents own television, 82.3% own radios and the minority number of respondents 0.68% own water heaters for warming their water. The study established the main energy for lighting, cooking, charging and listening to radio or watching a television or video. The findings are presented in Table 4.9.

Table 4.9 Main energy used in daily activities

Activity	Electricity	Generator	Gas	Biomass	Kerosene
Lighting	100	40.81	0	0	19.04
Cooking	3.7	0	35.37	100	43.20

From Table 4.9, 100% of respondents use electricity for lighting and only 40.81% and 19.04% use generator and kerosene respectively. For cooking 100% of household heads use biomass such as charcoal and fire wood, 43.20% use kerosene, 35.37% use gas and only 3.7% use electricity. For cell phone charging 100% use electricity and during power outage 80.95% use generators to charge their phones. For radio listening majority

use electricity 82.3% and 4.1% use generators when there is power outage/ in watching television 98% use electricity and 10.5% use generators on special occasions.

4.5 Rural Electrification Impacts

This section presents different impacts of the rural electrification program to the village before and after implementation of the program. It states the impacts towards business activities; it shows how the program has become time saving tool, ways to which the program has narrowed the gender gap and impacted personal productivity.

4.5.1 Rural electrification towards business activities improvement

A lot of literatures believe that electricity has the ability of activating and supporting income generating activities such as food processing mills, hair dressing salons, barber shops, selling of cool drinks, usage of electronic sewing machines (UN 2005, 2010). Establishment of rural electrification program in Gairo village has shown to have huge impacts on improving business activities. Different businesses that were lagging behind have been improved and those new have been established as a result of electricity availability promoted. Most of the respondents put much emphasis on the daily operating hours especially on the opening and closing hours, increase of operating hours is believed to have increased the business productivity and improved services for those who purchase goods. One respondent had this to say when asked of the impact of rural electrification program towards business activities improvement

“provision of electricity has helped more than I could imagine, I had a solar panel but it was not effective as I had to decrease he working hours so that to save some power for my family to use but with this program I have increased my operating hours to about 17 hours per day, I can open at 06:00am to 10:30pm everyday (response from a 32 years old woman owning a retail goods shop at her house)”

In the study area electricity has triggered many income generating activities that including were not present before. Youths have come innovated new business ideas such CD vending areas where people borrow CDs for hours, cell phone charging shops, television show rooms for example during world cup seasons those who could not afford expensive bundles that have access to world cup could go and watch matches from the showrooms. Therefore the presence of rural electrification program has also made youth to think outside the box and become innovative,

4.5.2 Rural electrification as a time saving tool on individual productivity

Most of the respondents have agreed that electricity has been a time saving and labor reducing tool. Most of women have the largest burden of domestic work such as cooking and food processing especially grinding cereals to make flour but with the presence of electricity domestic chores have been easier to handle as food processing is mainly done by the milling machine that increases their time for other economic activities. The solar milling machine started operating earlier 2013 enabling villagers to process their cereals before the introduction of the milling machine women had to grind the cereals mechanically which was tiresome and time consuming. It is estimated that women in rural areas spend between thirteen to sixteen hours per day with domestic work (Diagne Gueye 2007).

Before gaining access to electricity, kerosene lamps, candles and torches were used as lighting devices. The respondents were responsible for buying candles, kerosene or a battery, buying candles kerosene and battery was very expensive as it added expenditure to the family. After the provision of electricity the burden now has been relieved off. A study found out that in rural Africa, 87% of women's commutes are performed on foot and 65% of the household's transport is effected by women (Malmberg Calvo 1994). In this study, women and sometimes children in Gairo district had to travel from one ward to another in order to buy kerosene in times of short supply, a task that has become unnecessary with the access to electricity:

Policy papers often assume that time saved through access to electricity and the decrease of the workload is not only contributing to women's practical gender needs but also to women's productive and strategic gender needs. They argue that time saving through the access to electricity enables women to engage in income generating activities, to take part in decision-making processes within the household and the community or to engage in educational activities such as evening classes or reading (Diagne Gueye 2007; UN 2005, 2010; UN Millenium Project 2005; UNDP 2004). While the traditional division of labor certainly fosters gender-based social imbalances and women's time and human energy invested in domestic work plays a critical part in this (Diagne Gueye 2007)

Diagne Gueye (2007) adds that the high work load attributed to female household members in Senegal entails also that daughters or other female household members in school age attend school irregularly if at all. In all visited households, the domestic chores are shared between the co-wives, daughters, daughters-in-law or sisters-in-law and only half of the respondents' daughters in school age are going or have been going to school. However, the linkage between electricity and school attendance goes beyond this study and requires further research.

To conclude, it can be stated that time saving can surely impact the productivity in many rural areas as we draw evidence from the study area where most of women after the access of electricity have been able to increase their agricultural products. But there is one big factor that hinder them to achieve high production, that factor is traditional culture and norms that increases the gender gap. Though the gender gap has been narrowed down by the access of electricity but to some extent it lags women behind.

4.5.3 Rural Electrification Program narrowing gender gap

In the data collection all gender participated, both genders gave their views on the rural electrification program that it contributed to narrow the gender gap. Men and women in Gairo village have witnessed the increase in productivity in their daily activities. Women have had longer hours of rest in so doing it has created time for other business activities to be introduced. Men now recognize the contribution of women in their families from business activities that women do in their ample time after farming activities. Below is the response from a man whose wife is doing a small business

“My wife has been a great help to our family now a days since electricity was established income from her business is used to top up on our son school fees, she has opened a hair dressing salon that she operates it full time after the farming season but before establishment of this program she engaged herself only on agriculture activities and after the farming season she was a home staying mother. I see the benefit of this program in my family and I like it” (remarks from a 41 years old man)

It has been observed that presence of electricity has been a huge help to all age groups such as students, youths and people of old age including women and men living in the village. Students have had longer hours of studying during the night hence their performance has increased. Girls who used to help their mothers in cereals grinding now they have a lot of time for other important things due to the presence of milling machines

Most of women who participated in questionnaires and in the focus group discussion have admitted that the presence of electricity has changed their lives positively, it has enabled them to open small businesses that were not possible to be opened before also electricity has enabled increase the operating hours as now they can work even late at night without fear therefore electricity has increased the security of Gairo village. A response from a woman when asked how this program has helped her as a woman,

“I have been selling food since I was a young girl but I was limited to conduct my business only in the afternoon because it was impossible to sell food in the evening also It was very expensive to buy ice from cold rooms so that to cool my soft drinks but after the presence of electricity things have been easy because selling food under the presence of electricity has been smooth also from the fridge I have bought I can cool as many soft drinks as my customers demand. My profit has increased and I managed to build a three room’s brick house from this business, this program is good and we thank those who thought of us and brought it in our village” (says a 35 years old woman who is a food vendor in the village common known as ‘mama lishe’)

Some women went far and reported that there are some needs it is impossible to ask a man therefore from the small business they have been conducting it has enabled them to join in small groups common known as Village Community Banking (vicoba) where they can keep their money for their personal uses. This has decrease women dependency to a man that lead to them being submissive to their husbands. It has killed the old notion that women are staying home people they cannot produce and help in family planning and generating income. Women now can contribute in family economy.

CHAPTER 5

DISCUSSION SUMMARY OF STUDY FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter consists of discussion of study findings that were analyzed and presented on chapter four, also the conclusions and recommendations. The findings are presented with respect to the objectives of the study, where as conclusions are drawn from the study findings and then recommendations are given for further study to continue from where the researcher ended.

5.2. Summary of Findings

Data collected in the conduction of this study had the purpose of assessing impacts of the rural electrification program on narrowing gender gap that existed among the rural farmers. From the collected data it was discovered that rural electrification program has a positive impacts towards gender gap narrowing. The program allowed all genders to participate in socio-economic activities that enabled them to increase the individual and community productivity. Villagers became innovative into new ideas that will increase their income rather than depending only on agriculture, majority of the villagers have engaged themselves into second jobs that increases their earning. The study focused on household heads, government administrators, office employed people, students, social workers and business people. From all of these respondents the study was able to reveal the difference that existed before and after implementation of rural electrification program.

According to Amartya Sen in his *Capability approach*, development is a process of expanding freedoms that people enjoy (Ellis, 2000). Under this approach Sen sees human life as a set of “*doings and beings*” which we may call “*functionings*”. Capability reflects a person’s freedom to choose between different ways of living. The underlying

motivation on freedom is well captured by Marx's claim that what we need is "replacing the domination of circumstances and chance over individuals by the domination of individuals over chances and circumstances" (Sen, 1990).

The success of this program is measured on how it has impacted lives of the villagers in Gairo village. The contribution it had in opening and grabbing new opportunities to the population in the village, how it has given freedom to women in doing and pursuing their dreams without depending on men for everything. From the study it is evident that the program has succeeded by opening new opportunities and allowed youth to become more innovative

5.3 Conclusion of the study

This study had the purpose of assessing impacts of rural electrification program on narrowing gender gap also identifying socio-economic activities that have been started as a result of this program. Study findings revealed that rural electrification program is effective in narrowing gender gap by creating opportunities for both genders to engage in economic activities and reduce dependency on one sole economic activity that is agriculture.

From data collected it was found that uses of electricity in the household are still low, as majority of villagers use electricity for lighting, cell phone charging and other entertainment purposes but not for cooking. A large number of village population still use biomass as their main energy resource for cooking this is because they find it very cheap to use biomass than electricity for cooking of which is very healthy, effective and environmental friendly source of energy. The response of many people is electricity is very expensive and also cooking with electricity damages the food taste.

With the access of electricity it has enabled the village population to increase operational hours in their economic activities. Now they can operate until late at night without fear of security hence increase their earnings. Women can also save money in their women organizations of which this was not present before the implementation of

this program. There has been creation of new business ideas that were not in the village before the access of electricity, business like television showroom, game centers and CDs lending shops. Generally the village population has praised this program as it has enabled to bridge the gender gap that existed before as well as it has brought development and reduced gender violence activities towards women

5.4 Recommendations

The following recommendations were made from the study:

- i. From the proven efficiency of rural electrification program in bringing up development, more investment is needed so that to connect as many villages as possible. When many villages are connected it will create equal opportunity to those in the rural and urban areas as well as it may pave the way to development of Tanzania.
- ii. With the increasing demand of modern and clean energy, it is important to encourage people to invest on cheap sources of electricity such as solar and biogas energy. This will enable them to have electricity without waiting for the government to bring electricity to them that might take long time to wait for them.
- iii. Education and trainings on entrepreneurship to people, especially youth to be encouraged on becoming innovative rather than waiting on office jobs

REFERENCES

- Amin E. M. (2005). *Social Science Research, Conception, Methodology and Analysis*, Makerere University Press. Kampala.
- Armatya Sen (1999) *Development as Freedom Theory*
- Aslam, S. M. (2012). *Energy and economic prosperity. Energy and the challenge of sustainability*. UNDP, New York. 413pp.
- Barnes, D. F. (2012). *The Challenge of Rural Electrification: Strategies for Developing Countries*. New York: Routledge.
- Bhattacharjee, A. (2012). *Social Science Research Principles, Methods and Practices*. University of South Florida, USA. 41pp.
- Collings, Simon (2011) "*Phone Charging Micro-Businesses in Tanzania and Uganda*" *GVEP International Report*, http://www.gvepinternational.org/sites/default/files/phone_charging_businesses_report_with_gsma_final_for_web_0.pdf cited on 12-1-2018
- Diagne Gueye, Y. 2007. *Gender and Energy in Senegal: The Paths to Sustainable Development*. In Gail Karlsson, ed. 2007. *Where Energy is Women's Business: National and Regional Reports from Africa, Asia, Latin America and the Pacific*. Leusden: ENERGIA.
- ENERGIA (2017): *Energy access and gender equality, what we know so far and knowledge gaps*. Gender + Energy Research Programme.
- Global Gender and Climate Alliance (2011). Gender, climate change and food security sponsored by UNDP Empowered lives and Resilient nations Programme*
- Giddens, A. (1976). *New Rules of Sociological Method: a positive critique of interpretive sociologies*. London: Hutchinson

- GNESD (2007) Reaching the Millennium development Goals and Beyond: *Access to Modern Forms of Energy as a pre-requisite.*
- Kanangawa, M and Nakata, T (2008): *Assessment of Access to Electricity and the Socio-economic Impacts in Rural Areas of Developing Countries*; In Energy Policy 36: 2016-2029.
- Kihwele. S et al (2012); “*Visions, Scenarios and Action Plans Towards Next Generation Tanzania Power System in Energies* **2012**, 5(10): 3908-3927
- Köhlin et al., (2011) : “Rural electrification and domestic violence in Sub Saharan Africa” Ruhr Economic Paper, No. 570
- Maleko, G. (2005). *Impact of electricity services on microenterprise in rural areas in Tanzania.* Dissertation for Award of MSc. Degree at University of Twente, 105 pp.
- Malmberg Calvo, C. 1994. *Case Study on the Role of Women in Rural Transport: Access of Women to Domestic Facilities.* Washington, D.C.: World Bank. Sub-Saharan Africa Transport Policy Program, World Bank and Economic Commission for Africa. Working Paper 11.
- Ralph H.B. Benedict, David Schretlen, Lowell Groninger and Jason Brandt (1998): Hopkins Verbal Learning Test. Revised: Normative Data and Analysis of Inter-Form and Test-Retest Reliability. Page 43-55
- Rosamaría Dasso and Fernando Fernandez (2015): Powering change: Can rural electrification close the gender gap?
- Taryn Dinkelman (2011): The Effects of Rural Electrification on Employment New Evidence from South Africa. American Economic Review Vol. 101, NO. 7 pp. 3078-3108

- UN. 2005. *The Energy Challenge for Achieving the Millenium Development Goals*. New York: United Nations. http://www.un-energy.org/sites/default/files/share/une/un-energ_paper.pdf, 2013-05-02
- UN. 2010. *Energy for a Sustainable Future: The Secretary General's Advisory Group on Energy and Climate Change (AGECC). Summary Report and Recommendations*. New York: United Nations.
- <http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/AGECC%20summary%20report%5B1%5D.pdf>, 2013-04-23
- UNDP. 2004. *Gender and Energy for Sustainable Development: A Toolkit and Resource Guide*. New York: UNDP.
- URT (2003). *National Energy Policy*. Government Printers, Dar es Salaam, Tanzania. 78pp.
- Van de Walle, D., M. Ravallion, V. Mendiratta and G. Koolwal (2013), “*Long-term impacts of household electrification in rural India*”, World Bank Policy Research Working Paper(6527). <http://ideas.repec.org/p/wbk/wbrwps/6527.html>.
- World Bank (2010). *Low cost rural electrification pilot design in Tanzania*. [<http://www.devex.com/en/projects/low-cost-rural-electrication-pilot-design-in-Tanzania>].

APPENDICES

Appendix A: Questionnaire

This questionnaire is for the purpose of **this study only** and the information you give will be treated **confidentially** and your identity will remain **anonymous**. Please answer all the questions provided as honestly as possible, to the best of your knowledge.

Respondent's name

Respondent's age.....

A. Household Profile

1. Who heads this household?

Male ()

Female ()

2. Marital status of the family head

Married ()

Single ()

Divorced ()

Separated ()

Widowed ()

3. Family size (number of people)

1 ()

2-4 ()

5-7 ()

More than 7 ()

4. Education level of the family head:

Never attended school ()

Primary level ()

Secondary level ()

Certificate/Diploma/Degree ()

5. Duration of stay in the village

1 month – 1 year ()

2 – 5 years ()

5- 10 years ()

More than 10 years ()

6. Income generating activity

Activity	Selection
Agriculture	
Business	
Official employed	
Causal laborer	

B. Electricity Usage Profile

7. Assets ownership

Appliance	Tick
Electric Lamps	
Electric cooker	
Television	
Cell phone	
Radio	
Refrigerator	
Water pump	
Water heater	

8. What is your main energy for lighting, cooking, charging and listening to radio or watching a TV or video?

Electricity ()

Gas ()

Kerosene ()

Generator ()

Biomass ()

9. How do you consume electricity in your household?

.....

C. Impacts of electricity

10. What was the condition of this village in terms of energy/ electricity? Has there been electricity in this village at least in the past 10 years?

.....

11. Have you ever heard of rural electrification program in your village?

Yes ()

No ()

12. What was the level of people's participation in the whole process of the rural electrification program implementation?

High ()

Medium ()

Low ()

13. How do you differentiate your life before rural electrification program and the time after rural electrification program in the village?

.....
.....
.....

14. How do you think of the effectiveness of the rural electrification program in this village in the whole process of transforming your livelihood in this village?

.....

.....
.....

15. How has this program helped you as a woman?

.....
.....
.....

16. To what extent has this rural electrification program been able to help the youth and the entire population of this village?

High ()

Medium ()

Low ()

17. How has this program helped you in the improvement of your business?

.....
.....
.....

18. What do you see as the contribution of this rural electrification program in the improvement of health services?

.....
.....
.....

Appendix B: Interview guide (To the government administrators)

Name of the respondent.....

Position held.....

Education level.....

Age of the respondent..... (in years)

1. For how long have you been working here?
2. How many houses have access to electricity as an impact of rural electrification program?
3. What income generating activities are being done due to the presence of rural electrification program?
4. Is there equal participation between men and women in this village (gender gap situation)?
5. Has the gender gap decreased after rural electrification program?
6. What should government do to improve access of electricity?
7. What are the challenges facing this village on utilization of electricity?

Appendix C: Questions to the Focus Group Discussion

- 1 For how long have you been living in this village?
- 2 Have you ever heard of rural electrification program in your village?
- 3 Has your life changed before rural electrification program and the time after rural electrification program in the village?
- 4 Is there equal participation between men and women in this village (gender gap situation)?
- 5 Has the gender gap decreased after rural electrification program?
- 6 How has this program helped you as a woman?
- 7 Does rural electrification program have impact on youth of this village?
- 8 How has this program helped you in the improvement of your business?

Appendix D: Letter of introduction

Mchilo Mizambwa,
PAU Institute of water and energy sciences (PAUWES),
c/o Université Abou Bekr Belkaid Tlemcen,
B P. 119, Campus Chetouane,
13000 Tlemcen, Algeria.
+213 (0) 542729546.
chylomiz@yahoo.com.
2nd May 2018.

TO: District commissioner,
Gairo district,
P. O Box 21,
Morogoro.
Tanzania.

Dear Sir,

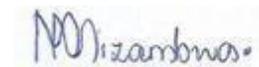
REQUEST TO CONDUCT A RESEARCH STUDY IN YOUR VILLAGE.

My name is Mchilo Mizambwa, a student from The Pan African University Institute for Water and Energy Sciences (PAUWES), pursuing Masters of Energy Sciences (Policy Track). The major aim of this letter is to request the permission to undertake the study on:

Assessing Impacts of Rural Electrification Program on Narrowing Gender Gap Among Rural Farmers in South East Tanzania; A Case Study of Gairo Village.

I would like to have your full cooperation and participation in this study by freely responding to the questions I will ask. This study is meant for academic purpose and not otherwise. I therefore ensure the anonymity and confidentiality of the higher standard. The responses given under this study will remain a secret between you and me as a researcher.

Thank you for your cooperation.



MCHILO MIZAMBWA.

2nd May 2018

Appendix E: The Budget

	Explanations and Quantity	Amount in TZS
A. Research equipments and Materials		
1. 1 Portable hard drive	Data storage	195,000
2. Internet modem	Internet surfing for articles	320,000
3. Hiring Tape Recorder and Camera	For primary data collection	400,000
4. Hiring GPS device	Location obtaining	556,000
5. Cell phone airtime	Communication	82,000
	Total:	2,781,500
B. Travel		
1. Flight ticket	From Algeria to Tanzania round trip	2,054,500
2. Transport expenses from Dar es salaam to the study area	2 trips to the study area	140,000
3. Local transport within the study area	Taxi renting 28 days @25,000 28 days	700,000
4. Local transport to REA and TANESCO in Dar es Salaam	Secondary data collection 5 working days@ ≈ 36,800	184,000
	Total:	3,106,150
Bank Transfer Charges	Transferring money from Algeria to Tanzania \$70 x 2,000 = 140,000	140,000
	GRAND TOTAL:	6,000,000

GRAND TOTAL 6,000,000

EXCHANGE RATE 2,000

6,000,000 /2000 = 3000 USD That I received as Research Grant

Appendix F: The workplan

Activities	2018																							
	APRIL				MAY				JUNE				JULY				AUGUST				SEPTEMBER			
	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	W17	W18	W19	W20	W21	W22	W23	W24
Internship																								
Ethical clearance and study permission																								
First site visit																								
Pilot study																								
Finalizing questionnaires and interview guide																								
Data collection from REA and TANESCO																								
Data collection from study site																								
Data coding and entry in a computer																								
Data analysis																								
First draft report writing																								
First report consultation																								
Report correction																								
Final draft submission (second consultation)																								
Final correction																								
Masters Thesis report submission																								
Masters Thesis Defence																								
Masters Thesis Report Final Submission																								

Appendix G: Morgan and Klejcie (1970) sample size table

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	146	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note:

N is population size.

S is sample size.