

**RURAL ELECTRIFICATION AND LIVELIHOOD  
DIVERSIFICATION AMONG RURAL HOUSEHOLDS  
OF BUMULA SUB-COUNTY IN BUNGOMA COUNTY,  
KENYA**

**BY  
KULOBA ABRAHAM**

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University of Nairobi in Partial Fulfilment of the Requirements for the Award  
of the Degree of Master of Arts in Development Studies**

**November 2017**

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Faculty/School/Institute	<u>INSTITUTE FOR DEVELOPMENT STUDIES</u>
Department	<u>IDS</u>
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Date: .....

**Dr. Joseph Onjala**

**Institute for Development Studies**

**University of Nairobi**

Signature: .....

Date .....

**Dr. Paul Kamau**

**Institute for Development Studies**

**University of Nairobi**

## **DEDICATION**

I dedicate this work to the great family of Kuloba

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## **ACRONYMS AND ABBREVIATIONS**

ESMAP	Energy Sector Management Assistance Programme
IDS	Institute for Development Studies
IEA	International Energy Agency
IEG	Independent Evaluation Group
ITC	Industrial Training Centres
KIHBS	Kenya Integrated Household Budget Survey
KII	Key Informant Interview
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KITI	Kenya Industrial Training Institute
KNBS	Kenya National Bureau of Statistics
MSE	Micro and Small Enterprise
NITA	National Industrial Training Authority
ODI	Overseas Development Institute
OECD	The Organisation for Economic Co-operation and Development
REA	Rural Electrification Authority
REP	Rural Electrification Programmes
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
UNDP	United Nations Development Programme
WHO	World Health Organisation

## ABSTRACT

*Livelihood diversification is a common approach for coping with economic and environmental jolts, and is instrumental in poverty reduction. The case is particularly true for rural electrification and livelihood diversification, where rural livelihood diversification rely on electricity powered micro-enterprises. Nevertheless, past studies on rural electrification focus more on the effects that rural electrification have on the enhancement of social welfare generally by exposing individuals to news media, allowing extended studies and revisions for children. Further to this, past studies generally examine the extent of rural electrification coverage and community-based electric grids. To deepen our conceptual understanding of rural livelihood diversification processes, this study examined the influence that rural electrification grid connections have on livelihood diversification through establishment of rural micro-enterprises. Thus the study argued that rural electrification contributed to the establishment of micro-enterprises that supported livelihood diversification.*

*The study interviewed one hundred micro-enterprises engaging in different nature of activities in Bumula sub-County in Bungoma County, Kenya. Primary data from micro-enterprises were corroborated with secondary data collected from two key informants from West Kenya Rural Electrification offices in Eldoret. Both quantitative and qualitative data were collected by use of a questionnaire with both structured and unstructured items and key informant guides. Data collected from respondents in micro-enterprises were analysed using IBM Statistical Package for the Social Sciences (IBM SPSS 24) while thematic analysis was employed in the analysis of data collected from the key informants.*

*The study found that rural electrification supported the establishment of micro-enterprises such as welding services, barber shops, salons etc. Proprietors' gender, income level and level of education was an essential determinant of the different type of micro-enterprises one established. The study concludes that rural electrification contributed to the emergence of micro-enterprises, thus supported livelihoods diversification. The study recommends that the National and County Government in concert with electricity service providers and related agencies to reconsider the maximum 600 metres distance required for rural electricity connection to accommodate more individuals in the rural areas.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the Study

Among the basic national infrastructural services geared towards developmental needs, rural electricity is a critical input, and yet globally and locally, many people particularly the rural poor are still not able to access electricity or other forms of modern efficient energy (Bensch *et al.*, 2011). Approximately 1.6 billion people out of the total global population of approximately 6.7 billion people globally have limited access to modern clean energy such as electricity. Moreover, a ballpark of 2.7 billion people in the world rely on unclean sources of energy such as biomass for energy production, majority being located in Sub-Saharan Africa (SSA) (OECD, 2006). In this scenario, the poor are unlikely to have access to electricity and other forms of modern energy and this is a contributing aspect for the poor to remain poor.

A significant number of policy makers believe that increasing rural electrification access and use is essential for poverty alleviation since it makes it possible for the poor people to improve their lives by diversifying their income generating activities supported by rural electrification. Access to rural electrification services is critical for increasing and boosting economic activities, increasing agricultural productivity, increasing income opportunities, and as a catalyst in the process of employment creation (UN, 2002). Rural electricity as a modern energy input is also essential for generating agriculture inputs, supporting commerce and industrial activities (UN-Energy, 2005).

In Kenya, Rural Electrification Authority (REA) was established under section 66 of the Energy Act, 2006 (No 12 of 2006), as a body corporate and became operational in July 2007, with a vision to provide electricity to all rural areas in the country. The Authority was created in order to speed up the rate of rural electrification in the country, a function that had for long been undertaken by the Ministry of Energy (MoE). Its function of accelerating the pace of rural electrification is anticipated to support viable socio-economic

development in the county. REA provides affordable and high quality electricity connectivity in the rural areas. The REA also desires to achieve greater standards of consumer service and getting the community to participate in order to guarantee long term sustainable socio-economic development (REA, 2014).

Rural electrification is key for livelihood diversification, the latter being motivationally pursued on different reasons; some individuals diversify their livelihoods as a desire to accumulate material resources, others engage in the processes of livelihood diversification in order to invest while others do so to spread risks and or maintain incomes to the requisite to adapt and survive in eroding situations. In addition, livelihood diversification is reliant primarily upon the setting within which it is happening. Nonetheless, the poorest rural groups perhaps have the scarcest opportunities to diversify their livelihoods in a way that will lead to accretion of resources for investment purposes (Hussein and Nelson, 1998).

The rural poor have developed ingenious ways of coping with ever increasing susceptibility associated with agricultural production; migration and moving out of farming areas, livelihood diversification and intensification (Ellis, 1998). Livelihood diversification as a strategy encompasses the endeavour by rural individuals and rural households to find new ways of generating as well as increasing their income in order to protect themselves from environmental risks. This efforts contrasts sharply by the degree of freedom of choice (either to diversify the income activities or not) and the possible reversibility of the result (Hussein and Nelson, 1998).

The study sought to address the influence of rural electrification on livelihood diversification in rural areas. Rural electricity is one of the ways through which the rural population can satisfy its energy needs, besides it cannot be separated from other rural needs. Electricity brought to the rural people is not in itself an approach of contributing to poverty reduction, neither does it mechanically lead to development in the rural remote areas. However, the availability and access to rural electricity by the local people can support modern services such as tele-education that can provide access to far-off information relating to commerce, agriculture and other income generating activities. Rural

electrification can also directly power different sectors of production in the rural areas, hence influencing the processes of livelihood diversification.

## **1.2 Statement of the Research Problem**

In developing countries' rural energy strategies, rural electrification has been important in these strategic processes. Supporters of rural electrification assert that it is a major contributor in agricultural activities and industrial productivity, it has the capacity to create more job and raise rural livelihood and also reduces rural-urban migration (Ellis, 1998). Electricity is one of the aspects that has an influence on livelihood diversification in the rural areas. Due to ever burgeoning population in SSA, income from farming in rural areas is limited to cater for the needs of every member in these areas, therefore, rural livelihood diversification is crucial as the subject of conceptual and policy based research (Barrett *et al.*, 2001; Davis, 1993; Bryceson, 1999). Rural people are no longer confined to crop farming, fishing or livestock keeping but they combine a range of activities in making success of their livelihood (Dercon Krishanan, 1996; Ellis, 2000; Unni, 1996).

Rural electrification has been identified as an important aspect in rural livelihood diversification as it creates prospects for micro-enterprises activities in rural areas to grow and flourish (REA, 2013). While these assertions are convincing, data on the influence of rural electrification on livelihood diversification is exceptionally narrow (Meadows et al, 2003; Martinot *et al.*, 2002). Even where the literature review in the aforementioned studies indicates lack of empirical research done in Kenya to assess issues relating to rural electrification and rural livelihood diversification. Besides lack of reliable data on significant effects of rural electrification on livelihoods diversification. In particular, this issue remains a puzzle to be solved.

## **1.3 Purpose of the Study**

The purpose of this study was to examine the influence of rural electrification services and programmes on livelihood diversification among rural households of Bumula sub-County in Bungoma County, Kenya.

#### **1.4 Research Objectives**

The purpose of this study was to examine the influence of rural electrification on livelihood diversification. A particular aim was to underpin the process of livelihoods diversification process in Bumula sub-County as a result of the introduction of rural electrification. The overall objective of this study was to examine the influence of rural electrification on livelihoods diversification among rural households of Bumula sub-County in Bungoma County, Kenya.

More specifically, the study sought to achieve the following objectives:

1. To analyse the distribution and access of rural households to rural electrification in Bumula sub-County.
2. To identify the types of livelihood diversification activities in Bumula sub-County.
3. To investigate the influence of rural electrification on livelihood diversification in Bumula sub-County.

#### **1.5 Research Questions**

The overall question for this study was: What are the effects of rural electrification on livelihoods diversification among rural households of Bumula sub-County in Bungoma County, Kenya? To answer the main research question the following specific research questions were posed:

1. How is rural electricity distributed and accessed by rural households of Bumula sub-County?
2. What types of livelihood activities exist in the rural areas of Bumula sub-County?
3. How does rural electrification influence livelihood diversification in Bumula sub-County?

#### **1.6 Justification of the Study**

The study was informed by the rural electrification programmes being initiated in rural areas of Kenya. The overall objective of rural electrification programmes is to distribute and connect rural electricity grids to public utilities including; schools, health centres, boreholes/water sources and other public areas of interest. Although the broader objective



of rural electrification programmes is to connect the electricity grid to these public utilities, this study focused on the influence that electricity grid connections in micro-enterprises can help rural households in Bumula sub-County in Bungoma County, Kenya in their quest for livelihood diversification.

Empirical studies confirm the benefits of rural electricity on micro-enterprises, for instance; determinants of innovations in MSEs (Suresh *et al.*, 2009), how community-based electric grids contribute to rural development (Kirubi *et al.*, 2008). According to Kirubi (2008) universal access to rural electrification increases overall social welfare of the rural people particularly by exposing them to information through listen to radios and televisions viewing. Such areas have been the focus of electrification effort hence there is limited information concerning rural electrification and its role in influencing livelihood diversification. The government through REA has invested in distributing electricity in rural areas thus the major concern was to establish how this rural electrification programmes is supporting rural households' livelihood diversification. The major motive of this study was thus to address this particular knowledge gap by enhancing and deepening our understanding of rural electrification and how it is influencing the processes of livelihood diversification through micro-enterprises in the rural areas of Bumula sub-County in Bungoma County, Kenya.

Subsequently, the output of this study would be a report offering explanations of the influence of rural electrification on livelihood diversification in Bumula sub-County in Bungoma County, Kenya. The study findings would be important in the academia and also provide rural development practitioners, policy makers and entrepreneurs with discernments and lessons concerning rural electrification programmes and its role in engineering the processes of diversification in rural livelihood as well as how and why these can be linked to sustainable livelihood and poverty alleviation especially in rural Kenya. In addition, such work is relevant in informing broader policies on how government programmes influence everyday economic activities. Thus understanding how and why rural electrification influences diversity in rural livelihood is both critical and timely.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

In this chapter, the researcher reviewed both theoretical and empirical literature related to rural electrification and livelihoods diversification. The reviewed literature ranges from explaining rural electrification to reflecting on the best practices in development that benefits rural electrification to livelihood in the rural areas. Theoretical literature and conceptual framework of the study was also covered in this chapter. In order to create an understanding of the significance of rural electrification in rural livelihood diversification, this chapter presents the strong relationship between rural electrification and livelihood diversification by highlighting the insights into rural electrification and access to electricity, livelihood diversification activities and distribution of rural electricity. In addition, theoretical links for livelihood diversification and electricity access are also outlined in this chapter through a number of rural micro-enterprises considered necessary in livelihood diversification processes.

#### 2.2 Theoretical Links: Livelihood Diversification and Electricity Access

Rural electrification is an important part of a county's infrastructure in the context that diversity in rural livelihood epitomise an important connexion between rural electricity and rural development). Rural electrification is arguably the most desired investment in many countries around the world (Schramm, 1991). Access to electricity can positively trigger the processes of livelihood diversification; enabling utilisation of certain tools, equipment and machineries, hence increasing income opportunities (Kirubi *et al.*, 2009). A number of studies in the energy sector have sought to understand the linkage between rural electricity access and rural development through multi-dimensional development context (Barnes, 2005; Karekezi, 2002; Maillard and Hourcade, 1990) in their model, illustrated the importance of rural electrification in the improvements of the economic situation of the rural population by enhancing rural industrialisation and productivity, through this,

majority of the people are able to diversify their livelihood by engaging in diverse income generating activities.

Furthermore, Hussein and Nelson (1998) carried out a study on sustainable livelihood and livelihood diversification. In their study, they established that non-agricultural activities are essential mechanisms of the process of livelihood diversification, and that livelihood diversification is typical for most individuals in rural areas of SSA and other developing countries.

Nonetheless, besides the model by Hourcade that emphasises the relationship between rural electrification and economic situations, the Rational Choice Theory seek to unravel the orientation and the philosophical nature of infrastructural development in the rural areas. The theory assumes that people always make a rational thought before deciding what to do basing on their anticipated costs and benefit from the actions to be taken. Rational Choice Theory also holds that individuals ought to choose alternative courses of action basing on their understanding of the best outcomes from it. Individuals will always pick courses of actions that are likely predestined to steer them to their utmost contentment in life (Coleman, 1973; Heath, 1976; Carling, 1992). To effectively support rural livelihood diversification and development, there are apt conditions to be respected and in this situation, rural electrification is an attractive means. In Pearce and Webb (1987) model, rural electrification is analysed basing on multiple objectives and Millard (1985), states that the reasons for rural electrification varies across countries and that the end result is always justified in increasing opportunities for the rural poor by engaging in diverse sustainable livelihoods.

Availability of rural electricity services is a major factor that facilitates the decision by rural households to invest their resources in alternative income generating activities for livelihood diversification and this is indicated by majority of these enterprises being located in centres where rural electricity supply line is available. This in essence implies the nature of individuals in upholding what benefits them most and this leads them to adopt developmental infrastructure in their areas such as rural electrification to better diversify their livelihood (Coleman, 1973). In addition, the use of rural electrification to achieve

livelihood diversification in rural areas is possible through engaging in micro-enterprises. For instance, micro-enterprises in telecentres, such as cyber cafés or internet cafés and computer-based games are presented as being fiscally sustainable to the households adopting micro-enterprises activities because of their commercial orientation (Bell, 2006; Oestmann and Dymond, 2001). Further to this, a study by Rajalekshmi in rural India indicated that internet cafes in the rural areas help people in these areas to access e-government services at ease (Rajalekshmi, 2007). The Kenyan government strive to engineer the processes of delivering its key services through digital electronic systems, thus internet cafés in the rural areas are vital in this linkage between the citizens and e-government services.

The selective nature of rural electrification is illustrated by Hourcade *et al.*, (1990), the more developed areas within the rural spectrum will have the greatest positive impact of rural electrification as compared to least developed rural areas on economic growth. Also areas equipped with infrastructure (transportation, water systems) besides electricity, reap huge rural electrification stimulating effect than those without aforementioned infrastructures. Barnes (1988) model also affirms that rural electrification meaningfully contributes to social and economic development in the rural areas but this also depends on the corresponding programmes and or conditions. In the same line, Vogel (1993) contends that rural electrification is an instrument to diversify the economy hence, improving living standards of the rural poor and creating employment for the same people by increasing and diversifying their income activities, this reduces rural-urban disparities.

## **2.3 Review of Empirical Literature**

### **2.3.1 Rural Electrification and Access to Electricity**

Rural electrification is basically defined as the endowment of electricity energy to rural expanses with diminutive demand and which are sporadically occupied, it is the process of generating and distributing electrical energy to countryside expanses (Bhattacharyya, 2005). In any country, socio-economic development is supported by electricity as it is attendant with the provision of copious services which directly and indirectly enhance their livelihood and improve the quality of their life. There is no doubt that electricity is a benefit

to the rural households since majority of the micro-enterprises requiring clean power to run will be better off connected to electricity grid. Productive uses of electricity should not be limited to income generation alone, rather it should be used to support other social amenities as well such as; education, health, communication and women empowerment. Cabraal *et al.*, (2006) for instance, cite empirical evidence from rural Peru and rural India which indicated that provision and access to electricity and education yield better and higher income within households than provision of electricity alone to these households. The study by World Bank in the Philippines concluded that availability and access to electricity correlated with commendable educational accomplishment (ESMAP, 2003).

Universally, it is acknowledged that electricity is important in enhancing the quality of life at household level, moreover, electricity also stimulates economy of a country at a broader level. Immediate benefit in education is through extended study due to better lighting as a result of electricity, improved lighting also enhances domestic chores especially by women in cottage industries such as weaving and sewing. Non-farm rural households economic activities progresses as a result of use of electricity, for instance, adoption and use of electric irrigation pumps can increase crop productivity, and at the industrial level, electric tools and machinery can impart efficiency and increase productivity (Khandker *et al.*, 2009).

Kanagawa (2008) advanced an energy economic model in rural India. The study assessed the relationship between households' access to rural electrification and the socio-economic developments in the rural areas with a particular emphasis on poverty reduction. The study by Kanagawa (2008) concluded that the enhanced literacy rate above six years could be elucidated on rural households access to rural electricity, and emphasising how educational attainment can be attributed to access to electricity. Far-reaching agreement similarly has it that for global poverty to be addressed, the underprivileged must have access to modern energy services such as electricity services. A number of scholars assert that for modern energy to make a transformation on poverty, it must necessarily contribute to productive use that generate income and create jobs. IDS (2001) avows that the spiteful cycle of poverty will only be eliminated by linking advanced energy services with end-uses that

generate cash income as well as offering alternative income generation avenues. Rural electrification programmes which are soundly planned, targeting the right regions, zones and areas, and which are as well implemented effectually have the prospective of opening up development prospects in businesses for minimal income rural area inhabitants to increase their daily and periodic incomes and thus hastening rural growth and development (World Bank, 2008).

Enterprises growth and facilitation in rural areas make up a package of livelihood diversification that is closely linked to access to rural electrification. At the community level, rural electrification can also influence livelihood diversification through establishment of electricity supported enterprises and other income generating activities such as local machinery repair and manufacturing, food processing and conservation of agricultural products such as meat, milk and crop products both for commercial and domestic consumption. Due to electricity in the rural areas, it is also noted that, some policies will also encourage some manufacturing and processing industries to move to the rural areas closer enough to the raw materials, hence promoting job creations to the local population and increase income to industrial investors (UNDP, 2007; Fluitman, 1983).

Institutional structures such as REA in Kenya are vital in enhancing the success of rural electrification programmes in the developing world. The core mandate of REA is to supply and distribute electricity in the rural areas (Barnes *et al.*, 2004). Most rural households in Kenya rely on traditional energy sources such as biomass in form of wood, cow dung, charcoal, and crop residues. In fact, the most used non-electrified energy source in rural households is charcoal and wood fuel. As highlighted statistically, 70% of energy supply in all sectors are provided by wood fuel, with the exception of the transport sector. Wood fuel is also commonly used in rural households because of its relatively cheaper cost and it is extensively available, 80% of these rural households consume wood fuel (Kammen and Kirubi, 2008). It is also noted by Kammen and Kirubi (2008) that wood fuel has adverse negative impacts ranging from indoor pollution, poor lighting as well as a deterioration of the environment due to carbon emission and a moribund economic well-being.

Demand in rural households lighting and to link micro-enterprises to rural electrification grids is an essential aspect in rural electrification services (Barnes *et al.*, 2004). In contrast, Adkins *et al.*, (2010) looked at the connection between electric lighting and income generation in Malawi. Their main study was about innovations in lanterns that use light emitting diodes powered by batteries and charged by electricity or smaller solar panels. This innovation in Light Emitting Diodes (LED) lanterns have emerged as an alternative to kerosene lamps and other fuel powered lighting technologies. Agoramoorthy and Hsu (2009) who were carrying out a related study in India came to the similar conclusions.

In the rural regions of the developing world, evidence shows that access to rural electrification is important in opening technological changes in micro small enterprises in existence. For instance, in Indonesia some shoe workshops in the rural areas changed their operation and production processes. Some who used manually operated machines and equipment shifted to electrically operated machines and equipment associated with product innovation and enhanced productivity hence largely changing the conventional way of earning a livelihood. In addition, some local enterprises in Indonesia came into existence after the introduction of rural electrification programmes and grid connections by different households, these include and not limited to; beauty parlours, battery charging services as well as ice-cream making (Smith, *et al.*, 1994). In the Philippines, many micro-enterprises activities, for instance the technical and economic sector efficiency transformed by adopting modern technology powered by electricity. Similarly, in Peru the growth of new micro-enterprises was observed as a result of the introduction of rural electrification programmes and the subsequent electricity grid connections (Rogerson, 1997).

### **2.3.2 Livelihood Diversification Activities**

Livelihood is the linkage between assets and the choices people have in practice to pursue alternative activities that can generate the income level essential for survival (Ellis, 2002). Livelihood diversification involves the ingenious ways of securing the necessities of life, for instance enlargement of new ways or set of activities that rural households undertake in sustaining livelihood. As acknowledged by the United Nations Development

Programmes (2006), provision of rural electricity is a means of “development first” especially for the developing countries to improve the social and economic status of those living in rural areas. Provision of electricity in the rural areas enhances and promotes human welfare especially by providing a better environment having the replica comfort and convenience experienced by people in the urban areas (UNDP, 2006). Nonetheless, the major view is that economic usage of electricity in rural households and at the industrial level is still very minimal in the rural areas of developing countries (Foley, 1992). Hence there is a need to understand how the use of rural electricity at household and industrial level in the rural areas helps in the diversification of rural incomes.

The livelihood “concept” arose in the 1970s after the global crisis and multiple development failures. Livelihood diversification is also defined as the process through which households create new and sundry assortment of activities and capabilities in social support programmes directed towards survival and improving their living standards (Ellis, 1998). The definition of livelihood diversification denotes the attempt by individual members and households to identify new ways of getting income and cushion themselves against diverse livelihood shocks.

Livelihood diversification entails activities undertaken by individuals in rural areas using their capabilities and available opportunities to derive material/financial reward and improve living standards (Hussein and Nelson, 1998; Scoones, 1999; Assan, 2008). These livelihood diversification activities have become pertinent in the lives of individuals as an important survival strategy. The study by Scoones (1999) and Assan (2008) addresses the following livelihood diversification activities; telecentres (internet cafés), food processing micro-enterprises, metal fabricating Micro Small Enterprises, hair salons, barber shops, *posho* mills/grain milling, tailoring etc. Livelihood diversification is assumed by rural households in an effort to generate livelihood and start enterprises that are anticipated to protect them from the stress and shocks of life hence are able to maintain their present and future assets and capabilities (Escobal, 2001; Barrett *et al.*, 2001; Ellis *et al.*, 2003).



In the rural areas, scarcity of diverse income generating activities and lack of access to information, power, voice and social networks are some of the sources of poverty (UNDP, 2010). Poverty especially in rural areas is related to the traditional use of unprocessed biomass for basic uses such as cooking, heating and also lack of access to electric power services use in income generating activities. Often termed as the “energy-poverty nexus” is a two-way off-the-cuff relationship between lack of adequate and dependable electrification programmes and poverty (UNDP, 2006; Masud *et al.*, 2007). Dependence on biofuels in the rural households as a result of lack of affordable renewable energies results in energy poverty and low productivity among rural households (WHO, 2006). Lack of access to electricity affects income generating activities hence minimising an individual’s livelihood diversification. The low opportunities and livelihood diversification opportunities in turn affect an individual’s ability to improve living conditions.

Maleko (2005) developed an economic model in which an in-depth analysis of the impact of electrification on microenterprises operations which influenced livelihood diversification in rural Tanzania. To measure changes in livelihood characteristics, he analysed metal fabricating microenterprises in which the author found out that most of the entrepreneurs established metal fabricating and welding shops in rural areas because there was free working space, rural electricity connections and also cheaper spaces compared to urban areas. The model also analysed other micro-enterprises including; hair salons, tailoring shops and *posho* mills/grain milling. These aforementioned micro-enterprises were found to increase in areas with rural electrification, in turn it also led to increased monthly turnovers.

### **2.3.3 Distribution of Rural Electricity**

Access to rural electrification and other forms of modern energy has been given significant consideration in many developing countries. In order to uplift the living standards of most of the poor people and other disadvantaged people in the rural areas, rural electrification has over time been recognised as one of the pre-requisite for development, with an exceptional attention to the geographically as well as economically disadvantaged people mostly in the rural areas. Since 1970’s more engrossed research have begun and are still

ongoing, though there has been limited effort in tracking electrification of the poor in the rural areas (Karekezi *et al.*, 2011).

Electricity is an ingredient for society's economic development as well as industrial progress. It powers economic activities and it is also a vehicle through which rural society's poverty can be alleviated, though access to it and consumption is very unequal (Alazraque-Cherni, 2008). Anderson (2000) articulately states that, increase and access to electricity is a co-requisite and this helps improve the living standards of the people especially the rural poor in developing countries. The poor in the rural areas of developing world have lower consumption level as compared to their counterparts in the cities as well as in industrialised countries and they also typically lack access to these electricity services. In most developing countries, sustainable development and progress faces major impediment of lack of reliable modern clean energy such as electricity especially in the rural areas. Human progress in the developing world can be supported by availability and access to electricity especially addressing rural electricity supply in the rural areas (Khatib, 2006).

Rural electrification has been acknowledged as one of the major necessities in elevating the standards of living of the rural poor in developing countries around the world. Rural electrification services benefits the household and the larger community socially and economically through a varied of ways. For instance in an economic standpoint, households get an additional income due to diversified income generating activities (Barnes, 2007; Fluitman, 1983; Niez, 2010). Rural electrification programmes are essential as they are also envisioned and justified in upholding household welfare by augmenting better quality of life and increased productivity (United *et al.*, 2005). The World Bank Independent Evaluation Group (IEG) (2008), indicated that using electricity was better and cheaper, hence, rural households saved on money and eventually the money saved can be seen as an additional income for the household. In businesses, electricity for lighting plays a role in increasing income since the working hours are increased, therefore increasing income for the business owners.

The literature about rural electrification in sub-Saharan Africa focusses on field trials or existing Rural Electrification policies. Gaunt (2005) studied the evolvement of rural electrification in South Africa drawing a closer attention on social objective of poverty alleviation and how these decisions affected the process of rural electrification with technology, ethical aspects, financial and institutional aspects as well as lessons learned by other developing countries from the experience of South African. Though rural electrification in South Africa is planned and evaluated on a socio-economic basis, in the study, Gaunt discovered that apart from socio-economic reasons, electricity is also carried out and evaluated as a mechanism of awarding political leverage to some politicians. Study by FAO (2001) on systems of farming and poverty suggested that investments and encouraging livelihood diversification is the most significant foundation of poverty alleviation. One aspect to a successful rural livelihoods diversification processes is connectivity to rural electrification services, since with deprived access and connection to it, limits the chances to access tele-information which may pave the way for livelihoods diversification in rural areas (Abdullah and Markandya, 2012).

Rural electrification supports rural microenterprises which are at the centre of livelihood diversification processes in these rural areas. The possibility for new profit potential is through the founding and formation of new enterprises, and or through the significant improvement of existing enterprises, thus the desire of employment through development of these microenterprises (Awosika, 1997; Schmitz, 1995). Investment in microenterprises engineers the process of livelihood diversification in rural areas by acting as a shift from total reliance on resource-based and agrarian activities.

Only 10 percent to 50 percent of the fiscal costs of Rural Electrification Programmes is recovered from the rural electricity consumers, consequently making these programmes vastly subsidised by the government and or by the urban industrial consumers (Aligula *et al.*, 2006). Moreover, rural electrification programmes in Kenya are also crippled by financial burdens (KIHBS, 2007). The energy market in Kenya faces the greatest challenge in form of viable balance between investment and supply. Investment through greater involvement of new electricity providers together comprising the private sector is a

demanding task, and the case of Kenya also highlights the embryonic nature of electricity privatisation, more needs to be addressed in order to mend the reform efforts (Eberhard and Gratwick, 2005).

Rural electrification programmes are also coupled with a number of challenges and these ranges from political interference, difficulty in acquiring wayleaves where some local farmers denies to allocate a wayleave for rural electricity power lines (Anderson, 2000). Ilskog and Kjellstrom (2008) conducted a study in seven rural areas of Eastern and Southern Africa to assess the contribution of rural electricity by the private and non-governmental organisation as compared to those offered by government utilities in regard to engineering the process of sustainable development. The authors concluded that rural electrification utilities provided by the government performed better from a social/ethical outlook however the private sector and non-governmental organisations managed client relationships much better than the government utilities.

It is approximated that 1% of the rural population have access to rural electrification, this is an indication that very few rural households have access to electricity. This statistics indicates serious shortfalls in the provision of rural electricity to the rural people. Besides this, the amended Energy Act of Kenya 2015 does not adequately address electrification of the poor people in rural areas, it highlights largely about the intended mainstream proficient power supply to the whole country. In addition, reports from the Ministry of Energy, utilities and the Kenyan energy regulatory agencies does not attempt to make any trajectory about electrification of the poor (Kenya Gazette Supplement, National Assembly Bills, 2015; Karekezi *et al.*, 2011). Initial connection fee to the electricity grid coupled with low consumption rates for low-income households is the major obstacle for reducing the costs for both grid and off-grid rural electricity services (Townsend, 2000). Household income ought to be compared to connection cost in order to assess affordability of households to connect to rural electricity services (Estache *et al.*, 2002).

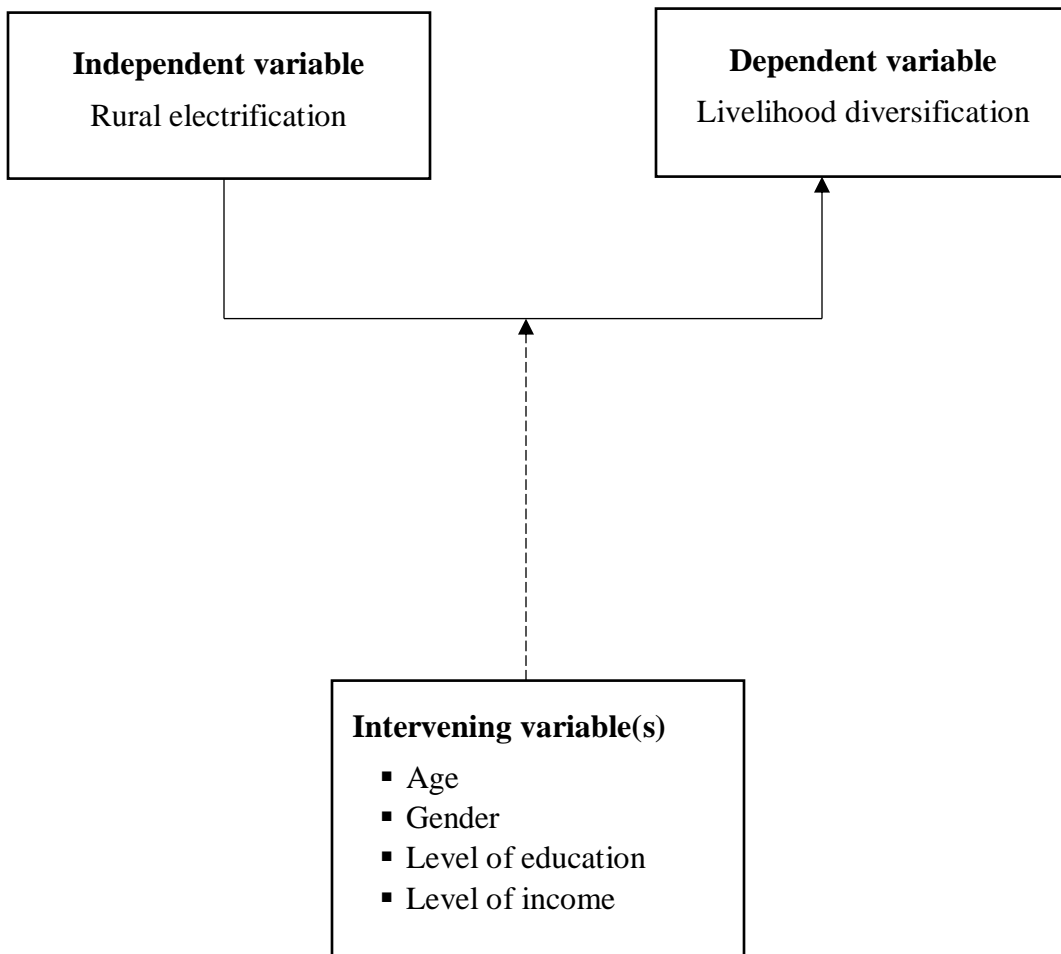
## **2.4 Conceptual Framework**

The study conceptualised that the introduction of rural electrification programmes in the rural areas may support rural households to establish micro-enterprises to aid them in livelihood diversification. The relationships among the independent, dependent and intervening variables in the study were indicated in the conceptual framework. The independent variable was rural electrification, the dependent variable being livelihood diversification and the intervening variables included; age, gender, level of education and levels of income. The main purpose for the relationship between rural electrification and livelihood diversification was electricity power to support the operations of micro-enterprises in rural areas. Age of the respondents may also contribute in the types of micro-enterprise one establishes for instance, barber shop micro-enterprises were likely to be established by younger people of below the age of 35 years.

Another intervening variable was gender which could also contribute to the kind of micro-enterprise an individual established. Micro-enterprises in salons and juice retailing were likely to be established by women while battery charging services, barber shops, welding, phone repairs etc. were most likely started and operated by men. This explains the processes and effects of gender roles and socialisation of people in the African societies where different activities are expected to be done by people of particular genders. Level of education as a variable was a likely contributor in the type of micro-enterprise respondents were capable of establishing. Micro-enterprises like bakery activities and chicken hatchery services were most likely to be established by professionals in respective fields. Moreover, level of income could influence the type of micro-enterprises an individual establishes, for instance capital intensive enterprises in grain milling and fuel pump micro-enterprises required could only be established by individuals who have adequate capital. See figure 1 for graphical representation of the conceptual framework.

**Figure 1: Conceptual Framework**

The conceptual framework used in this study is shown below:



*(Source: Author's conceptualisation, 2017)*

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter presents the research methodology that was used to carry out the study. The chapter consists of the following sub-chapters and sections; study/research design, study site, unit of analysis, population of the study, sampling procedure, research instruments, data needs table and criteria used for data analysis and presentation.

#### **3.2 Research Design**

According to Bryman (2012), a research design provides a framework for data collection and analysis, therefore Bryman (2012) further states that a choice of research design reflects decisions about the priority being given to an array of dimensions of the research process. These include the significance attached to expressing causal relationship between study variables, generalising the research findings to larger population, understanding behaviour and their meaning in specific social context. The research design that was used in this study is case study design. Bryman (2012), argues that the basic case study research design entails thorough and rigorous analysis of a single case. Bryman's argument is seconded by Yin (2009) who acknowledges that a case study research is an empirical enquiry that allows the researcher to investigate a contemporary phenomenon in depth and within its factual context. This is relevant to the study as the focus is on the influence of rural electrification which is a contemporary phenomenon, on livelihoods diversification among rural households of Bumula Sub-County in Bungoma County, Kenya.

The study was done in Bumula Sub-County in Bungoma County, Kenya. Rural households (unit of analysis) were sampled using micro-enterprises as an entry point. The researcher did a reconnaissance study in which he created a sampling frame of 360 micro-enterprises. The study respondents were selected centring on the kind of activities they engage in for instance, only those people who had established micro-enterprises as an additional income generating activities were selected for the interviews. The researcher asked the proprietors

whether or not they had another income generating activity, and those who reported having other income generating activities were selected to be respondents.

A key informant guide was used to interview the two key informants from REA West Kenya offices in Eldoret in order to prompt rich qualitative data. The data collected from the key informants helped in giving interpretations and meanings to some quantitative data collected from the field. More quantitative data was also captured from the researcher's observations and respondents' elaborations during interviews. The sample design of the study was based on a purposive sample design. This ensured that only households with the desired characteristics were chosen for the study. The target households were those that had established micro enterprises besides their primary income generating activities.

### **3.3 Study Site**

#### **Bumula sub-County in Bungoma County, Kenya**

The study was conducted in Bumula Sub-County which covers an area of 347.8 km<sup>2</sup> and by the year 2013, it had a total population of 202,133 people (Males 97428 and Females 104,705) hence a density of 581 people/km<sup>2</sup>. By the year 2017 as per the 2009 population census, the population of Bumula Sub-County was projected to stand at 228,387 people (Males 110,082 and Females 118,305) with a population density of 657 people/km<sup>2</sup> (KNBS, 2009). Bumula sub-County with its geographical map indicated on appendix III has seven administrative wards including; Bumula, Siboti, Khasoko, South Bukusu, West Bukusu, Kabula and Kimaeti. The major economic activity is subsistence agriculture with maize, sugarcane, tobacco, beans, potatoes, sunflower, coffee and cassavas being the main crops. Due to the burgeoning population, agrarian activities were becoming unsustainable (KNBS, 2010). Bumula sub-County was purposively selected primarily because of the rural electrification programmes and its largely rural areas with no major town.

### **3.4 Unit of Analysis**

The unit of analysis in this study was the household whereby purposive sampling method was employed, targeting micro-enterprises as an entry points to arrive at the unit of analysis being the specific households owning these micro-enterprises. Sampling was done with reference to the goals of research in that the units of analysis were sampled in terms of



criteria that allowed the research questions to be addressed. Sample cases/participants were identified and sampled in a strategic manner so that they were relevant to posed research questions and objectives. After finding these enterprises, the researcher proceeded to find out the particular households that have established them. An interview was conducted to these specific owners of the enterprises within the households.

### **3.5 Population of the Study**

The researcher did a reconnaissance visit to the field before the actual data collection process, in the reconnaissance visit, the researcher enumerated a number of micro-enterprises in the study area found 360 micro-enterprises operating in the selected study area. From the 360 micro-enterprises, the researcher narrowed down to a manageable size and purposively sampled by calculating a third of the population which led to a representative sample of 120 micro-enterprises. Each of the seven administrative wards in Bumula sub-County, had micro-enterprises connected to the rural electrification grid, and the average of 17 micro-enterprises per administrative ward was recorded.

The administrative ward with the highest number of micro-enterprises was Kabula ward with 28 micro-enterprises, followed by Bumula ward with 22 micro-enterprises, Siboti ward had 18 micro-enterprises, West Bukusu ward had 15 micro-enterprises, Khasoko ward had 11 micro-enterprises, while South Bukusu and Kimaeti wards had 13 micro-enterprises each which altogether makes a total of 120 micro-enterprises. Due to logistical and financial constraints, the researcher managed to interview 100 micro-enterprises owners from these administrative wards. In addition, two key informant interviews conducted at the REA West Kenya offices in Eldoret.

### **3.6 Sampling Procedure**

The sampling technique used in this study was purposive sampling. Purposive sampling also known as subjective/judgement/selective sampling technique is a non-probability sampling method in which the researcher chooses the samples centring on his or her own

judgement to obtain a representative sample. These qualities makes purposive sampling technique the most cost-effective and also saves on time during the research process (Thornhill, 2012). Purposive sampling is a non-probability sampling technique in which the researcher sample cases in a strategic way to find samples that are relevant to research questions asked (Bryman, 2012). Berg (2009) also contends that purposive sampling is a non-probability sampling technique. It lets the researcher to use their knowledge and expertise, about some select cases during the research process that represent the target population. Purposive sampling technique best suited the study since the researcher was able to single out those enterprises linked to rural electrification. These enterprises were also supposed to serve as an extra/addition income contributor to the proprietor. These aforementioned qualities thus enabled the researcher to choose relevant enterprises that suited the study.

With a population of 360 micro-enterprises, the researcher calculated a third of it to get a representative sample of 120 micro-enterprises. The researcher sampled the micro enterprises within different administrative ward in Bumula sub-County basing on the total number each had. The administrative wards with large number of micro-enterprises provided more sampled enterprises as compared to those with few enterprises. The researcher walked around the shopping centres to identify the ideal micro-enterprises to interview and collect data from, to attain that the researcher picked different types of micro-enterprises from different areas, this ensured that each administrative ward contributed a number of respondents.

The discussions held by enterprises proprietors during a reconnaissance visit enabled the researcher to get much needed referrals about enterprises of similar nature in other administrative wards within the sub-county. Specifically, the proprietors were asked whether their micro-enterprises were serving as avenues of generating additional incomes besides their major income generating activities more so in farming and salaried employments. Majority of the micro-enterprises were visible right from afar thus, the researcher was able to locate them at a glance.

### **3.7 Research Instruments**

The basic research instrument that was used in this study was the questionnaire with a target of 120 respondents (micro-enterprises owners). The researcher also observed and noted the key points from the relationships between rural electrification services and livelihood diversification processes. Observations by the researcher were made in particular services such as welding, barbering services, salons and battery charging services. These micro-enterprises used electric tools which enabled the researcher to take notes about their efficiency and workability in support of business operations.

The questionnaires were administered to sampled households that had diversified their incomes through micro-enterprises connected to rural electricity. The items in the questionnaire were both structured and unstructured. Structured items were closed ended questions while unstructured items were open ended questions. The structured items in the questionnaire were used to measure the subjective responses given by the respondents and clarify the objective responses given by the respondents, which helped in the formulation of recommendations of the study. A key informant guide was employed to collect data from the key informants from REA West Kenya offices in Eldoret, the key informants.

### **3.8 Data Collection Methods**

During data collection, both primary and secondary data were collected. Primary data entailed the information collected from the field by administering questionnaires and using key informant guides. Secondary data was collected from the Rural Electrification Authority offices for West Kenya region at Kiptagich House in Eldoret. Together with the key informant guide and the questionnaire, the researcher also employed direct observation during data collection in this study, whereby he noted down the observations made and corroborated them in the analysis section of the study. This study intended to find out the influence of rural electrification on livelihood diversification in rural areas of Bumula sub-county in Bungoma County, Kenya.

Interviews were conducted in the seven administrative wards of Bumula sub-County within a period of 17<sup>th</sup> July 2017 to 29<sup>th</sup> July 2017 where the study targeted 120 respondents of which 100 respondents were interviewed. Gathering of primary data progressed as follows; prior to data collection, the researcher made a reconnaissance visit to the field where he identified two key informants at REA West Kenya offices and later proceeded to the study area where an approximate total of 360 micro-enterprises were enumerated. Due to logistical and time constraint, the researcher managed to interview 100 respondents.

Respondents were micro-enterprises owners from several shopping centres within the seven wards, and to reach a target of 120 respondents. The researcher purposively sampled an average of sixteen micro-enterprises from each administrative ward. A household questionnaire administered by the researcher gathered both qualitative and quantitative data on the basis of the research questions formulated and each interview lasted between ten to fifteen minutes. The instruments comprised both open-ended and closed-ended questions, the open-ended questions enabled the respondents to freely give as much information as possible without any constraint. Thus, the researcher asked respondents to make more explanations that prompted and enriched qualitative data.

Supplementary data were collected through observations of the operations of various micro-enterprises for instance artisanal work in welding services, service provisions in refrigeration, salons, barbering and battery charging services and processing of biscuits and breads in a single bakery identified at Kimwanga shopping centre. During the reconnaissance visit, micro-enterprise owners acted as guides to the next similar and varied enterprises connected to the grid.

Literature search process involved both primary and secondary literature, the process for searching secondary literature was mainly from online and library hard copy materials sources in form of text books, journals, project papers and theses. University of Nairobi library repository accessed mainly at the IDS library enabled the researcher to access online literature in JSTOR. Several other online literature offered best results in accumulating relevant literature through engaging in google scholar and electronic journals. The

researcher started by conducting a search in JSTOR to obtain relevant electronic articles in areas of rural electrification programmes rural electrification distributions. This was closely followed by an online JSTOR search for articles addressing rural electrification and livelihood diversification as well as the linkage between electricity and diversification.

In addition, the researcher collected journals from REA West Kenya offices at Kiptagich House in Eldoret that offered great insights in rural electrification programmes west Kenya region, in which lies the study area. In particular, the officers from REA West Kenya offices in Eldoret provided information that helped the researcher to explain on the aims and objectives of rural electrification programmes, challenges faced by rural electrification programmes and the extend of these programmes. The key informant guide focused on the aims and objectives of rural electrification programmes, distribution and challenges facing rural electrification programmes.

### **3.9 Data Needs Table**

Prior to data collection process, the researcher formulated a data needs table indicating the three specific research questions, data needs, types of data, sources of data and the instruments used in data collection. The first research question assessed the distribution of rural electrification and access of rural households to the electricity grid. In the first step the researcher was guided by the public utilities i.e. Water boreholes, health centres and schools within Bumula sub-County. The researcher used a key informant guide to interview the key informants from REA West Kenya offices, where it was established that the aim of rural electrification is to connect the power grid to public utilities, and thereafter local residents were able to apply and get their households connected to the power grid. In the second step, the researcher qualitative and quantitative data through questionnaires where it was found that economic capabilities among the rural residents such as sufficient capital contributed to the households access to the electricity grid.

The second research question asked for the identification of livelihood diversification activities in the rural areas of Bumula sub-County. The researcher started by making an observation to identify the types of micro-enterprises connected to the electricity grid.

Questionnaires were then administered to reinforce the observations made the researcher in highlighting types of micro-enterprises. These micro-enterprises were being established as a mechanism of diversifying rural livelihoods. The respondents were asked to identify and make referrals to other micro-enterprises connected to electricity grid, this enabled the researcher to access these micro-enterprises without taking much time.

The third research question required respondents to indicate how rural electrification influenced their livelihood diversification. In this question, respondents were asked to establish whether rural electrification services motivated them to start their businesses. Through the questionnaire which had both closed and open ended questions, the respondents indicated how rural electrification was of any importance in supporting them start their enterprises. The respondents were as well asked to show the benefits they have obtained as a result of connecting their micro-enterprises to the rural electricity grid. The researcher observed the activities and operations in these micro-enterprises and noted the important observations which were corroborated with the data collected by the key informant guide and the questionnaire.

**Table 1: Data Needs Table**

<b>Question</b>	<b>Data needs</b>	<b>Types of data</b>	<b>Sources of data</b>	<b>Instrument</b>
How is rural electricity distributed and accessed by rural households of Bumula Sub-County?	Public utilities	Qualitative	Key informants from REA	Key Informant guide
	Social and economic capabilities	Qualitative/quantitative	Respondents	Questionnaire
What types of livelihood activities exist in the	Types of micro-enterprises	Qualitative/quantitative	Respondents	Questionnaire

rural areas of Bumula Sub-County?	Sources of livelihood i.e. welding, barber shops, grain milling etc.	Qualitative	Respondents	Questionnaire Observationnaire
How does rural electrification influence livelihood diversification in Bumula Sub-County?	Income sources i.e. types of income activities	Qualitative/ quantitative	Respondents	Questionnaire
	Establishment of micro-enterprises	Quantitative /qualitative	Respondents	Questionnaire Observationnaire

*Source: Field data, 2017*

### **3.10 Data Analysis and Presentation**

Data analysis involves data cleaning, reduction, display and drawing of conclusions from patterns of association in data, it is an iterative process (Miles and Huberman, 1994). Data reduction process involves; data selection, simplification and transformation in qualitative data. According to Miles and Huberman (1994), data analysis involves data organisation in the study to draw final conclusions. According to Mugenda and Mugenda (2003) data analysis involves the arrangements the researcher engages to clean, organise, describe basic features of the study and draw inferential conclusions. Data analysis can also be seen as the categorisation, accretion/assembling and manipulation of data to attain answers to the formulated research questions in a study (Grover and Vriens, 2006).

This study used both qualitative and quantitative data analysis methods. Quantitative approach was mainly descriptive, taking into account the frequencies and percentages in data presentation. The collected data through completed questionnaires and key informant guide notes were cleaned to ensure accuracy and completeness. Sorting and coding was done on open-ended questions, responses listed into various thematic areas of the study

and emerging themes identified, this helped support aspects of quantitative nature in the study.

Upon completion of data coding, the collected data was processed using two main data processing applications. The quantitative data was entered into the IBM Statistical Package for the Social Sciences 24 (IBM SPSS 24), IBM SPSS Statistics 24 software was very useful in descriptive analysis (giving simple frequencies and percentages). The frequencies and percentages generated by IBM SPSS Statistics 24 were on variables such as respondents' age, gender, type of micro-enterprises established, year of micro-enterprises establishment, nature of micro-enterprises and type of alternative energy technologies adopted. Open-ended questions carrying much of qualitative data were thematically analysed and the results presented as per the research objectives in identified themes. In addition, qualitative approach on the other hand was used to present qualitative data obtained using a key informant guide.

Further to this, the Likert type questions were analysed using mean scores and standard deviations. The analysis indicated the mean scores as the statements that the respondents agreed with Tables and graphs were used to summarise the data. Equally, measures of central tendency including the mean, mode and median were calculated and assigned to some quantitative variables that required this kind of analysis. Tables, figures and graphs were also used to indicate distinct frequencies of various factors in the study and the data presented in a narrative form and was very vital in complementing the quantitative data.



## CHAPTER FOUR

### DATA ANALYSIS, PRESENTATION AND DISCUSSION

#### 4.1 Introduction

This chapter analyses, interprets, discusses and reports data thematically according to the three objectives of the study outlined in section 1.4 of chapter one. The first section details the basic characteristics of the respondent followed by the general information about the enterprise. The third section focusses on the distribution and access of households to rural electrification in Bumula sub-County. The fourth section presents the types of livelihood diversification activities in Bumula sub-County. The final section presents findings on the influence of rural electrification on livelihood diversification in Bumula sub-County. The main objective of the study was to examine the influence of rural electrification on livelihood diversification in Bumula sub-County. The study focussed on micro and small enterprises (MSEs) located in Bumula sub-County that are connected and rely on grid-based rural electricity for much of their operations.

#### 4.2 Response Rate

The study targeted 120 micro small enterprises in Bumula sub-County but due to logistical constraints, we were able to interview 100 respondents, these respondents were micro-enterprises proprietors/owners and two key informants from REA West Kenya offices in Eldoret. A response rate of 83 percent was attained with 17 percent not achieved due to logistical and budgetary constraint. Nonetheless, the response rate in this study was somewhat high as Kothari (2004) as well as Nachmias and Nachmias (2006) have commended on a 51 % rate of response in research. The statistically significant response rate for research analysis should be at the least 50 percent (Mugenda & Mugenda 2003). Notable studies concerning rural electrification programmes in different regions were conducted by various scholars and their response rates recorded such as; Kirubi (2006) achieved a response rate of 70 percent, Ali and Singh (2010) attained 63%, Ondari (2010) attained 67% while Sawe (2004) managed to achieve 58% response rate.

### **4.3 Basic Household Characteristics in Bumula sub-County**

The study focussed on the influence of rural electrification on livelihood diversifications in rural areas of Bumula sub-County. As recommended by statistician Kothari (2004), three respondent demographic aspects were enumerated to present a concrete reference to all data and these aspects included age, gender and education levels. These characteristics are essential because of the perceived effect they bear on the choice of micro-enterprises established by different households.

#### **4.3.1 Age and Gender of the Respondents**

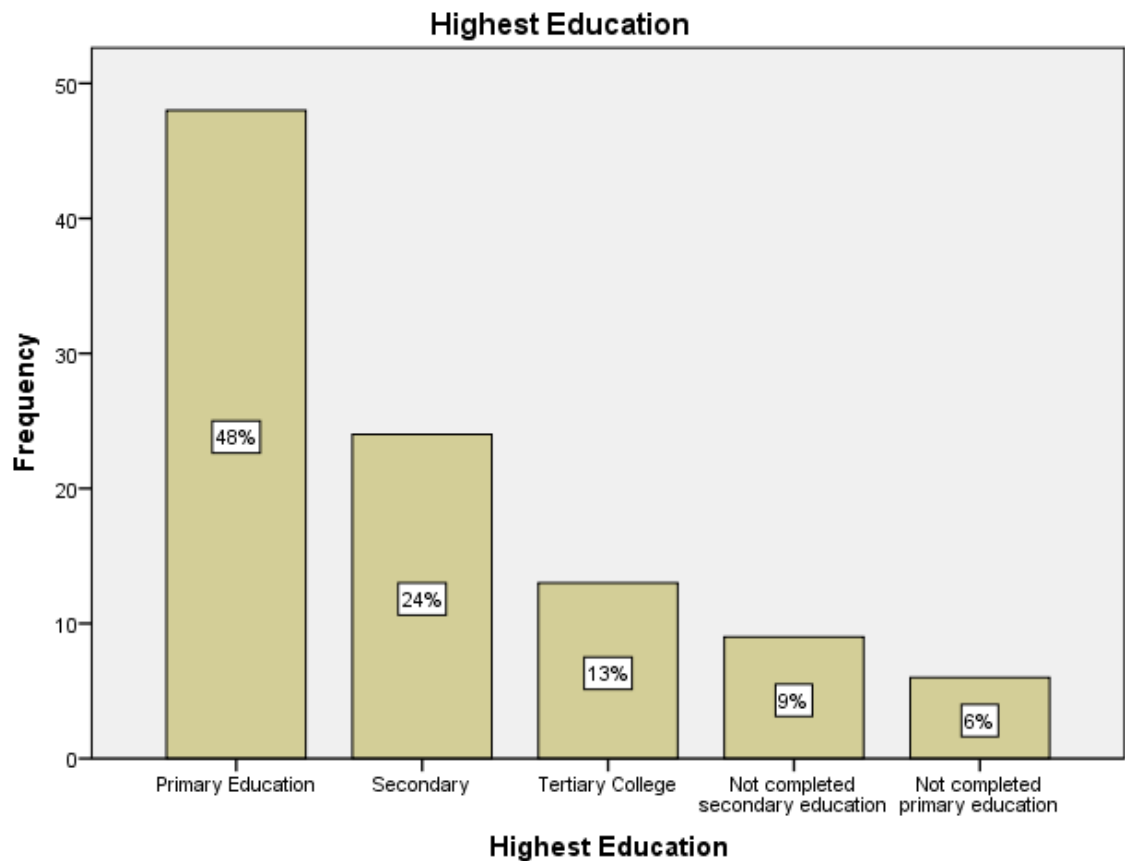
The study revealed a wide gap between the youngest and oldest proprietors. The youngest proprietor was 17 years old while the oldest proprietor was 62 years of age. The mean age of the respondents was 32 years, while the median age of the respondents was 30 years. The mode in the respondents' age was 24 years. This showed that majority of the youths were establishing micro-enterprises. In addition, majority of the micro-enterprises established were welding services, barber shops and salons which were the type of businesses embraced more by the youths. The age of the respondents in the study indicated that the respondents who participated in the study were mature people. In the study, respondents must be described clearly notwithstanding of whether the narrative is of any substantial contribution to the study. In doing so it gives credibility to the data collected as it indicates that the data collected is from sources we can physically relate to and or respondents we can figure out (Nachmias and Nachmias, 2006). For the gender of the respondents, majority of the respondents were males at 79 percent while the female micro-enterprises owners were the minority at 21 percent. The study results about gender in establishment of micro-enterprises highlights the need in gender empowerment to enable women take up businesses activities like their male counterparts.

#### **4.3.2 Level of Education**

The study sought the information about the highest academic attainments of the respondents. The results indicated micro-enterprises owners had a 48% completion of primary school education, this was closely trailed by 24% secondary school education. The tertiary college level was placed at 13%. The study also reveals that 9.0 percent of the

respondents did not complete secondary school education and 6.0 percent of them did not complete primary school education. The level of education influenced the nature and type of enterprises the respondents established. Sophisticated micro-enterprises such as chicks hatchery were established by professionals, moreover a single bakery owner interviewed at Kimwanga market had a diploma in food preparation related course. Most barber shops were established by individuals who dropped out of school at primary level and some at secondary level, which basically influenced them to engage in ventures that require little or no college education.

**Figure 2: Highest Level of Education**



*Source: Field data, 2017*

#### **4.4 Rural Electrification Programmes**

This section presents the findings of the first research objective which sought to explore the distribution and access of households to rural electrification in Bumula sub-County. It also discusses the study findings on the activities and the benefits that micro small enterprises reap from their connection to rural electricity grid. Furthermore, types of alternative energy used by some enterprises especially during electricity shortages or blackouts are also discussed. In addition, the findings here are also corroborated with qualitative data that were obtained from key informant interviews.

##### **4.4.1 Rural Electricity Connections**

The study ascertained rural electrification programmes by delving into coverage and connectivity to the grid. Of the respondents interviewed only 26.0 percent have both their households and enterprises connected to the rural electricity grid, 74.0 percent of the respondents have their enterprises connected to electricity grid but their households were not connected.

To better understand the hindrances in rural electricity grid connections, the question of the challenges facing rural electrification programmes was posed to the key informants. The key informants who provided a summary of the challenges facing rural electrification programmes noted; distance from electricity transformers, acquiring way-leaves, treacherous terrains and political interferences as summarised in the excerpts below:

*“The REA requirements for a household to be connected to the electricity grid for instance distance from the electricity transformer stipulates that one should be within a radius of six hundred (600) metres. This partly explains why most of the micro-enterprises proprietors have their households not connected to the grid.”(KII 1, 17 July, 2017).*

*“Political interference is another hurdle in getting all rural areas electrified, rural electrification programmes are primarily meant to connect to public utilities in the rural areas and thereafter, local residents can have their share of rural electricity grid connections as well. Due to political interference in some instances, politicians*

*influence the electricity to be diverted to some places of their personal interest and frequently use this to gain political leverage.” (KII 1, 17 July, 2017).*

*“The difficulty in acquiring a way-leave and poor terrain to facilitate transportation of electricity equipment hampers the progress of rural electrification programmes. Another major concern noted was financial constraint since REP is majorly funded by the government exchequer.” (KII 2, 19 July, 2017).*

Further to this, the study established that low consumer demands for rural electrification in the context of high connection charges indicated the dilemma the rural inhabitants face in their desire to adopt rural electrification. It was established that bureaucratic systems and a connection fee of fifteen thousand shillings impacted on households’ decision to purchase a connection to the electricity grid. This study supported the study by Leegwater and Shaw (2009) who noted that even though people in rural areas might be in reach of an electricity grid, connection to it was not easy for most of the rural dwellers. Similar study findings were also recorded by Abiego and Okefe (2009) when they noted the struggle of rural inhabitants in connecting their households to rural electrification grid. Other studies also recorded rural electrification in Kenya being insufficiently distributed in the rural areas (Numela, 2010; Nganga and Onyango, 2009). While the condition of rural electricity connection in Bumula sub-County is perhaps not as critical as in other rural areas in Kenya, rural electrification has expanded from 30 percent to 55 percent within a period of 2007 to 2013. Still it does appear that households and enterprises access and connection to rural electrification grid is far from perfect.

Regarding electricity bills, a few enterprises especially those in close proximity to the proprietors’ households shared electricity bills. Most respondents reported that they operated their enterprises far off their homes which made it difficult for the enterprises and households to share electricity bills, and those that shared electricity bills, proximity to the proprietor’s household and the need to minimise on monthly electricity taxes were the striking reasons. A small minority of the enterprises at 6.0 percent shared electricity bills

with the proprietor's households while 94.0 percent of the enterprises did not share electricity bills.

#### **4.4.2 Benefits of Rural Electrification**

Regarding the perceived benefit of rural electrification in livelihood diversification processes, the study established that every administrative ward within Bumula sub-County had several individual fuel/petrol pumps within designated shopping centres. The respondents (proprietors) reported to benefit from the daily profits, and besides the said profits, fuel pumps significantly addressed the question about safety of the initial road-side fuel vendors, who traded their products dangerously in used soda and water bottles. In the analysis, 4.0 percent of the respondents engaged in fuel businesses whereas the respondents further lauded the efficiency of electricity in operating their businesses. In this changing times or what can be referred to as the evolution of the *boda boda* sector from bicycles to motorcycle *boda bodas*, emergence of these fuel enterprises especially in the region where *boda boda* businesses first started was greatly revered. Majority of the respondents indicated their desires to establish fuel enterprises but the price tag to the fuel pumps inhibited their desires.

Different households benefitted differently from adopting rural electrification in their enterprises, 30 percent of the respondents reported rural electricity usage was cheaper, businesses in barber shops and phone and battery charging services found electricity usage to be cheaper unlike when they relied on car batteries and generators. Furthermore, 19 percent of the respondents acknowledged the flexibility enjoyed by using rural electricity to run their enterprises, again relying on car batteries meant taking them for charging at battery charging points regularly which was indeed cumbersome. 13 percent of the respondents admitted rural electrification having attracted and increased customers to their businesses, while 9.0 percent of them acknowledged profit increase as well as another 9.0 percent who also reported their income to have increased as a result of using rural electricity in their enterprises.

In addition, the study established that 6.0 percent of the enterprises enjoyed better lighting at night hours. Lighting at night enabled some women at Kitabisi ward to engage in mat

weaving and food processing such as maize and beans sorting. The mats woven at night hours were sold and this incomes supplemented their main regular agricultural activities. Furthermore, 4.0 percent of the respondents reported efficiency of equipment using rural electricity. In addition, 3.0 percent of the young respondents reported rural electricity to have aided in job creation through operating particular enterprises such as barber shops and salons. Apprenticeships in salon services and barbering equipped the youths with necessary techniques to start their separate enterprises, thus rural electrification supported rural residents in diversifying their livelihood as well as enabling human asset to be imparted to some residents through apprenticeships. In addition, 1.0 percent of the respondents reported rural electricity to have improved their lifestyles, brought development as well as enabled learning of computers in primary schools at. The said development was partly evidenced by the three enterprises that many households engaged in as a way of diversifying their livelihood i.e. welding enterprises, barber shops and salons that reported a 21 percent, 14 percent and 11 percentage respectively among the respondents.

#### **4.4.3 Adoption of Alternative Energy Technologies**

Turning to alternative energy adoption, some enterprises in this study were found to have been relying on other sources of energy for their operations especially in the event of power shortages and blackouts. The study indicated that 26 percent of the enterprises relied on other forms of energy particularly during blackouts while 74 percent of them did not have an alternative source of energy. The enterprises that did not adopt alternative energy technologies reported losses especially at the periods when the power blackouts occurred. In the discussion, respondents were also asked to mention the type of alternative energy adopted in case of electricity shortage or blackouts.

The study indicated that 14 percent of the respondents used kerosene as an alternative energy source. The most adopted alternative energy was car battery at 41 percent, 5.0 percent of the respondents adopted solar energy while 11 percent used charcoal, and lastly 24 percent of them relied on generator sets as an alternative source of energy. This analysis highlighted some of the weaknesses in rural electrification programmes whereby frequent

electricity shortages and blackouts affected business operations. In the event of adopting an alternative energy technology indicates losses since the entrepreneurs could still pay the monthly electricity charges. Electricity blackouts was more pronounced during rainy seasons and telecentre businesses suffered a lot since it was costly for these businesses to rely on generator power for as fuel is as well a costly commodity.

The findings here supports the literature, Sen (1999) posits that freedom has to be achieved for development to take place, and in this case there is a clear indication that once rural electrification grid connections were introduced in Bumula sub-County, the relentless constraint that people faced of having relying on one source of un-reliable source of energy was being overawed. The study findings supports Sen's theory since freedom in the context of this study means more enterprises development, and the data indicated that respondents have acquired an energy relieve through rural electrification which have enabled them to operate *posho* mills, battery charging services, barber shops, salons, fuel pump enterprises etc. In addition, these respondents have been able to diversify their livelihood through incomes from the aforementioned enterprises.

#### **4.5 Livelihood Diversification Activities**

The second objective of the study identified the types of livelihood diversification activities in Bumula sub-County. In regard to this objective, this section sought information on the characteristics of the employees and of the micro small enterprises, the attributes considered included the types of activities, that is the micro small enterprises that helps in the process of livelihood diversification by using rural electrification services, the nature of the enterprises, types of enterprise ownership, year of establishment and number of employees.

In ascertaining whether rural electrification was associated with the establishment and increase of micro small enterprises in Bumula sub-County, the study sought to establish the number and types of MSEs that had emerged after the rural electrification programme was initiated in the rural areas of Bumula sub-County. The study ascertained that the rise



of most of the micro small enterprises in Bumula sub-county was as a result of rural electricity grid power connection and not by mere chance.

#### **4.5.1 Processes and Types of Livelihood Diversification Activities**

The study sought to understand the different types of micro-enterprises engaged in with a connection to rural electrification grid. The study revealed that some MSEs were involved in more than one activity, and in such cases the respondents were asked to state only the activity that is more essential to them. The most prevalent MSEs were barber shops in which 21 percent of the micro-enterprises were established, welding services took 14% of the share. Salon micro-enterprises took 11% while petrol/fuel pump/station MSEs were at 8.0 percent.

Some of the respondents engaging in welding services reported rural electrification services to have contributed in much successes in their lives, some were able to buy motorcycles and employ young men to do *boda boda* businesses for them. It was thus evident in such cases to link rural electrification in the emergence of micro-enterprises, job creation and thus, diversifying not only the livelihood of the respondents but stretching to other community members as well. Barber shops businesses aided some respondents to purchase agricultural inputs such as fertiliser, seeds, insecticides and pay for farm labour. This practice supported the entrepreneurs to find sufficient time to run their businesses, some respondents reported their new ventures being a real booster in acquiring household equipment and other assets, paying school fees and buying food.

It was apparent that other noted enterprises included grain milling/*posho* mill at 7.0 percent, while 6.0 percent of the MSEs involved in cyber café services. Grain milling micro-enterprises elicited interesting observations whereby besides a fee charged for grain milling, the proprietors gained more from selling ground waste flour locally known as '*unga ya chini*' and floor left-over maize to poultry, ducks and pig farmers. This observation was indeed interesting since such proprietors were able to increasingly diversify their livelihood with minimal struggles. MSEs engaging in phone/battery charging, video show shop/movie shop and workshops individually took 4.0 percent, while

those involved in general shops and clothe making/tailoring took 3.0 percent each. In addition, 2.0 percent of the MSEs engaged in electronic repair, borehole (water supply and sale) and butchery activities each. The least practised MSEs at 1.0 percent of the total number of the micro-enterprises included; carpentry work micro-enterprises, milk bar MSEs, juice retail activities, brick making enterprises, fish selling, bakery enterprise and hatchery services.

Rural electrification was a major contributor in the establishment of these micro-enterprises, electricity operated brick making machines reduced on the number of labourers enabling the proprietors to save on money. Most permanent and semi-permanent houses in the study area were made of bricks, thus brick making activities served these entrepreneurs sufficient profit to enable them diversify their livelihoods. Electric brick making machines were efficient, producing adequate bricks to fill the demands, henceforth, investments in micro-enterprises such as brick making, hatchery services, bakeries were to be encouraged to transform and reach an industrial level production for them to serve a larger population and make more income. Incomes from these micro-enterprises were found to be the major contributors in livelihood diversification processes.

The results for the rising of enterprises in this study affirms the findings by REA (2003) and Sawe (2004) who posits the increasing of new enterprises and evolution of existing enterprises in producing new products and services as a result of the introduction of new reliable forms energy in a commercial environment. Nonetheless, the findings indicate that much of the micro-enterprises were established through convenience and probably copying from other enterprises, as less innovation was observed but much of similar enterprises mushroomed altogether.

**Table 2: Micro-Enterprises in Livelihood Diversification Processes**

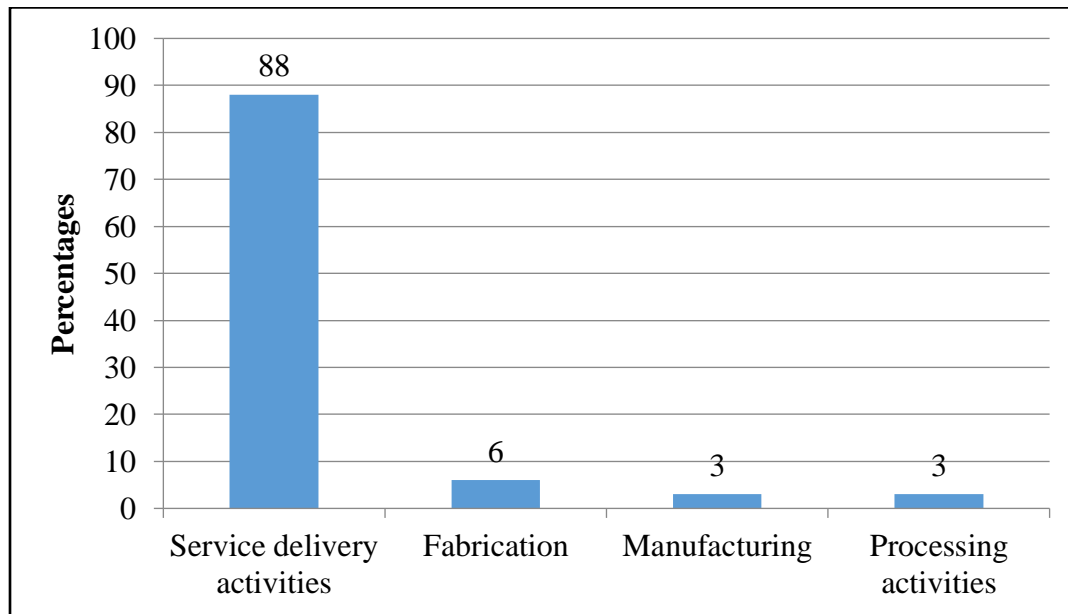
Type of Enterprise	Frequency	Percentage
Barber shop	21	21
Welding	14	14
Salon	11	11
Petrol pump/station	8	8
<i>Posho</i> mill	7	7
Cyber cafe	6	6
Phone/battery charging	4	4
Video show shop/movie shop	4	4
Workshop	4	4
General shop	3	3
Clothe making/ tailoring	3	3
Electronic repairs	3	3
Borehole	2	2
Butchery	3	2
Carpentry	2	2
Milk bar	1	1
Juice retail	2	1
Brick making	1	1
Fish distributor	1	1
Bakery	1	1
Hatchery	1	1
Total	100	100

*Source: Field data, 2017*

#### **4.5.2 Nature of the Enterprises**

This study sought information on the nature of the enterprise and services offered and the result indicated that different nature of micro-enterprises have been established in Bumula sub-County since introduction of rural electrification. The study found that 88 percent of the enterprises engaged in service delivery activities. This is consequently because in the analysis of types of livelihood diversification activities in section 4.4.1, the results are indicative of the thriving service industry in Bumula sub-County and generally in Kenya as a country since majority of the enterprises engaged in service activities. Further to this, 6.0 percent of the enterprise engaged in fabrication activities, manufacturing activities took 3.0 percent and lastly processing enterprises were at 3.0 percent.

**Figure 3: Nature of the Micro-Enterprises**



*Source: Field data, 2017*

#### **4.5.3 Enterprise Ownership**

The study sought information on the ownership type of the micro small enterprises. The analysis indicated the highest number of micro small enterprises being of sole proprietorship at 87 percent while 13 percent of the enterprises were of partnership type. With limited capital and a desire to start up micro-enterprises, majority of the proprietors usually established individual businesses and in most cases the proprietors themselves run their businesses on daily basis. In few occasions the proprietors assigned someone to work for them in the event they were engaged in other income generating activities. Decision making in sole proprietorship was quick since they faced less hurdles and in most cases they did not consult on matters pertaining their businesses. The study established that partnerships in micro-enterprises businesses allowed proprietors to engage in other sole proprietorship, this was evident when the business was overseen by one partner while the other engages in other income generating activities. Thus, partnerships in micro-enterprises enabled wider livelihood diversification by permitting partners time to engage in different income activities at the same period.

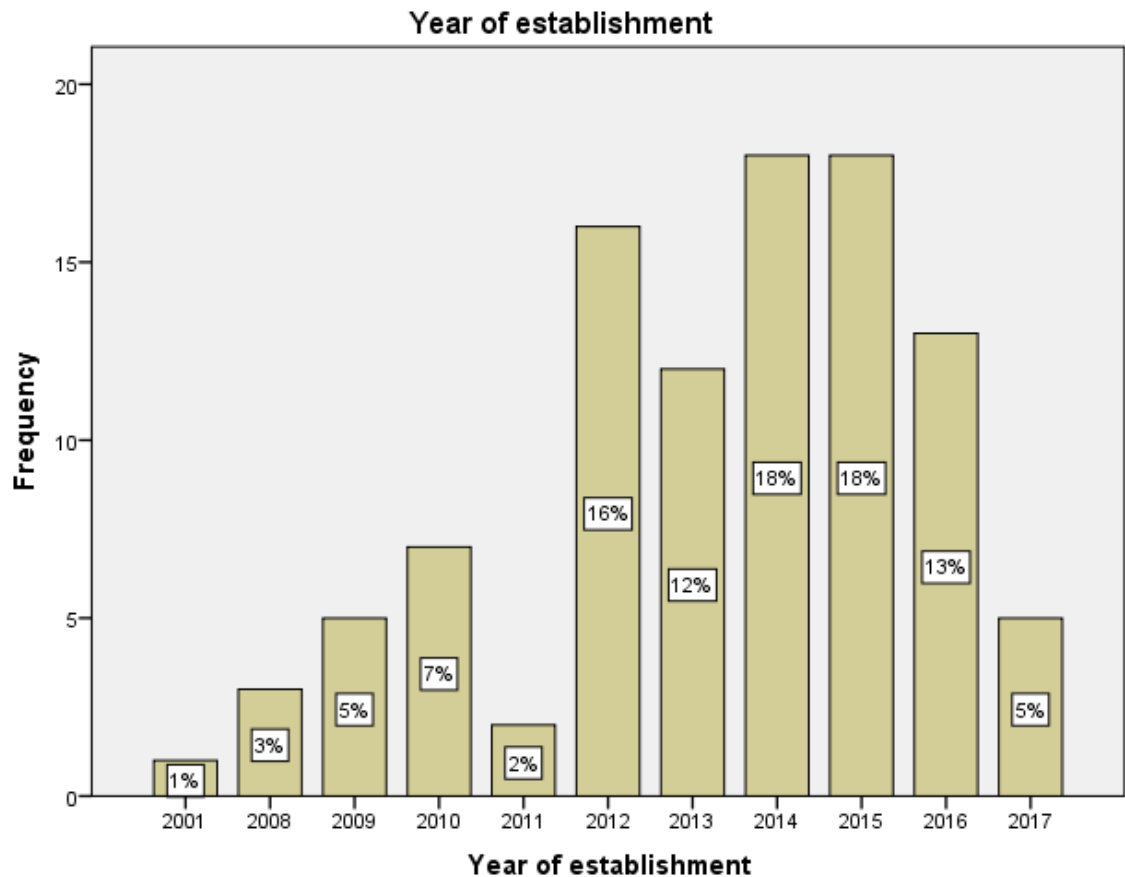
#### **4.5.4 Year of Micro-Enterprises Establishment**

The study probed respondents to indicate the year of their enterprise establishment. All ages were calculated as at July 2017 during which data collection was carried out. Literature indicates that REA a body established by the government to oversee the electrification of rural areas in Kenya was established under section 66 of the Energy Act, 2006 (No 12 of 2006), as a body corporate and became operationalised in July 2007 (REA, 2014). The study established that in spite of this there was no sudden spurt of micro-enterprises establishment on rural electrification in the year 2007, in regard to this most respondents attributed it to the prohibitive charges required for one to connect to the electricity grid.

Nevertheless, the study indicated that micro-enterprises were progressively established over the years that followed electricity supply. In the year 2008 at the time when rural electrification programme had already been rolled out, 3.0 percent of the enterprises were established. More enterprises were established following the years 2009 and 2010 which recorded a 5.0 percent and 7.0 percent respectively. In 2011, enterprises were established at 2.0 percent and in 2012 established enterprises stood at 16 percent, the year 2013 to record a 12 percent enterprises establishment. An increase in enterprises establishment was observed in the years of 2014 and 2015 to 18 percent respectively, thus the study indicated a government subsidy intervention in rural electrification partly as a motivation that enabled many entrepreneurs to engage in micro-enterprises connected to rural electrification grid.

It is thus safe to deduce that the burgeoning of micro-enterprises was realised since the introduction of rural electrification programmes in Bumula sub-County. Several micro-enterprises were established in the year 2016 which had a 13.0 percent of micro-enterprises, and lastly during the time of data collection in July 2017 the micro small enterprises established that year stood at 5.0 percent. Issues with high price to some rural inhabitants was a major setback to adopt electricity, besides, issues related to credit constraints, bureaucratic hurdles in the distribution of electricity and low rural electricity grid reliability diminished household demand for rural electrification grid connections.

**Figure 4: Year of Micro-Enterprises Establishment**



*Source: Field data, 2017*

#### **4.5.5 Employees' Status**

In terms of employment, the study found that most micro-enterprises had 1.0 employee, this was as result of the sizes of these micro-enterprises, barber shops, battery charging enterprises, juice retailing, butchery, fuel pump enterprises had a single employee due to the sizes and limited capital for investment among majority of the proprietors. The median number of employees was 2.0 and a mean of 2.0 employees which as well illustrated capital limitation, size and nature of the micro-enterprises in the study area.

The maximum number of employees working in an enterprise was 11 which was found at the bakery. Bakery services included preparation of sweet potatoes i.e. peeling, drying and

the actual baking processes, these activities required much labour than barber shops, welding, and salon services. The minimum number of employee(s) in an enterprise was 1.0. Majority of the enterprises studied were operated by the proprietors themselves since they were small and operated mostly from 10 am after the proprietors were through working in their primary mode of living. Limited financial capital and physical capital was the major impediment in micro-enterprises expansion, henceforth this rendered them incapable of employing and accommodating many employees.

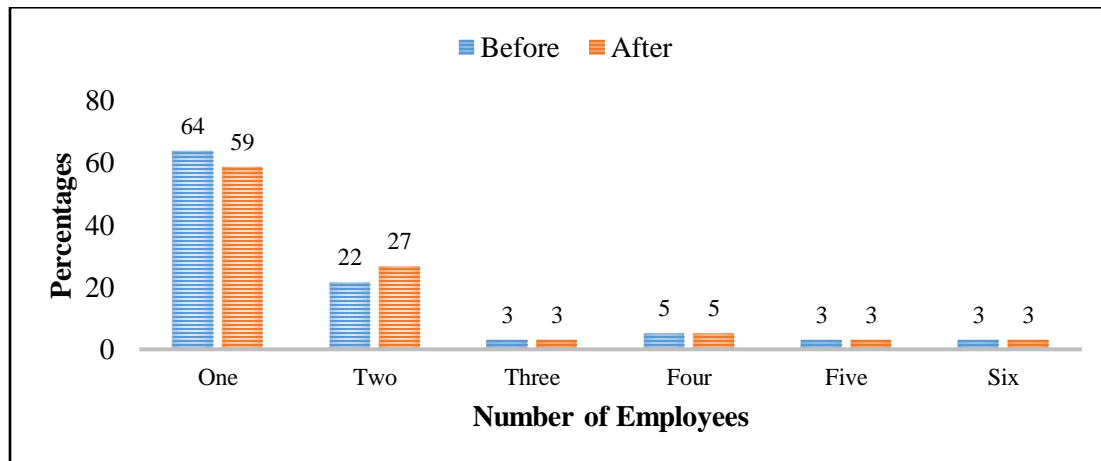
**Table 3: Number of Employees**

Mean	2.01
Median	2.00
Mode	1
Minimum	1
Maximum	11

*Source: Field data, 2017*

There was an observed variation in the number of employees that the enterprises had before and after the same enterprises being connected to rural electricity grid. Enterprises that existed before and after rural electrification were analysed and the results indicated that those enterprises that were run by one employee before connection to the rural electricity grid were at 64 percent and after connection to rural electricity grid these enterprises reduced by 5 percent to settle at 59 percent. The enterprises that employed two personnel before connection to the grid had 22 percent and this increased by 5 percent to 27 percent after these micro small enterprises were connected to the electricity grid. The study observed that the MSEs that were run by three, four, five and six employees were consistent before and after their connection to the electricity grid, and they maintained percentages before and after their connection at 3%, 5%, 3% and 3% respectively.

**Figure 5: Pattern of Employees and Electricity Connection**



*Source: Field data, 2017*

#### **4.6 Rural Electrification and Livelihood Diversification**

The third objective of the study sought to establish how new micro small enterprises had sprung up following the rural electrification grid in Bumula sub-County and how they are influencing livelihood diversification. It was noted that various MSEs that were in operation before rural electrification were enhanced due to the ease of electricity in their operations, other enterprises that existed before rural electrification also diversified their operations by providing new services, products and adopting new technologies. Accordingly micro-enterprises that operated diesel grain milling/*posho* mills some opted to buy electric grinders due to its ease and savings on energy unlike diesel engines which are bulky and consumes a lot of fuel. Many of them did not do away with the diesel engines but used them during electricity blackouts as this was their major challenge.

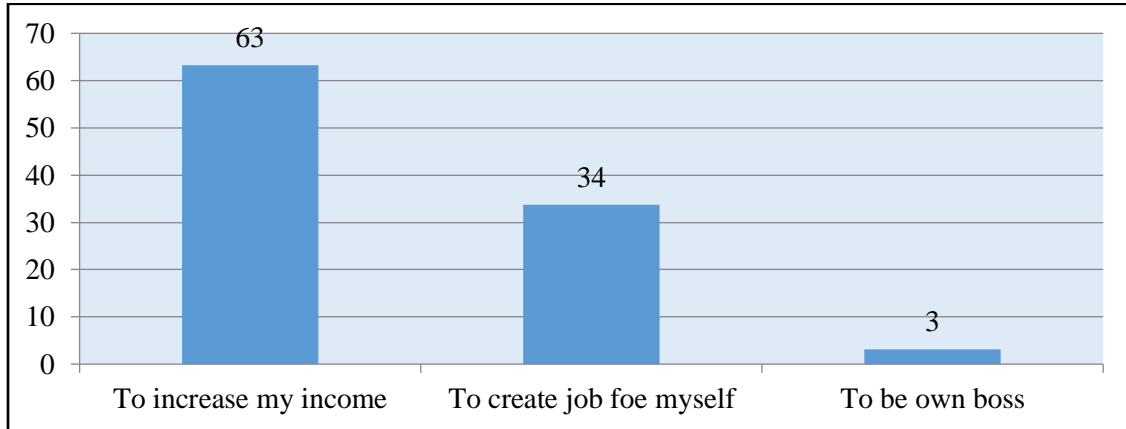
##### **4.6.1 Motivation for Starting Micro Small Enterprises**

Study findings on the proprietors' motivational background to start or establish micro-enterprises revealed that over 63 percent of the respondents reported increasing own income as the main motivation followed by to create job for myself (34 percent), and only a small minority cited their motivation to start/establish enterprises in order to be own boss at 3.0 percent. The desire to increase income by majority of the respondents is unsurprising due to the low wages from farming activities especially since the break-down of various



sugar factories in the region which was their main income earner to the locals besides mixed farming activities.

**Figure 6: Motivation in Establishing Micro-Enterprises**



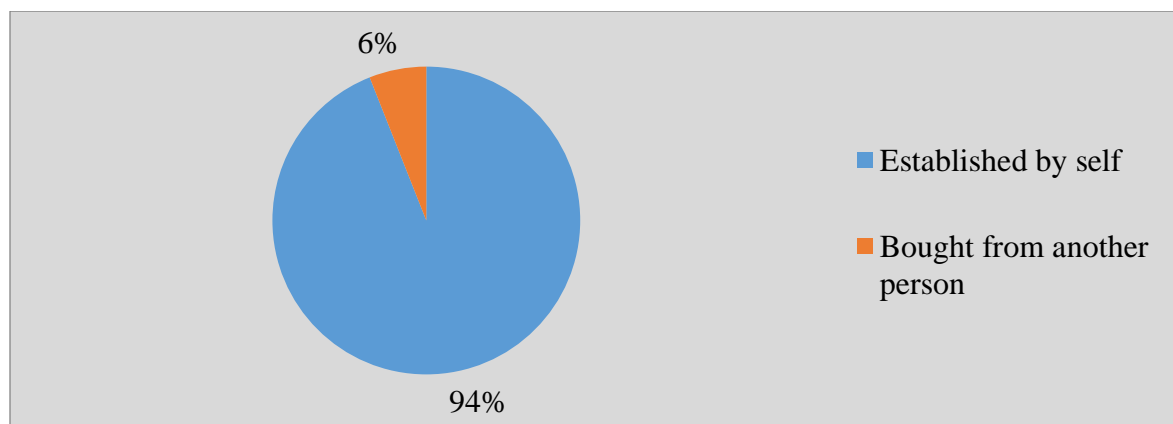
*Source: Field data, 2017*

The study also sought information about the contribution of rural electrification in the establishment of micro small enterprises as a means of diversifying livelihood by the residents of Bumula sub-County. The results indicated that 90 percent of the respondents acknowledged rural electrification as the main contributing factor in starting their enterprises, while 10 percent of the respondents reported against rural electrification being an impetus for establishing their enterprises. Majority of the respondents illustrated how rural electrification contributed in their business ventures, they lauded the versatility of electricity in running complex machines that enhanced their service delivery. Efficiency using electricity in mobile phone charging increased customers in such enterprises thus greatly contributing to the proprietors' incomes. The use of mobile money in payment of products and services improved since mobile phone charging was easy, this contributed in turn-around of activities. Increased mobile phone usage increased the rate of phone charging, hence mobile charging enterprises had regular customers, who in turn paid for charging services. The results draw the conclusion that rural electrification has been a vital element in the emergence and establishment of micro small enterprises in Bumula sub-County.

The study established that rural electrification had greatly influenced livelihood diversification in mainly through established micro-enterprises which earned respondents incomes. Rural electrification supported various households to start-up ventures in fuel businesses, this to a greater extent was by the installation of petrol/fuel pumps at various designated points in Bumula sub-County. Fuel pump enterprises was noted to be the most expensive of all the enterprises established since the start of rural electrification programmes in the area, fuel pumps which requires much power to work could only be operated after rural electrification programmes had enabled owners to achieve better cash flows. Much of these enterprises sufficiently supported the respondents in diversifying their livelihood since the *boda boda* businesses is an ever increasing means of transport in Bumula sub-County and to an extent the whole country. The start-ups in fuel pump enterprises aided in the elimination of the illegal fuel adulteration practices which was a norm with road-side fuel vendors. In addition, safety was improved through installation of standardised petrol/fuel pumps.

In addition to investigating the proprietors' motivation in starting micro small enterprises, the respondents were also asked to state the manner in which they started these particular enterprises. The study found that 94 percent of the enterprises were established by the proprietors themselves while 6.0 percent of them were bought from other persons.

**Figure 7: Micro-Enterprises Initiator**



Source: Field data, 2017

#### **4.6.2 Emergence of Micro-Enterprises**

In this section, the study sought to establish other types of MSEs that have sprung up as a result of rural electrification besides the respondents' enterprises. In order to find out about these particular enterprises the study asked respondents to identify other micro-enterprises on rural electrification programmes. The analysis of the results indicate that 25 percent of MSEs established were welding services enterprises, 19 percent of the enterprises started are those engaging in barbers services while 11 percent of the enterprises were cyber café service enterprises.

Moreover 10 percent of the MSEs established as a result of rural electrification are in salon service enterprises, 7.0 percent engaging in grain milling/*posho* mill activities, 7.0 percent of the enterprises involving in fuel/petrol pump service stations, 5.0 percent in retail shop services, and 4.0 percent engaging in refrigeration services mainly in beverage refrigeration. Mobile phone charging and workshop enterprises each had 3.0 percent of the enterprises influenced by rural electrification, whereas water boreholes/water pumps had a 3.0 percent and 2.0 percent of the enterprises identified by the respondents engaged in battery charging services. Close to this 1.0 percent of the enterprises listed by the respondents engaged in electronic repair services, furniture making, bakery and chicken hatchery enterprises were the least established MSEs at 1.0 percent each since rural electrification programme was initiated in Bumula sub-County.

There is a strong evidence to suggest that availability of rural electrification services in Bumula sub-County has led to the emergence of various micro small enterprises. Enterprises are established in rural areas even with little or limited amounts of electricity. The results in this study corroborate what the World Bank (2008) established that various business enterprises could thrive if electricity grid connection is availed to people.

Similarly, Barnes (2012) and Moha *et al.*, (2000) in their studies concluded that micro small enterprises located in rural areas are bound to be boosted if reliable form of power is discovered or introduced to them. The study findings supported the study by Vandenberg (2009) who established that livelihood commercial activities in rural areas are most likely

to spiral up if connection to the national electricity grid is available, affordable and accessible. The structuration theory by Giddens (1976) is the leading theory that supports this development, in which the principle is that individuals in a society will probably support structures put in place that seem to turn-about events for the improvement of their living.

Another observation was that whereas there was a craving enthusiasm on the introduction of rural electrification grid connection in Bumula sub-County, some people found it difficult to get their households connected to the grid. Most respondents complained of high initial connection costs and the obstinacy by REA officials from connecting this precious energy to the households beyond 600 metres radius from the nearby transformers. Nevertheless, efficiency was clearly on the rise as many respondents acknowledged electricity grid to have positively benefitted their areas.

#### **4.6.3 Different Perspectives on the Benefits of Rural Electricity**

During the field interviews, the researcher sought to gain a better understanding of the energy patterns in Bumula sub-County, in this, respondents were asked to highlight the benefits of rural electrification services has in diversifying their livelihoods. A five item Likert-type scale indicated various levels of benefits of rural electrification as cited by the respondents. In the scale, the highest mean attained was 3.88 in which rural electrification services helped in the establishment of telecentres, rural telecentres helped proprietors engage in more income generating activities such as offering online services such as renewal of drivers licences, application of passports, job searches through Brighter Monday, KRA tax filing and submissions and computer games etc. These incomes enabled them purchase household products, pay medical care, school fees and other domestic necessities.

The respondents by a mean of 3.66 reported that few people were willing to relocate from their villages due to rural electrification services in and a mean of 3.59 for those who felt rural electricity has resulted in people eager to migrate to their village. Migration within villages raised land value especially around rural shopping centres as reported by a mean

of 2.92 due to rural electrification services and this encouraged more investments in micro-enterprises in such areas. The inadequate rural electrification distribution led to majority of the proprietors to migrate or rent for space in areas connected with electricity grid. Respondents who established barber shops, grain mills, battery charging, cell phone charging, welding emerged as reported by a mean of 1.92 of the respondents and this improved the family incomes of the respondents as reported with a mean of 2.78. This increased households incomes from different sources by the respondents resulted in livelihood diversification as they were empowered with more income generating activities. Increased households incomes reported at a mean of 1.79 was as a result of diversification in the aforementioned enterprises, in addition, a mean of 3.37 of the respondents felt that their villages to have generally developed and a mean of 3.19 who felt that they have developed due to rural electrification services.

**Table 4: Benefits of Electricity to the Village**

<b>Level of Benefit</b>	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Enterprise like salons, barber shops, <i>posho</i> mills, battery charging , cell phone charging ,welding have emerged	100	1.92	.849
Establishing telecentres in the village	100	3.88	1.140
Households incomes have improved	100	2.78	.871
People feel that they have developed	100	3.19	.787
We have a feeling that our village is developed	100	3.37	.837
Few people are willing to relocate from this village	100	3.66	.781
Many people want to migrate to this village	100	3.59	.889
Land value has gone up especially in market centres	100	2.92	1.220
My income has increased because I have an enterprise I opened because of electricity	100	1.79	.977

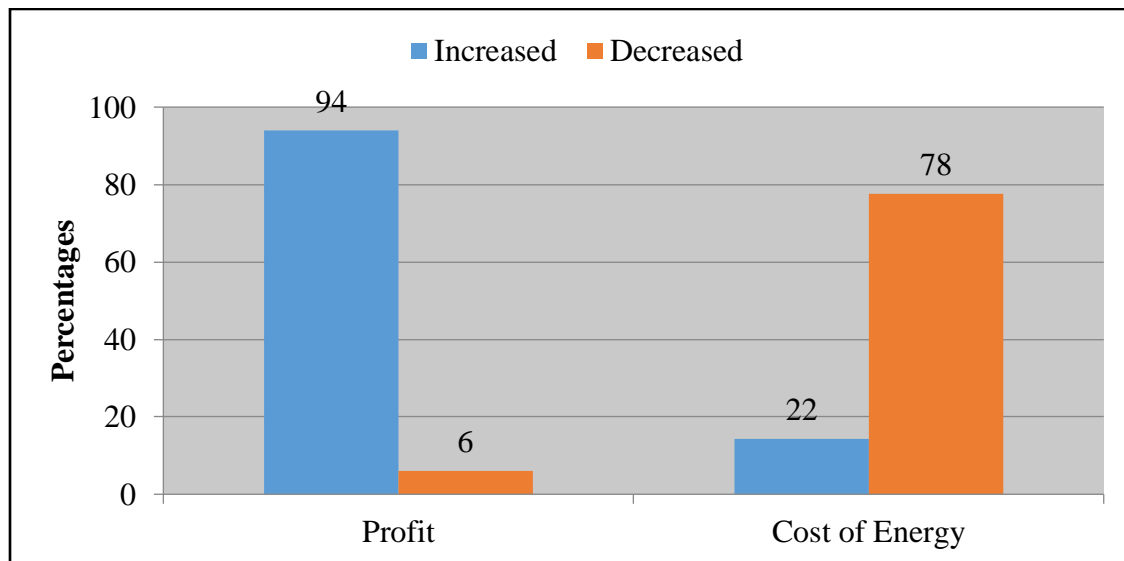
**Key: 1-Extremely A lot, 2-A lot, 3-Moderate, 4-Just a little and 5-Not at all**

#### **4.6.4 Energy Expenditures**

The study sought to understand the effects of running enterprises using rural electrification on the profits and cost of energy. The results indicated that 94 percent of the respondents have experienced an increase in their profits unlike if they could be relying on other non-reliable forms of energy to run their enterprises, while 6 percent of the respondents recorded a decrease in their profits due to high electricity tariffs. In terms of cost of energy

22 percent of the respondents recorded an increased energy cost due to high electricity tariffs as well. 78 percent of the respondents experienced a drop in energy cost when they used rural electricity in the activities of their enterprises.

**Figure 8: Profits and Energy Cost Using Rural Electricity**



Source: Field data, 2017

#### 4.6.5 Livelihoods Diversification Processes

The study established that rural electrification had greatly influenced livelihood diversification in mainly through established micro-enterprises which earned respondents incomes. Rural electrification supported various households to start-up ventures in fuel businesses, this to a greater extent was by the installation of petrol/fuel pumps at various designated points in Bumula sub-County. Fuel pump enterprises was noted to be the most expensive of all the enterprises established since the start of rural electrification programmes in the area, fuel pumps which requires much power to work could only be operated after rural electrification programmes had enabled owners to achieve better cash flows. Much of these enterprises sufficiently supported the respondents in diversifying their livelihood since the *boda boda* businesses is an ever increasing means of transport in Bumula sub-County and to an extent the whole country. The start-ups in fuel pump enterprises aided in the elimination of the illegal fuel adulteration practices which was a

norm with road-side fuel vendors. In addition, safety was improved through installation of standardised petrol/fuel pumps.

Rural electrification had stimulated livelihood diversification in several interviewed households, this was basically realised through building a variety of micro-enterprises including welding shops, barber shops, salons, battery charging, phone repairs, mobile phone charging, telecentres, refrigeration etc. in the study area. These enterprises were a major contributor in livelihood diversification processes of these households, much of them were able to make an extra living from the regular profits generated. Welding services were only found in Bungoma town, but with the introduction of rural electrification, fourteen other welding services have sprung up in the study area, aiding the owners in diversifying their livelihood through regular profits. Apprenticeship particularly in barbering, welding and salon shops supported young people to open up micro-enterprises in the experience learned since most of the respondents were primary school dropouts. In the absence of fees and technical institutes in their localities, apprenticeships and engaging in micro-enterprises ventures besides coming from farming community the youths were able to access a variety of income sources.

Further to this, the study established that access to even limited amounts of rural electrification for micro small enterprises in rural areas was an important in the establishment and growth of businesses. Ideally the study identified a number of micro-enterprises in retail shops to have expanded and started to offer new services in refrigeration. Electrification enabled the operation of businesses in bakery and a notable agribusiness venture in hatchery services. These enterprises offered sustainable cash flow to the entrepreneurs, and besides the profits, rural bakery which relied on sweet potatoes increased the demand of this farm produce thereby enabling farmers to generate income from their produce. Rural electrification services were found to create a chain of income generation and diversification among the rural residents, diversified incomes thus enabled them to create a stable balanced portfolio of incomes. Furthermore, the study established that the scope of generating income activities in rural areas which were sparsely populated were greatest when inward investment moved to low cost areas with better infrastructures.

Since rural electrification distributions were restricted to certain lengths from the electricity transformers, majority of the rural households started their enterprises farther.

Livelihood diversification as an important survival strategy for the rural households in the developing countries was supported by rural electrification services. Nonetheless, there are several constraints to successful livelihood diversification in Bumula sub-County. Identification of constraints is crucial for future studies and policy formulation. Low household incomes prevented majority of them from connecting to the rural electricity grid, this was because of the high initial grid connection charges or in what was said as the prohibitive fee. Since it is revered as the cornerstone of rural energy programmes, policy makers at the devolved county government level should take charge and ensure that this form of energy is a success.

#### **4.6.6 Livelihood of the Community**

Since the introduction of rural electrification in Bumula sub-County, the respondents who were operating various micro-enterprise immensely benefitted from increased incomes emanating from different sources, these were their primary income activities such as farming, salaried employments, trading and the micro-enterprises they started. With regard to the observations made in the study area by the researcher, the immense impact rural electrification had on rural households and the community was analysed using community livelihood characteristics as follows:

Foremost, the presence of rural electrification services made many grain milling/*posho* mills were established at walking distances. This development made women and girls since they were the ones who regularly engaged in grain milling household chores to save much time to engage in other productive activities. Other micro-enterprises in this trend were barbers shops, salons, welding, battery charging etc. Secondly, due to increased grain milling/*posho* mills in the area, the price for milling cereals had been lowered and this helped community members to save on money. Grain millers also offered good services since there was stiff competition, thus customers getting satisfaction in the services they sought. In such cases proprietors gained profits which diversified their livelihoods. Besides



grain milling, other emerged micro-enterprises experienced the same as there was burgeoning welding services, barber shops, phone charging shops, fuel pumps, salons etc. who also lowered their prices to attract customers and survive the competition.

Thirdly, the presence of rural electrification improved the telecommunication network and well-being of community members. Telecommunication services was observed to support proprietors in the use of contemporary business opportunity services such as Safaricom *Lipa na Mpesa*, Airtel Money and other mobile money services in their enterprises. It was observed that some community members who used to charge their mobile phones and torches at far off distances could now charge them conveniently at walk-away distances at a fee of twenty (Ksh.20) shillings. Furthermore, rural electrification grid has enabled the establishment of petrol/fuel pump station in various locations. Before rural electricity, proprietors sold petrol dangerously to *boda bodas* in water bottles and any available jerry-cans and they were frequently arrested by law enforcement officers. This illegal ways of vending petrol was as well rampant with fuel adulteration by mixing petrol with kerosene in bottles, but with emergence of fuel pumps fear of such practices has reduced.

Lastly, rural electrification has enabled establishment of telecentres. These telecentres are immensely helping members of the community in services such as driving licence renewal, business registration, job applications, computer games and other computer related services. This is in line with the Kenyan government's digital dream of delivering its key services through digital electronic systems. In conclusion, centring on field findings, rural electrification services contributed in the establishment of micro-enterprises using rural electricity services in Bumula sub-County. A variety of micro-enterprises were established and as a result, people are getting services at shorter distances. Availability of those services at doorsteps saved time enabling people to engage in other productive activities, they also saved on money as in many instances competition compelled businesses to lower prices. The increase in access to rural electrification grid, thus, facilitates the establishment of micro-enterprises which supports livelihood diversification in rural areas.

#### **4.7 Chapter Summary**

This chapter sought to analyse, present, interpret and discuss the field findings using standard statistical tests and research methods. The themes of each sub-chapters were based on the carefully formulated study objectives and research questions in which the analysis section allowed each variable to be analysed using specific descriptive statistics and thereafter, inferential conclusions were drawn. The solid conclusions drawn from the analysis of the field findings were also corroborated by studies of other notable scholars in the field of study. The aim and purpose of the study was effusively accomplished giving way to the conclusions, suggestions and recommendations in the next chapter.

## **CHAPTER FIVE**

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

The previous chapter presented field findings for the research objectives and also in tandem with the research objectives. The chapter also demonstrated how the current field findings obtained connect with the literature, in practice and in theoretical analyses. This chapter gives a summary of the entire research, detailing the conclusions, suggestions, and recommendations both in areas for further research and recommendations in policy making. The recommendations and suggestions are made in line with the previous chapters as guided by the research objectives which profoundly relied on research questions.

#### **5.2 Summary of the Study Findings**

The study's main objective was to examine how rural electrification was influencing livelihoods diversification in Bumula sub-County, with a particular aim of underpinning the process of livelihood diversification in Bumula sub-County as a result of rural electrification services. Thus, the study used interviews with micro-enterprises owners in Bumula sub-County to collect data that was cleaned before being cautiously analysed quantitatively and qualitatively to arrive at the conclusions, suggestions and recommendations made by this study.

The study findings indicated a wide-ranging agreement in adopting rural electrification in running the micro-enterprises as opposed to non-reliable alternative energy sources by the people of Bumula sub-County. Micro-enterprises owners were clear in their decisions to adopt and remain on rural electrification grids even though the cost and frequent challenges in electricity blackouts and shortages, the benefits of using this precious energy to them outweighed the challenges accompanied. The study also established that emergence of micro-enterprises as a result of rural electrification programmes was evident and that community members have experienced an improvement in their living standards. The multiplier effect of these enterprises have helped micro-enterprise proprietors and

community members as a whole. For the proprietors, they have been able to diversify their livelihood through micro-enterprises, many of whom relied mostly on minor agricultural activities and *boda boda* services, have increased their incomes through businesses. For the community members, due to competition among service providers, they have been able to receive quality services and in some cases lowered service and commodity prices have enabled them to save on money and put it into other developmental ingenuities.

A notable development has been the contribution of rural electrification services in the establishment of fuel pump MSEs. This development has prominently secured the safety of the community members and *boda boda* riders who initially relied on road-side fuel vendors who handled fuel dangerously in bottles. With the introduction of rural electrification services, the practice has ceased, fuel adulteration reduced and safety given priority through establishment and installation of recommended fuel pumps. In addition, new technology was observed in the tailoring shops whereby some tailors bought electric motors and connected them to their manual sewing machines instead of purchasing whole units of electric sewing machines. This kind of ingenious arrangements was observed to save on space as they could easily switch to manual mode in case of blackouts or electricity shortages.

In regard to micro-enterprises establishment, a variety of other notable enterprises that emerged due to rural electrification services included; barber shops, salons, tailoring shops, grain milling/*posho* mills, fuel/petrol pumps, movie shops, carpentry/furniture manufacturer, retail shops, bakeries, battery/phone charging, a hatchery and welding shops. However, growth of MSEs in terms of employee numbers in the study area and establishment of new branches of these MSEs within the study area and outside was observed at a low rate. This may be more gainful, if rural electrification services were affordable to the rural people, reliable and supplied unlimitedly to most of the rural areas of Bumula sub-County.

Although micro-enterprises connected to rural electricity grid reported its usage was cheaper than other non-reliable sources of energy, electricity distribution and connection

was still a major hurdle as not every household could access and connect to the grid. The REA requirements states that one has to be within a 600 metres radius to get connected, this has left several households not connected to the grid. And for those connected to the grid, the study revealed that a minority of them adopted alternative energy especially in the event of electricity shortages and blackouts. From the establishment of micro-enterprises, the study revealed a notable number of the youths engaging in micro-enterprises which empowered and enhanced their self-dependency. The rise in micro-enterprises enabled residents to get services and products at shorter distances if not at door-steps, saved on time to engage in other productive activities, for instance the multiplier effect in the number of grain milling/*posho* mills enabled women and school going girls to save on time and young girls in the evenings had sufficient time studying.

There were also observed changes in livelihood characteristics of micro-enterprises owners and community members who lived near these enterprises. These changes were eminent in the increase of assets such as motorcycles, livestock and new modern houses among the interviewed micro-enterprises. Another outstanding development was an increase in human asset among the enterprise owners and some community members who engaged in apprenticeship activities especially in salons and barber shops. Young men learnt the art of barbering in nearby barber shops and later on opened their own businesses. Furthermore, human asset in terms of business knowledge also grew as entrepreneurs dealt with customers for a long time, more apprenticeship activities in tailoring, welding and furniture making/carpentry shops enriched their human asset. Financial asset was also observed to have changed due to increased incomes, some entrepreneurs recounted about being able to pay for medical cover, getting better daily meals and paying school fees for their children and in some cases their relatives.

The service sector was observed to be the pivot of micro-enterprises in the study area, majority of the enterprises were of service nature. There were minimal enterprises in processing and manufacturing activities. The enterprises were dominantly owned by sole proprietors since they also had few employees and in most cases those who did day to day activities of these enterprises were the proprietors themselves.

Another key finding was the government initiative through REA to support rural electrification services. This had led to the emergence and development of new micro-enterprises in various locations within the study area. Thus more individuals had also registered for electricity services and awaiting connection to the grid to enable them set up businesses as well. On the other hand those who are connected are benefiting from the services and encouraging others to follow suit. Further to this, community members benefitted from services proximity to their homesteads, their interaction with micro-enterprises proprietors through purchase of products and services benefitted enterprises owners in profit, thus diversified their livelihoods. Lastly, emergence of efficient micro-enterprises such as welding, battery charging, fuel/petrol pumps, salons, telecentres etc. have relieved residents of long journeys to seek services in neighbouring towns. Many cottage industries in electronics repair, furniture making/workshops, and bakery had been established and some offering apprenticeship lessons to the interested youths. To this end, numerous services that took residents to trek a farther neighbouring towns like Bungoma are now self-sustaining and can be accessed at a stone throw distance in rural areas. Proximity to these local services thus speeds up the turn-about time for most rural activities.

### **5.3 Conclusions**

In conclusion, the study identified a number of observations concerning the influence of rural electrification on livelihood diversification in rural households of Bumula sub-County. Besides confirming what theory and literature say, the study also underlined additional insights especially in life changing developments such as emergence of fuel pumps and apprenticeship activities.

Firstly, the study revealed how rural electrification services in Bumula sub-County has supported the emergence and development of micro-enterprises though at a low rate in rural areas, there is a direct linkage between rural electrification programmes and the emergence of micro-enterprises. The study findings indicated that there is a prospect of rapid emergence of micro-enterprises in rural areas of similar characteristics as those of Bumula sub-County if the rural electrification services supplied are accessible to majority of the rural dwellers, dependable and affordable to majority of them.

Secondly, the respondents indicated the desire to make good use of the opportunities provided by the introduction of rural electrification services to increase the size and number of their enterprises. These advantages will be realised in establishing new micro-enterprises in their areas and use rural electrification services more productively. There was observed interest both the rural residents and the government through Rural Electrification Authority (REA) to promote the distribution and access of rural electrification services in all rural areas. Furthermore, rural households displayed the interest to get connected to the electricity grid but claimed were hindered by unaffordable initial connection fee and installation charges and ensuing tariff structures.

Thirdly, micro-enterprises owners acknowledged the efficiency of working with rural electricity, the services offered and products produced are of good quality, faster processes in their enterprises and also due to lighting, businesses operated for longer hours. Community members also displayed their gratitude to the services being offered in the study area after the introduction of rural electrification programmes. The reason alluded to lack of connection to the grid were the strict distance (600 metres radius) required from the electricity transformer of which many people were out of coverage and the initial connection and installation fee and subsequent charges. Some individuals who had made applications also cited longer time taken waiting on line of connection to the grid, the period of applications and physical connection and installation was longer than expected. Finally, as it was indicated by the respondents, they were willing to remain connected to reliable and affordable energy sources in their households as well as help them establish micro-enterprises in order to diversify their livelihood and support them in leading a sustainable livelihood. Undeniably there is a great potential in getting more people in the rural areas connected to rural electricity grid if the national government abides by the country's new development blue print Vision 2030 and effectively implement it to the latter.

#### **5.4 Recommendations**

The findings of this study have highlighted vital effects for the progress steered towards expanding and boosting rural electrification services in rural areas. The main

recommendation is that Rural Electrification Authority should reconsider the coverage area from electricity transformers in the rural areas since unlike the urban, rural households are scattered making the required maximum of six hundred (600 metres radius) metres from the nearby electricity transformer too limited to cover most households. In regard to this, REA should increase electricity network in villages and more importantly install more transformers at strategic places in order to accommodate more households.

Another recommendation is that Rural Electrification Authority (REA) should liaise with Kenya Power and Lighting Company (KPLC) to intensify their electricity maintenance services in rural areas to avoid frequent blackouts and electricity shortages. KPLC should as well reconsider the monthly electricity tariffs/charges and the deadlines applied therein since unlike the urban residents, most rural dwellers are not used to this strict deadlines and yet lack of adherence to them results in severe punishments such as disconnection from the grid and punitive charges applied even without utilising electricity services.

To sum up, the study also recommended that the national government should partner with non-governmental organisations, benefactors and donors such as International Monetary Funds (IMF) and World Bank to facilitate more funds in support of rural electrification programmes and make it a great success and ultimately a success story to be fêted by rural inhabitants.

#### **5.4.1 Recommendations for Policy Makers**

The study findings led to policy implications in terms of theory, practice and policy. The national government through the National Industrial Training Authority (NITA) should open up more Industrial Training Centres (ITCs) to add on the existing ITCs at Athi River, Kisumu and Mombasa. Through these ITCs, programmes can then be rolled out to cater for the school dropouts especially at primary levels to engage in industrial courses so that they can apply the knowledge and make good use of rural electrification services in their rural homes. To this end, NITA and Kenya Industrial Training Institute (KITI) should intensify research in industry oriented courses and share the research outcomes with micro-enterprises owners to enable them acquire industrial and technical knowledge and leapfrog



to more industrial ventures that can benefit the entire country as well as a large number of community members through employment, services and apprenticeships. Intercessions in the areas of industrial trainings by KITI, cottage industries and incubation programmes are notably recommended.

Further to this, the study recommended policy makers to encourage innovations in areas of rural services provision and production as the study show that there was minimal innovations in productions and service delivery in reference to rural electrification programmes. The National Government should also adhere to the plights of the rural people who have been neglected for long and serve them at best centring on the country's development blueprint document the Vision 2030 which advocates all-inclusive and participatory stakeholder consultative process, involving Kenyans from all parts of the country. Thus this will enable the rural people to get speedy and quality services like their urban counterparts, such services like rural electrification services will empower the rural people to turn-around their livelihoods if used productively.

#### **5.4.2 Recommendations for Further Research**

While the findings of this study offer useful comprehensions concerning the influence of rural electrification on livelihood diversification among rural households, it also exposed gaps in knowledge which can be addressed in future studies. Essentially, the current study concentrated on the process level, future studies may address issues of periodic enterprise turn-over as a measure of productive usage of rural electrification services. Also, while this study recognises the influence of rural electrification on livelihood diversification in rural households, it only did so by investigating the number of micro-enterprises emerged as a result of rural electricity grid connection and services, which might seem to tone down external and internal forces as well personal and or natural desires to invest. The study therefore, recommends future studies incorporating and comparing internal and external forces as determinants for individuals to engage in life changing ventures.

Furthermore, the current study only concentrated in Bumula sub-County whereas there is little known about the emergence of micro-enterprises as influenced by rural electrification services in other parts of the country. It therefore recommended that future studies should focus on broader areas and regions to enable a broader outlook adept of making inferential generalisation. In regard to this, similar studies in different areas will facilitate in making comparisons about which areas and regions are best utilising rural electrification services. Lastly, the study recommended the use of various participants who are affected by rural electrification programmes instead of using only micro-enterprises to make recommendations concerning rural electrification programmes and services.

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## APPENDICES

### Appendix I: Household Questionnaire

Dear Respondent,

My name is Kuloba Abraham, a post-graduate student at the Institute for Development Studies (IDS), University of Nairobi. I am carrying out a research entitled: **Rural Electrification and Livelihood Diversification among Rural Households of Bumula Sub-County in Bungoma County, Kenya**. In relation to this, your household is among those purposively selected for the study and I would really appreciate if you spare about 15 minutes to answer some questions. This information will be used strictly for academic purposes only (M.A Project Paper) and will be treated with utmost confidence. Thus, your support is greatly cherished.

#### A. BASIC DETAILS OF THE RESPONDENT

1	Name of respondent	
2	Age of respondent	
3	Gender	
4	Contact/phone number	
5	Highest level of education attained	
6	Date of interview	

#### B. GENERAL INFORMATION ABOUT THE ENTERPRISE

7	Name of the enterprise	
8	Nature of the enterprise	
9	Location of the enterprise	
10	Year of establishment	
11	Number of employees	

12. (a) **Are there family members employed in this enterprise?** 1= Yes [ ] 2= No[ ]

(b) **If YES, state the number and their position(s) in the enterprise**

Relationship	Position held	Number
<b>Total</b>		

13. **How would you describe the ownership status of this enterprise?**

- 1) Sole proprietorship
- 2) Partnership (*state number of partners*)\_\_\_\_
- 3) Independent private limited company

14. **How did you begin this business?**

- 1) Established by self
- 2) Bought from another person
- 3) Bought from another business
- 4) Inherited (*specify generation*)\_\_\_\_\_
- 5) Spin-off (*specify*) \_\_\_\_\_
- 6) Other (*specify*) \_\_\_\_\_

15. **Which of the following activities if offered by your enterprise?**

- 1) Service delivery activities
- 2) Manufacturing activities
- 3) Processing activities
- 4) Other (*specify*) \_\_\_\_\_

16. **Identify the main reason for deciding to engage in this business?**

- 1) To create job for myself
- 2) To be own boss
- 3) To use my past experience and training

- 4) Could not find job appropriate for my background
- 5) Flexibility for family life
- 6) To increase my income
- 7) Other (*specify*)\_\_\_\_\_

**C. RURAL ELECTRICITY CONNECTIONS**

**17. Does your household have electricity?**

- 1) Yes [  ]
- 2) No [  ]

**18. Does your enterprise share the electricity bills with your household?** (*If YES go to question 19 and if NO proceed to question 20*)

- 1) Yes [  ]
- 2) No [  ]

**19. If YES above, what is the reason(s) for a joint enterprise-household electricity bills?**

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

**20. Is availability of electricity a contributing factor for starting your enterprise?** (*If NO go to question 21 and if YES proceed to question 22*)

- 1) Yes [  ]
- 2) No [  ]

**21. If NO above, what was the influencing factor(s) for you to start your enterprise?**

- 1) .....
- 2).....
- 3).....

**22. What are the benefits obtained from connection to the grid electricity?** (*List multiple responses where applicable*)

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

23. **Which new product/service have you started to produce after connecting to electricity?**

**Mention them**

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

4) \_\_\_\_\_

5) \_\_\_\_\_

24. **Do you use other source(s) of energy?** *(If YES go to question 25 and if NO proceed to question 26)*

1) Yes [  ]

2) No [  ]

25. **If YES above, which activity(s) do you use other source(s) of energy for, and why?**

**Activity(s)**

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

**Reason(s)**

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

**D. EFFECTS OF RURAL ELECTRIFICATION ON THE OPERATIONS OF MSEs  
IN BUMULA SUB-COUNTY**

26. How many employees do you have before and after your enterprises was connected to rural electrification programme?

1) Before \_\_\_\_\_

2) After \_\_\_\_\_

27. After your enterprise was connected to rural electricity would you consider your profits have?

1) Increased [ ]

2) Decreased [ ]

3) Remained unchanged [ ]

28. After your connection to rural electrification, did the cost of energy:

1) Increased [ ]

2) Decreased [ ]

3) Remained constant [ ]

4) Don't know [ ]

29. What kind of energy did you use before the connection to rural electricity?

1) Petrol [ ]

2) Diesel [ ]

3) Kerosene [ ]

4) Car battery [ ]

5) Solar [ ]

6) Other(s) (specify) \_\_\_\_\_

**E. EXTENT TO WHICH RURAL ELECTRIFICATION PROGRAMME HAS  
CONTRIBUTED TO DEVELOPMENT AND AN INCREASE IN MSEs**

30. What type of enterprise(s) in this village has/have emerged as a result of rural electrification programmes? (Multiple responses possible)

1) \_\_\_\_\_

2) \_\_\_\_\_

3) \_\_\_\_\_

- 4) \_\_\_\_\_
- 5) \_\_\_\_\_
- 6) \_\_\_\_\_
- 7) \_\_\_\_\_
- 8) \_\_\_\_\_
- 9) \_\_\_\_\_
- 10) \_\_\_\_\_

**31. Using the scale below, rate how you feel electricity has been helpful to this village?**

**1. Extremely a lot   2. A lot   3. Moderate   4. Just a little   5. Not at all**

No.	Appliance	1	2	3	4	5
31.1	Enterprises like salons, barber shops, <i>posho</i> mills, battery charging, cell phone charging, welding have emerged					
31.2	Establishing telecentres in the village					
31.3	Family incomes have improved in the village					
31.4	People feel that they have developed					
31.5	We have a feeling that our village is developed					
31.6	Few people are willing to relocate from this village					
31.7	Many people want to migrate to this village					
31.8	Land value has gone up especially in market centres					
31.9	My income has increased because I have an enterprise I opened because of electricity					

**\*End\***

**Thank you for taking your time to participate in this study**

**Appendix II: Key Informant Guide: Rural Electrification Authority (REA) Officials**

Date of interview: \_\_\_\_\_

Name of key informant: \_\_\_\_\_

Position: \_\_\_\_\_

Contact: \_\_\_\_\_

1. What is the role of Rural Electrification Authority (REA)?
2. What are the objectives of Rural Electrification Authority?
3. In your assessment, do you think you have achieved your objectives?
4. What factors determine the distribution of rural electricity within Bumula sub-County?
5. What are the drivers towards adoption of rural electricity in rural areas?
6. Describe the contribution of rural electrification to the emergency of micro-enterprises in Bumula sub-County? (*i.e. what drives their establishment, growth and challenges*)
7. In what ways does rural electrification link with livelihood diversification processes in Bumula sub-County?
8. What challenges have you experienced so far when implementing your projects?

**\*End\***

**Thank you for taking your time to participate in this study**



**Appendix III: Map of the Study Area**



*Map showing Bumula sub-County.*

*(Source: KNBS, 2010)*