BENEFITS ACCRUING TO RESIDENTS THROUGH RURAL ELECTRIFICATION OF INSIZA SOUTH DISTRICT IN ZIMBABWE

By

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DECLARATION

I, Crespen Ndlovu, hereby declare that this dissertation for the Masters in Rural Development (MRDV) degree submitted to the Institute for Rural Development at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design, execution and all reference materials contained therein have been duly acknowledged.

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To the Insiza Rural District community

ABSTRACT

In the year 2002, the Zimbabwean government adopted a Rural Electrification Programme (REP) as a developmental strategy designed to improve villagers' lives. Despite the government's noble initiative to improve rural areas' access to electricity, not much is known about the REP's socio-economic benefits to grassroots communities in the country. Thus, a study was carried out to determine the REP's socio-economic benefits accruing to villagers in Insiza South District located in Matabeleland South Province of Zimbabwe. Appreciative inquiry was undertaken following a mixed method approach. Data were collected through two sequentially integrated phases. Multistage sampling was applied to select respondents from 15 villages within three administrative wards 5, 7 and 12 of Insiza South District. Out of the 110 respondents who participated in the study, the eight key informants who participated in the first phase were drawn from the institutions that coordinated the REP. One hundred and two residents participated in phase two of data collection carried out through application of focus group discussions (FGDs). Thematic content analysis was used to analyse qualitative data collected in phase 1 of the study. Quantitative data was analysed using the International Business Machines, Statistical Product and Service Solution (IBM, SPSS) version 24 for Windows. More than 68 % of the respondents perceived basic uses (lighting, cooking, and for educational purposes) of electricity as the benefits accruing from the REP. Sixty six percent of respondents viewed modern uses (heating, cooling and air conditioning) of electricity as the benefits accruing from the programme. A much smaller proportion (31 %) of villagers singled out the benefits of electrification to be productive uses such as boiler making, manufacturing and mechanised farming. There were highly significant differences in perception among residents of the wards with respect to basic ($P < 0.001$) and modern ($P < 0.01$) uses. However, there were no differences in perception among male and female members of the three wards ($P < 0.05$). The collective community benefits included improved access to information, enhanced retention and attraction of teachers in rural areas, introduction of computer studies in schools and initiation of entrepreneurial projects such as welding and milling. Residents also benefitted indirectly from the REP through local electrified service centres. It was revealed that almost 91 % the local villagers were still using firewood while about 59 % of the villagers who could afford it had access to solar power. The study highlighted the need for a platform to deliberate on challenges relating to RE and its contribution to economy. The findings are crucial for rural development, policy reviews and academic research.

Key words. benefits, sustainably energy, rural electrification, Matabeleland South

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LIST OF ABBREVIATIONS

ADEA	Association for the Development of Education in Africa
ADP	Area Development Programme
AGECC	Advisory Group on Energy and Climate Change
AI	Appreciative Inquiry
DA	District Administrator
FGD	Focus Group Discussion
GIS	Geographic Information System
GPS	Geographical Positioning Systems
HIVOS	Humanist Institute for Development Cooperation
IBM-SPSS	International Business Machines- Statistical Product Service Solutions
IRDC	Insiza Rural District Council
MDGs	Millennium Development Goals
RD	Rural Development
REA	Rural Electrification Agency
REF	Rural Electricity Fund
REP	Rural Electrification Programme
RPC	Research and Publication Committee
NRF	National Research Fund
SDG	Sustainable Development Goals
UN	United Nations
WAPCOS	Water and Power Consultancy Services
ZERA	Zimbabwe Energy Regulatory Authority
ZERC	Zimbabwe Electricity Regulatory Commission
ZESA	Zimbabwe Electricity Distribution Company
ZimStat	Zimbabwe Statistical Agency

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

Rural Electrification (RE) is a programme of providing sustainable and reliable energy to isolated and marginal communities for socio-economic purposes (Shiu & Lam, 2004). Various governments have institutionalised RE, aiming to improve residents' livelihoods (REA, 2002; Mapako & Prasad, 2007). For example, RE was introduced in the United States of America in 1935 with the aim of increasing farm production using efficient energy for farm equipment (Carmody, 1939; Cooke, 1948; Rhodes & Wheeler, 1996). From its inception, farm production improved because of the use of electricity-powered farm equipment. Subsequently, it became a worldwide programme that governments and a wide range of institutions adopted to reduce rural poverty and inequality (Kanagawa & Nakata, 2008; World Bank, 2003; 2008; Zomers, 2014). The United Nations identified energy efficiency and access as key priorities for sustainable development because of socioeconomic improvements achieved through RE in developing economies such as China, India and Latin America (United Nations Secretary General's Advisory Group on Energy and Climate Change AGECC, 2010). The achievement of RE has been recorded extensively in all aspects of human lives in American farm beneficiaries. For example, it improved farm machinery efficiency, farm produce, reduced deforestation, pollution and increased environmental sustainability (Bernard, 2012). Furthermore, economic opportunities and improved rural livelihoods have been generated through the extension of the electric grid to marginal areas.

The World Bank (2008) estimated that between 1996 and 2006, there were more than 20 recorded projects benefiting from RE in the Caribbean, Latin America and Sri Lanka. The statistics marked an improvement in income generating projects for rural residents. During the same period, there were also more than 15 such projects in Africa which improved rural industrialisation and reduced deforestation. Excessive cutting down of trees in parts of East Asia and in the Pacific, was reduced by 14 % (Gómez, 2010). These findings reveal the importance of electricity to developing communities. Thus, understanding how residents benefit from using sustainable sources of energy is crucial. The Chinese government used Rural Electrification Programme as a means to stimulate industrial growth and improve industrial output. For example, more than 20 000 villages and 70 000 residents were targeted to improve their economic output through the use of efficient electric powered machines in various regions of the country. The strategy created

employment and delivered quality services to residents. Institutionalisation of RE minimised inequalities and household hazards (Rahman *et al.*, 2013). For instance, women who participated in economic projects that generated revenue by braiding and baking helped subsidise family income. This further reduced rural to urban migration (Cust *et al.,* 2007; Wyche *et al.,* 2013). Furthermore, there have been more achievements made in areas where RE has taken place, thereby bridging the social gap by improving women's participation in the economy and reducing indoor pollution resulting from using traditional fuels.

Access to electricity in Ethiopia improved entrepreneurial activities by simplifying manual labour which ultimately improved productivity. A survey of 336 rural households in Ethiopia revealed that electrification benefits went beyond lighting. Most households, it was discovered, had wider and broader off farm benefits and improved public services such as education, health and purified water access. However, the same study argued that long term benefits of electrification proved to be accumulating slowly in areas such as education and labour supply (Aragaw, 2012). It can therefore be argued that electrification benefits are not only short or medium term but accumulate gradually with time.

A study conducted in India revealed that households with access to electricity in most developing countries faced prolonged supply interruptions which negatively affected economic use of electricity, for example in irrigation water pumps that solely depend on electricity (Rao, 2013). Although such interruptions affected the projects, beneficiaries had a positive story to tell (Van de Walle *et al.,* 2013; Aguirre, 2014). For example, watering of plants was not done on a daily basis, meant that farmers shifted their time tables to match the times when electricity would be available to enable the functioning of water pumps. Although there have been strides towards electrification in rural areas, there are challenges faced by beneficiaries which have negatively affected their progress. Getting the views of rural residents would have assisted in framing informed policies and strategies to address the core problems.

Ghana introduced a National Electrification Scheme in 1989 which enabled the rural community to engage in agricultural projects and micro businesses that improved family income. The focus of the scheme was also to reduce rural-urban migration and inequalities (Khandker *et al.,* 2012). Only 470 out of 4221 communities had access to electricity during that time but by 2005, rural energy access had improved by 54 %. In Kenya for example, Wyche *et al.* (2013) discovered that government institutions praised the role of electrification to rural residents as it improved delivery

of health services, education and communication. Be that as it may, there is lack of resident centred studies (Mabhena & Moyo, 2014) on the benefits of electrification in isolated regions. Studies conducted in Burkina Faso focused on institutional options for rural energy access (Nygaard, 2010) and those in India on increase in household enterprise income (Rao, 2013). However, politically motivated reports have misinterpreted the reality in favour of political agendas (Bhattacharyya, 2006). Therefore, a resident centred study would unravel such misinterpretation of realities. Improvement in rural livelihoods amidst institutional and economic challenges have been realised in the above-mentioned countries. Furthermore, rural electrification has gained momentum as a strategy for poverty reduction in rural areas in many developing areas but little impact has been recorded in rural of Zimbabwe (Dube, 2001). Accordingly, the current study sought to identify and provide evidence of the types of benefits accruing to residents of Insiza South District of Zimbabwe. It was envisaged that this would help the governemnt to develop new or review rural electrification policies and strategies.

Bernard (2010) and Cook (2011; 2013) argued that government and institutions that implemented RE properly, accelerated the achievement of the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). For example, electricity in rural areas in the Sub Saharan countries assisted in reducing deforestation and pollution resulting from cutting and burning bushes for firewood. Access to electricity in rural South Africa is reported to have improved women's employment opportunities and economic participation by 9.5 percent (Demirbas & Demirbas, 2007). This confirmed that access to domestic energy improved rural socio-economic patterns and reduced poverty (Ohunakin *et al.,* 2011). Therefore, positively impacted on SDG number one, seven and eight of eradication of extreme poverty and hunger, promotion of gender access to affordable energy for all, and inclusive economic growth respectively.

Some studies revealed that provision of electricity exposed poor economic status of some households, for example, those who could not afford a two-plate stove (Matinga & Annegarn, 2013). It should be noted that benefits resulting from RE extend beyond individual family benefit. For example, residents who could not access electricity at their homes enjoyed improved services

such as street lighting for safety at night, access to services offered by other community members such as access to preserved foods from local spaza[1] and retail shops.

1.1.1 Rural Electrification in Zimbabwe

In 2002, the Zimbabwean government re-introduced the REP, which had been suspended in 1989 due to rising costs of capital equipment (Dube, 2001; REA, 2002). The programme was redesigned to accelerate the socio-economic development through the extension of electricity supply from the national power grid and promoting the adoption of solar technology in rural communities (Siyachitema, 2002). The Zimbabwean government continually attempts to improve rural electrification despite the socio-economic challenges bedevilling the country. Most of the electricity consumed in Zimbabwe is imported from the Democratic Republic of Congo (DRC), Mozambique and Zambia (Ministry of Energy and Power Development, 2012). Presumably, this explains why rural electrification projects move at a snail's pace Magrath, 2015. Costs related to the importation of power has reduced affordability, access and continuous availability to consumers (International Energy Agency, 2012; African Development Bank, 2015). Therefore, electricity generation and usage has significant negative implications to the country's REP.

Rural electrification programmes target both private and government institutions in growth points. Growth points in Zimbabwe refer to rural areas' socio-economic hubs where major services such as health (hospital/clinic), security (police), business (shops), social and religious institutions (schools and churches) are clustered (Mapako, 2007). Rural electrification was meant to drive the industrialisation processes in rural areas (Campbell, *et al.,* 2003). The aim was to create job opportunities for rural dwellers. Furthermore, the rural electrification project was, *inter alia*, aimed at improving the welfare of rural teachers, the introduction of science subjects that relied on electricity such as computer studies, biology, chemistry and, enhancing the learners' study times in rural schools. In addition, health and sanitation were also targets of improvement through the availability and use of electricity (Moner-Girona, *et al.,* 2006; Munyoro, *et al.,* 2016). However, due to the country's political and economic downturn (Scoones *et al.,* 2012), the government's envisaged goals here have not been realised.

[1] Spaza shops are largely informal convenience shops operating from domestic premises.

Reports indicate that by 2002 (since independence), there was less than five percent of rural institutions and households with access to electric energy in rural Zimbabwe (Davidson & Mwakasonda, 2004). The rural electrification project's aim was to address energy access inequalities between urban and rural areas. As mastered in this study, the progress has been slow, business beneficiaries testified to the importance of sustainable energy. Entrepreneurial ventures mushroomed in rural communities immediately after the introduction of the REP. Consequently, the access to electricity linked isolated villages to the digital world. This was a positive stride towards bridging the socio-economic inequalities that are apparent between urban and rural dwellers. Rural women, for example, started small business enterprises such as bakeries, cafes, hair-salons while schools introduced computer lessons. Enterprising households managed to purchase radio and television sets for their amusements in addition to access to news.

There were 5528 institutions in eight rural provinces (Zimbabwe has ten provinces of which two are entirely urban) that had been electrified through the REP in the country (REA, 2010). Amongst the benefiting provinces was Mashonaland East where Mudzi District was substantially developed socially compared to her economic aspect (Munyoro, *et al.,* 2016). Villagers in Gutu District of Masvingo Province have access to clean water through the Rural Sustainable Energy Development Project (RuSED 2011-2016) solar pumping system, while in Manicaland Province there is the Ruti irrigation scheme in Himalaya where villagers have sustained food provisions (Magrath, 2015). Umzingwane and Insiza South Districts of Matabeleland South Province were among the districts that benefitted from the REP (Ngwenya, 2013). The preceding paragraphs reveal how RE evolved and showed its potential for rural development. Based on this, one can conclude that there is little household benefit from the REP. This is because not all villagers participate in the economic projects for example, in Insiza South District there is no evidence of entrepreneurial projects mushrooming as a result of REP. Therefore, a village-centred inquiry on benefits accruing from rural electrification was needed to help model people-driven solutions to socio-economic challenges.

1.2 Statement of the Research Problem

Despite various governments and other interventions meant to enhance global prosperity and reduce rural poverty through improving energy access to rural areas (AGECC, 2010), limited appreciation and evaluation of RE projects regarding socioeconomic development have been

conducted in rural areas (Javadi *et al.,* 2013). In Zimbabwe, rural electrification was introduced to alleviate poverty through enabling socio economic projects reliant on reliable supply of power (Dube, 2001; REA, 2002; Mapako & Prasad, 2007). Insiza South District was one of the areas that benefitted from this government initiative. However, to date, there is no evidence of studies that were conducted to establish the nature and extent of benefits accruing to residents through the REP (Chambers and Pettit, 2013). This highlights the need for a scientific investigation that might unravel the benefits accruing to the local populace. Engaging residents to understand this phenomenon was regarded as the best way to acquire balanced perspectives of beneficiaries and institutions on the role of electricity in rural development.

1.3 Research Objectives

The main objective of the current study was to analyse the benefits accruing to residents from the rural electrification programme implemented in Insiza South District of Zimbabwe. Three specific objectives guided the study, namely to:

a) Identify Insiza residents' perceived benefits accruing from rural electrification;
b) Determine whether the perceived benefits accruing to residents from rural electrification varied due to gender and socio demographic groups in Insiza District; and
c) Determine the extent to which the original objectives of rural electrification were achieved.

1.4 Research Hypotheses

a) There are no tangible benefits accruing to residents from rural electrification;
b) There are no differences due to gender and location (ward) in perceived benefits accruing to resident's location; and;
c) The rural electrification original objectives have not been achieved.

1.5 Operational Definitions of Key Terms and Concepts

The meaning of "*benefits*" may vary in various disciplines. In the context of this study, "benefits" refers to socioeconomic advantages of accessing electricity by rural residents, for example domestic uses (cooking and lighting) and industrial (powering of machines and conditioning). Hirmer & Cruickshank (2014) describe benefits as welfares that are presented to an individual who uses electricity. These range from economic benefits, which include the ability to be involved in an economic activity that would yield financial gain and employment creation. Social benefits

include the ability to share information in a more modern way, for instance through using cell phones, radio and television. Technological benefits include the use of smart phones and computers which makes life easier for the users. Thus, in this study, benefits entail all gains resulting from the use of electricity by rural residents.

According to the ZimStat (2012a), *a resident* is defined as a person who has the legitimate right to abode in the country either by birth, descent or by registration with the Registrar General: Home Affairs Department of the country. For this study, the word resident may be interchanged with citizen. It this study, resident and villager will also be used interchangeably. These will include all natural persons who have been staying in Insiza district for more than five years. These are all individuals who may be considered permanent or long term inhabitants of Insiza district through national census.

Rural is a term that has been widely used to mean areas that are not urban. World Bank (2003) defines rural based on the population distribution per square kilometre, poor infrastructure, gravel roads, type of schools, type of grocery shops, limited government services and scattered or spaced settlements. Rural is further defined as areas where inhabitants predominantly practise subsistence agriculture with limited use of machinery and advanced farming implements. People living in rural areas are presumed to be poor and can hardly afford a standard meal. In this study, "*rural*' is used to refer to the area under study which has poor infrastructure, scattered population distribution, with limited government services such as water and sanitation. The word is also used to refer to areas where most of residents depend on firewood and other traditional fuels for household use.

Rural electrification is a programme initiated by the government of Zimbabwe and is aimed at linking rural households to a more sustainable and environmentally friendly electric grid for domestic and commercial use (REA, 2002). Jansi (2011) describes *rural electrification* as government attempts to revive rural economy by linking such areas to the national grid and off grid electric supply that will enable creation of an environment that promotes an entrepreneurship culture for socioeconomic development and generate employment. By providing electricity for productive uses in agriculture, it is envisaged that this will in turn boost other non-farm economic activities and ultimately improve the quality and standard of rural lives. In this study, RE refers to the programme of connecting rural areas with sustainable electricity for residents' socio economic and technological development. The REP has been broadened to include all programmes that

are aimed at connecting rural people to a clean and green energy such as photovoltaic and biogas sources of energy.

1.6 Outline of Dissertation

This dissertation is structured in five chapters. Chapter one introduces the study. Included in this chapter are the background of the study, statement of the research problem, justification and rationale of the study, objectives and operational definitions of key concepts and terms. Chapter 2 reviews related literature, specifically focusing on the perceived benefits accruing from rural electrification and variations of accruing benefits of electrification to various social groups. A synthesis of the literature on this subject has been used to define the theoretical framework underpinning this study in this chapter. At the end of this chapter, a summary of the reviewed literature is presented. Chapter 3 contains a detailed description of the research methodology. It includes a description of the study area, research design, sampling procedures as well as data collection and analysis methods and techniques. Chapter 4 outlines the results of the study concerning the benefits of rural electrification to residents of Insiza. Discussion, conclusions and recommendations in chapter 5 are drawn from the outlines with specific reference to the study objectives. In Chapter 5, the conclusion of the entire study. In this chapter, the research findings, conclusions and recommendations are summarised and discussed.

CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

Provision of affordable clean energy to rural communities on a sustainable basis is a matter of increasing concern in the developing world. This is because of the socio-economic benefits perceived to abound for residents and other forms of sustainable energy for domestic use. Consequently, governments and institutions worldwide set targets towards improving energy access to residents (Javadi *et al.,* 2013; Shaahid *et al.,* 2014; Van Der Schoor & Scholtens, 2015). Heads of state agreed on the agenda of ensuring access to affordable, reliable, sustainable, and modern energy for all by 2030 (United Nations, 2015; Long, 2015). Sustainable Development Goals (SDGs) have roots in the Rio Declaration, Agenda 21 (1992) where heads of states were searching for interventions for sustainable development. Several summits were held after the Rio Declaration to further the applicability and practicability of sustainable development. Although the inception of rural electrification dates to 1935 in the United States of America (Carmody, 1939; Rhodes & Wheeler, 1996), the introduction of sustainable development concept promoted the provision of sustainable energy to be part of the world development agenda. As part of global development agenda, provision of sustainable energy featured in the MDGs which were further expanded to the current SDGs (United Nations, 2015; Long, 2015). Embracing of SDGs by the heads of state presents a global developmental agenda. Therefore, it is essential to appreciate the benefits accruing to residents from electrification programmes which are aimed at reviving the socioeconomic competitiveness of rural communities.

In this chapter, literature on the benefits accruing to residents through rural electrification are reviewed and factors contributing to the success of electrification programmes are examined. The nature of benefits accruing to residents are also explained. Determination of whether benefits vary according to age and gender is explored. Appreciative Inquiry (AI) 4 D Cycle is articulated as the theoretical approach of the study, and as expected, the relevance of Appreciation Inquiry to this study is highlighted.

2.2 Rural Electrification in Perspective

The first stage to rural modernisation as a strategy to eradicate poverty in rural communities has been access to sustainable energy by rural residents (Zhaohong & Yanling, 2015). Through rural electrification programmes, beneficiaries have improved economic livelihoods by engaging in

economic activities that generate income and create employment opportunities (Mandelli *et al.,* 2016; Feldman, 2017). The United States of America introduced electricity in farms to improve farm equipment efficiency and to speed the processing of farm produce due to increased demand for food as the markets expanded (Rhodes & Wheeler, 1996). Electrification of remote areas was then applied by various countries, a movement that got the attention of sustainable developmentalists. Provision of sustainable and environmentally friendly sources of energy (electricity, wind, solar among others) became a key development strategy to both developed and developing countries. Thus in 1992 during the Rio Declaration, Agenda 21 – provision of sustainable energy – was prioritised and found its position in the world development agenda (MDG and SDGs) (Sapkota *et al.,* 2013; Loomba *et al.,* 2016). The global realisation of electricity as an enabler for socio economic development which includes employment creation and poverty alleviation is critical for rural development. Therefore, scientific appreciation of such programmes is essential to get an understanding of the perceptions of the beneficiaries.

Global environmental sustainability demands have also contributed to the wide spread adoption and implementation of REPs (Akikur *et al.,* 2013). Although the main form of energy provision to rural areas has been the extension of the national grid (hydro and thermal), it should be noted that RE has been extended to mean various attempts of bringing clean energy to rural areas. These various sources of energy include off grid hybrids (Kolhe *et al.,* 2015) wind energy, solar (Palit, 2013, Rahman *et al.,* 2014) biogas and geothermal (Javadi *et al.,* 2013). For years, rural communities have been entirely dependent on fossil fuels for household energy. Felling of trees for firewood has been a major threat to biodiversity. Various attempts have been modelled to deal with these environmental concerns. Thus, the extension of the RE 'mix' has been developed to cater for various needs of different societies.

Provision of sustainable energy triggers economic development in isolated regions. It has been primarily promoted through rural electrification programmes across the globe (Jansi, 2011; Rolland & Glania, 2011). Although it is considered a worldwide attempt to oust poverty, challenges have made several programmes fail to meet the desired goals, especially due to resource constraints, discontented customers and disgruntled communities (Ahlborg & Hammar, 2014; Schnitzer *et al.,* 2014). The main objective of electrification in Zimbabwe was identified as the improvement of the socio-economic wellbeing of rural areas. This study therefore sought to discover the benefits of electrification as a source of energy for social-economic development in

rural areas of Insiza district. Reviewed literature presented hereunder was aimed to reveal what has been found and position the current study in the existing knowledge gap.

2.3 Perceived Benefits Accruing from Rural Electrification

Access to electricity has been found to improve residents' social and economic conditions (Rohani *et al.,* 2013). According to the UN country analysis, electrification benefits come to residents in three ways namely basic, productive and modern uses where in:

a) Basic uses are for lighting, health, education, communication and community services;
b) Productive uses included use as fuels and energy services, agriculture, water pumping for farming, mechanised farming and commercial agricultural processes, and
c) Modern uses in domestic equipment, cooling, heating and conditioning (AGECC, 2010).

Electrification covers various services which improve the lives of beneficiaries. Basic uses improve communication through enabling the use of electronic devices (Mapako & Prasad, 2007; Khandker *et al.,* 2014; Manning *et al.,* 2015). Use of computers and other electronic devices is enabled, which improves knowledge access and connection to the global village. Productive uses improve the economic viability of society and individuals (Khandker *et al.,* 2013). Furthermore, employment opportunities are created, household income and standard of living for rural people are improved. Modern uses further support the productive uses by amplifying services that have economic value to the society. Although rural electrification benefits are multifaceted, not all beneficiaries use electricity in line with the above categories. Benefits may vary in different societies and as per objectives of electrification programmes as outlined by the implementing institution.

Rohani *et al.* (2013) established that in Africa, Asia and Latin America, levels of health, education welfare and technology had improved because of robust attempts by governments to extend electricity to rural areas. The promulgation of Rural Electrification Plan and Rural Electrification Law in Peru reduced respiratory cases in rural hospitals which had been resulting from polluting kerosene lamps (Accinelli *et al.,* 2015). Despite the positive wave by researchers placing high value on technical achievements of RE (Javadi *et al.,* 2013) appreciation of basic socio-economic benefits of RE has not yet been widely documented. The afore-mentioned study findings showed that RE benefits went beyond economic benefits. Hence understanding of RE benefits through

resident involvement is necessary as residents identify extended benefits that would have been neglected in secondary based studies.

A study conducted in Umzingwane District in Zimbabwe (Ngwenya, 2013) revealed that clean and green energy improved information access to students and community who had access to mobile phones, televisions, radios and other communication devices which used electricity even though such households were not directly connected. Understanding the views of RE beneficiaries and sharing such findings with policy makers could contribute to improved decisions on rural energy access and increasing its impact.

2.4 The Extent to which the Original Objectives of Electrification were Achieved

The extent to which the original objectives of electrification are achieved is viewed differently by the government and beneficiaries. This section of the review sought to highlight the factors that contribute to the success of electrification programmes.

2.4.1 Factors Contributing to the Success of Electrification Programmes

Factors contributing the success of electrification objectives vary from strong guiding policies, availability of resources and the willingness of the government and the community involved. China introduced specific and time framed strategies which helped towards the achievement of 100 percent electrification of rural households. Firstly, the Chinese government and other stakeholders were strongly committed to RE (Bhattacharyya & Ohiare, 2012). The government provided a guiding plan for the electrification process. Active participation informed local participation which also helped the achievement of the desired goals of RE. The government understood resource variations in different rural communities and therefore adopted a multiple solution approach. This approach enabled the use of available resources for the construction of mini grids. It further empowered and capacitated local people with skills and knowledge to contribute to the programme. Quality and safety standards were standardised, ensuring reliable and safe provision of electricity (Bhattacharyya & Ohiare, 2012). The success story of Chinese REP provides several guiding aspects that can be benchmarked by other governments in developing country. Although resources in countries vary and the attention given to RE may vary, without a guiding plan, strong commitment to implementation and local participation, desired progress cannot be achieved. Although electrification covered extensively the rural areas, critics

argue that the demand for electricity lead to increased air pollution in China. This was attributed to the use of coal for the generation of thermal electricity.

The existence of policy guidelines in Ghana, namely the Strategic National Energy Plan 2006-2020, and National Energy Policy and Action Plan and Sustainable Development Action Plan for Ghana of 2005 which govern the energy sector have provided a roadmap for the success of the programme. Involvement of multiple stakeholders in rural energy transmission made the programme move fast to achieve the desired goals (Mahama, 2012). The policies were introduced through proper consultations with the public. Traditional leaders and other citizens were involved in planning and implementing the projects. This confirms that for a project to reach the desired goals, consultation and involvement of the entire citizenry is crucial. The achievement of the study objectives should therefore be supported by the inclusion of the residents and rural administration in projects of a national magnitude.

Rural electrification in Indonesia realised high rates of job creation, industrialisation, improved income and distribution of wealth (Mohsin, 2014). This was achieved through an aggressive national RE Master Plan supported by a viable financing plan which minimised costs and created effective institutional framework. The institutional framework cultivated decentralisation and innovative approaches where the government monitored the standards and trends of the programme. In this case, great vision showed the potentials of RE in improving rural livelihoods. The Cuban government introduced the renewable energy initiative which improved villager's access to electricity. By 2009, 90 % of Cuban residents had access to electricity from the grid whilst 7 % were linked to off grid (Cherni & Hill, 2009). All these success stories motivate the inquiry of the benefits that accrued to residents in rural areas. It has also been noted that rural electrification promoted rural irrigation, poultry projects and backyard industries in Bangladesh, Brazil, Kenya, Ghana and Zambia among other countries (Bhattacharyya & Ohiare, 2006; Gómez & Silveira, 2010; Barfour, 2013; Zomers, 2014). It has therefore been established from the above empirical literature reviews that increased access to sustainable and affordable energy by rural residents is a multi-lateral approach in addressing rural poverty and unemployment.

Lack of human capital and improper planning hindered the desired progress of RE for rural industrialisation in Tanzania and Mozambique (Ahlborg & Hammar, 2014). This limited the speed at which rural industrialisation was expected and decreased investor confidence in rural areas (Mainali & Silveira, 2012). From the above experiences, it can be concluded that the success of

RE projects was solely dependent on the attention given by the governments and their stakeholders. In addition, proper financial planning and involvement of the local people played a major role in the achievement of the desired goals. Lack of such commitments led to poor results as was the case in Tanzania and Mozambique.

Although the economy of Zimbabwe is currently depressed, there has been a significant improvement in rural livelihoods over the past two decades. This has been necessitated by government programmes such as RE and agricultural reforms (Mushonga & Scoones, 2011). The Zimbabwean REP was introduced to reduce poverty by targeting income generating activities in rural areas and address other socio-economic challenges inherited from the colonial regime (Siyachitema, 2002; Mapako & Prasad, 2007). Mapako (2007) observed the positive link between energy and development in Zimbabwe. Siyachitema (2002) alluded on the reduced levels of indoor pollution and deforestation. Electrification proved to promote productive time use by women. The time that used to be spent on laborious search of firewood by women could be spent on baking, sewing and other socioeconomic activities (Siyachitema, 2002). Despite the government's attempt to address electrical energy access and usage, backlogs persist. Scattered settlements with poor road networks and rugged terrain make it difficult to extend the grid to reach everyone. Furthermore, low income based on subsistence agriculture and lack of access to electric equipment still bridge the desired goal of RE (Dube, 2001; ADEA, 2013). Despite these challenges, most researchers' negative perception about rural communities have contributed to little attention given to the appreciation of the benefits accruing through rural electrification (Muldera & Tembe, 2008). This study aimed at engaging with the most disadvantaged rural electricity beneficiaries to garner their voices. Such contribution would assist in mapping a resident-centred developmental policy. Furthermore, involving residents in identifying the benefits derived from electrification can suggest or point to other possible means that can be used to improve rural energy access.

Schillebeeckx (2012) analysed 323 scholarly articles on REPs which revealed that most governments prioritised institutionalisation and expanding technology to rural areas (Siemons, 2001). The priorities did not integrate viability in terms of revenue structure. The challenges included the government's inability to construct and maintain infrastructure and the inability of the consumers to pay rates. User centric variables to do with understanding the needs of customers, and providing technology that addresses customer needs in an affordable and reliable manner were also factors that did not get much attention. These were the main causes of failure of RE

projects in developing countries (Nygaard, 2010; Muldera & Tembe, 2008). Lack of community participation in design and assessment were also identified as hindrances to desired progress (Yadoo & Cruickshank, 2010). The study proposed and recommended a framework which integrates technology, institutional, viability and user-centric variables which governments and institutions could apply for the success of REPs (Schillebeeckx, 2012). This study sought to discover the benefits resulting from RE. Contributions made by residents through identifying the benefits of electrification will further assist in the design and empowerment of the beneficiaries to get the best out of RE. Possibly, resident involvement would prove to be the best strategy to be used by the Zimbabwean government to further pursue RE objectives.

Factors that contributed to the success of rural electrification were collected from national statistical reports, UN project reports and other development agencies. Systematic review of secondary data and contingency analysis was used (Manning *et al.,* 2015). Cross sectional studies provided the generic picture of RE projects mostly in developing countries. Content analysis and categorization were used to analyse data (Cust *et al*., 2007; Bhattacharyya & Ohiare, 2012; Rao, 2013; Rohani *et al.,* 2013; Zomers, 2014). The fact that the above study conclusions were based mostly on secondary data, reflects the controversial knowledges on rural electrification. This could have been caused by the agenda and objectives that motivated such studies. Primary information is always crucial to verify what is generally accepted. Hence this study combined the primary data and secondary data for a balanced conclusion. Primary data also assisted in getting residents' insight of what they regard as benefits of electrification. This study employed interviews through Focus Group Discussions (FGDs) and facilitation of questionnaire with a sample from the community and the rural district administration. The samples were taken from various demographic groupings across the wards under study. This is discussed in detail in the following chapter. Findings of the study can assist in the formulation of responsive policies and strategies for rural development.

2.5 Benefits Accruing to Gender and Socio Demographic Group of Residents

Rural electrification bridges the digital gap in rural residents and educational institutions (Javadi *et al*., 2012). Studies conducted in Philippines, Peru and Kenya attested that electrification promoted basic computer skills development for students (Bernard, 2012; Aguirre, 2014; Accinelli *et al.,* 2015). Ahlborg & Hammar (2014) confirmed this through citing improved performance of students in Zambian rural schools because owing to availability of electricity. Zomers (2014)

further pointed out that RE has the potential of changing rural development trends and promoting social stability. Guardians who responded to a study conducted in Kenya indicated dissatisfaction with electrification to some extent. This was because children and youth spent much time on social media channels. However, it was an advantage to the youth as it elongated their study times, expanded their social networks and bridged the digital gap (Wyche *et al.,* 2013). Studies in Matabeleland found that entrepreneurs appreciated rural electrification as it improved their economic participation and social benefits (Ngwenya, 2013; Mabhena & Moyo, 2014). Individuals who did not access and those who did not use electricity saw no value of it to their lives.

South African achieved a significant improvement in rural energy access from 35 % in 1990 to 84 % by 2011 (StatsSa, 2012). Although not all residents benefited from rural electrification, such improvement resulted in enhanced rural life and growing business opportunities in rural areas. A study conducted in rural South Africa also confirmed Ngwenya's (2013) findings in that some respondents did not see the value of electricity because they had no electrical appliances or were not engaged in any activity that used electricity (Matinga & Annegarn, 2013). Rural electrification improved socio-economic viability of South African rural communities (Prasad, Dieden, 2007, Dekker *et al.,* 2012). It was reported that primary health care improved in the rural areas that accessed electricity (Bernard, 2012, Kusakana, 2014). It was further recorded that through rural electrification, 2390 temporary and 197 permanent jobs were created by 2003 (StatsSa, 2012). The above evidence suggests that rural electrification as witnessed in other countries, South Africa have also accrued various benefits which contributed to rural economic and social wellbeing of the South Africans.

Siyachitema (2002) discovered that people experienced different electric satisfaction. This was revealed by responses from residents of Seke and Chitungwiza rural villages. Women showed user satisfaction as it substituted polluting firewood. School going children indicated improved study times and introduction of computer curriculum (Siyachitema, 2002). This was the general finding among different social groups in various areas. Although electrification benefits vary with age, gender and position in society, there is a thin line in differentiating the benefits between genders. For example, what is valued by youths is different from that of women and business people. Through this study, determination of accruing benefits amongst socio demographic classifications was vital as it gave a clear picture of how the availability and access to electricity in the rural community under study was viewed.

2.6 Theoretical Framework of the Study: Appreciative Inquiry (AI) Model (4-D cycle)

The Appreciative Inquiry (AI) model (4-D cycle) (Cooperrider *et al.,* 2005) informed the current study. Figure 2.1 shows how the model was designed to change the vision and thinking of human kind towards development of their community. Appreciative Inquiry acknowledges the positive change and benefits brought to a society by a development programme. This supports the basis of this study. Although there may be some negative effects brought by the REP to Insiza residents, there is a positive side to acknowledge. For example, improved teacher retention in rural areas, establishment of entrepreneurial projects like welding and boiler making and water pumping for household and irrigation. A society's change is proportional to the passions, interests and perceptions people have (Cooperrider & Whitney, 2001; Kessler, 2013). This point motivates residents to be optimistic about development. This anchor the essence of this study in that, the more positive aspects are identified about a programme, the more value is realised. For example, the study builds on identifying the benefits accruing to residents and further give suggestions on how to improve the existing benefits. Furthermore, such inquiries promote positive thinking about developmental projects in a society and create new avenues for improving development projects. Beneficiaries of such developmental programmes could apply innovative strategies that can improve the impact of the programme on their livelihoods.

The AI framework was relevant to this study because discovering the positives about electrification creates a positive mind set in residents and opens their innovative thinking regarding the value of electricity to their lives. Furthermore, promotion of residents to be futuristic is enhanced (Whitney & Trosten-Bloom, 2010) if the programme is improved and maintained properly. This framework also shows an element of improving the vision of rural administrators and developers to "dream and design" what can be the best for residents if the latter are consulted. The AI has been used for discovering, understanding and fostering improvements in communities (Cooperrider *et al.,* 2008). Linking to this study, AI cultivates innovativeness concerning what can be done to such developmental projects to empower and change many rural lives. This can be achieved if residents identify the positive aspects brought by the programme. Thus, a more appreciative direction yields positive change, and more negations and complaints lead to apathy and demotivation.

Appreciative Inquiry model is grounded in a positive question (affirmative topic choice) which originates out of will. The question motivates individuals to engage and identify the positives and

be willing to influence constructive change (Cooperrider *et al.,* 2005). In this regard, the research objectives were aligned to this model. The study triggers an investigation on how the benefits that accrued to residents through electrification, can be improved. The respondents were guided to discover benefits of electrification through positive questioning that led them to visualise what could be the benefits of electricity access for their livelihood improvement (Kotter, 1996). Hence institutions and residents would move from negative stereotypes to a positive thinking that could influence change and improve residents' livelihoods through their participation.

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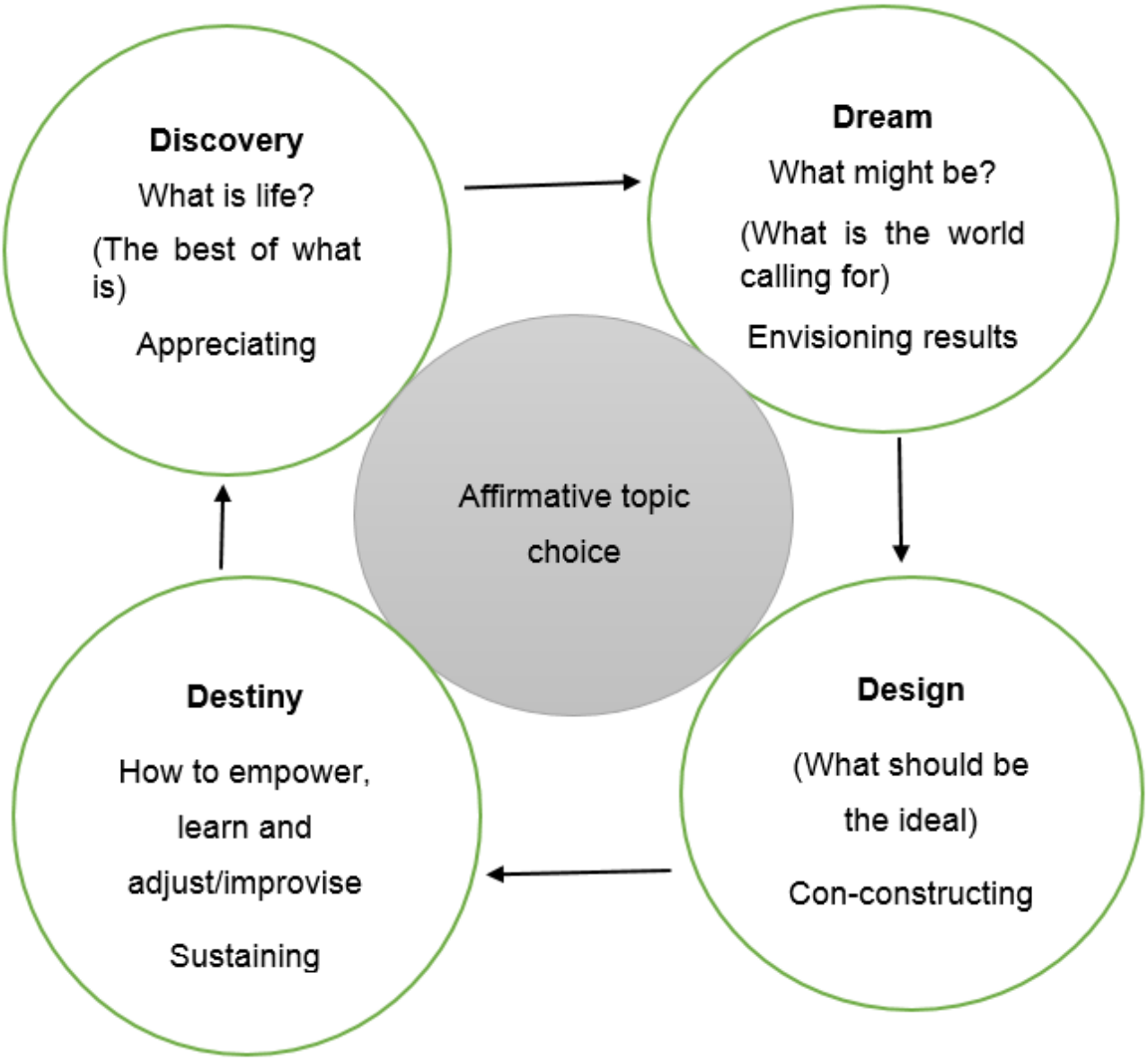

Figure 2.1 Theoretical Framework of the Study: The 4 D Cycle as a Model of Appreciative Inquiry.

The Cooperrider *et al*. (2005)

2.7 Summary of Literature Review

Literature revealed that RE brought multi-faceted benefits and challenges. It emerged that electricity was used for basic things such as lighting, health, and education by rural people. Electricity was also used for agriculture implements, irrigation water pumping, mechanised farming, commercial agricultural processes and for domestic equipment, cooling, heating and conditioning. The nature of benefits or challenges depended on the beholder. Youths and the students proved to have more appreciation for RE as it addressed their most urgent needs, such as improving access to information and internet social networking. It was found that institutional support and proper planning together with active participation of the community from planning to implementation yielded positive outcomes. This was observed in RE projects implemented in China and Ghana. Poor institutional support yielded poor results as evidenced in Tanzania and Mozambique. Conclusions from most studies on rural electrification, were based on secondary data. It can be argued that this did not fully portray the original views of beneficiaries because the analysed reports had varying objectives. However, for the current study, a deeper understanding of the residents' perceived benefits was inquired using a resident-centred research design where most of the information was primarily collected and secondary data was used for cross reference purposes only.

The main aim of electrification in the developing world is to link electricity to rural strategic centres which include schools and business centres. It was also found out that increased electric access to rural areas addressed several socio-economic challenges such as bridging the digital gape, reducing indoor pollution and deforestation. The AI framework promotes a positive thinking about development. A resident-centred study provided resident's views that help to get a deeper understanding of their views on benefitting from RE. The views can contribute towards improving RE for the mutual benefit of residents and the local authorities in promotion of social cohesion, fight against poverty and job creation in rural Insiza.

CHAPTER 3 RESEARCH METHODOLODY

3.1 Introduction

Application of more interactive and relevant research methods determines the extent to which research goals are achieved. In this chapter, the methodology used for this study is described. Kothari (2004) describes research methodology as a systematic procedure describing how data will be collected. The study area and size of the population are described, and the location of the sampled areas are shown. Due to involvement of multiple stakeholders in this study, a modern mixed scientific approach on data collection was used. Data was collected in phases from various stakeholders in the community and information provided was further authenticated through a transectional drive in the wards. An elaboration is done of the study design, the study population and sampling techniques applied. The two-stage mixed method design approach applied in this study is explained. Lastly, this chapter highlights a summary of how data was analysed.

3.2 Description of the Study Area

The study was carried out in Wards 5, 7 and 12 of Insiza South District (Figure 1) situated in Matabeleland South Province of Zimbabwe. Matabeleland South Province constitutes 5.2 % of the national population (ZimStat, 2012b). Insiza district had a total population of 100 333 in 2012 and 49.2 % were male. The district had 21347.4 households with an average of 5 individuals per household (ZimStat, 2012b). The wards under study had five villages each. Ward 5 had 950 households, Ward 7 had 815 whilst Ward 12 had 452 households (ZimStat, 2012b). The district is characterised by perennial acute drought and food shortages due to unfavourable climatic conditions and deteriorating farm land (Bird & Shepherd, 2003). More than 51 % of households hardly afford three meals a day (ADEA, 2013). More than 83 % of rural residents are not employed, and more than 60 % of households survive through remittances from their family members in the diaspora (Dube, 2014). Less than 27 % of the rural residents reside in modern houses. Sixty-seven percent of the resident's lack access to clean piped water (ZimStat, 2012a; Masuku, 2012; Ngwenya & Matingwina, 2014). Seventy-nine percent of the population use wood as a household energy and are not connected to electricity (REA, 2002; ZIEPC, 2011; Scoones *et al.,* 2012; ADEA, 2013).

Figure 3.1 Map showing the study area in Insiza South District of Zimbabwe

Coordinates 20° 32' 59" S, 28° 58' 30" E

Department of Surveyor General in Zimbabwe (2011).

There are nine primary schools, 5 secondary, two of these offering studies up to advanced level (Form 6) in the study area. The study area has three rural health facilities, one in each ward (ZimStat, 2012b). There are ten business centres and one of these has government satellite offices which include Veterinary Services, Agriculture Extension Services (AREX), District Development Fund (DDF), Ministry of Home Affairs, Registrar General and Zimbabwe Republic Police (ZRP) (Zimbabwe Parliament, 2011; ZimStat, 2012b). Figure 3.1 on Page 21 show the location of the study area in Zimbabwe.

3.3 Ethical Values of Research

Research dealing with humans must meet certain standards not to violate human norms and values (Singhapakdi *et al.,* 1995). Upholding ethical values and observing protocol in research makes authentic and reliable research findings (Bernard & Gravlee, 2014). In conforming to academic standards, the project acquired ethical clearance from the University Ethics Committee (Project No. SARDF/16/IRD/05/1405) (See appendix 7). Clearance from the office of the District Administrator (DA) (See appendix 8) and from the Insiza Rural District Council (IRDC) (Appendix 9) was granted prior to data collection. Key informants, ward councillors and residents who participated also gave consent by filling in the prepared consent form (see Appendix 3) which had approval letters from DA (see Appendix 8) and IRDC (see Appendix 9) attached. This was done to confirm to the respondents that the study had been approved, confidentiality upheld and that they would not be victimised or prejudiced by participating in the study.

3.4 Research Design

A mixed methods research design was used. Both qualitative and quantitative data collection were applied separately in a sequential order in line with Nataliya and Stick (2007) and Creswell (2012). Sequential application of qualitative and quantitative data collection approach was aimed at complementing results from each phase. This improved the quality of results. Qualitative data was collected using key informant interview in the first phase and the results of this phase informed the development of phase two data collection tools (See Appendix 4). Focus Group Discussions (FGDs) were used in phase two of data collection. The FGD guide comprised of closed-ended questions. This was done to determine whether residents and officials shared a common understanding of RE and benefits accruing thereof. Results from the two phases were analysed and merged for the conclusion of the study. Figure 3.2 shows the explorative sequentially design procedure.

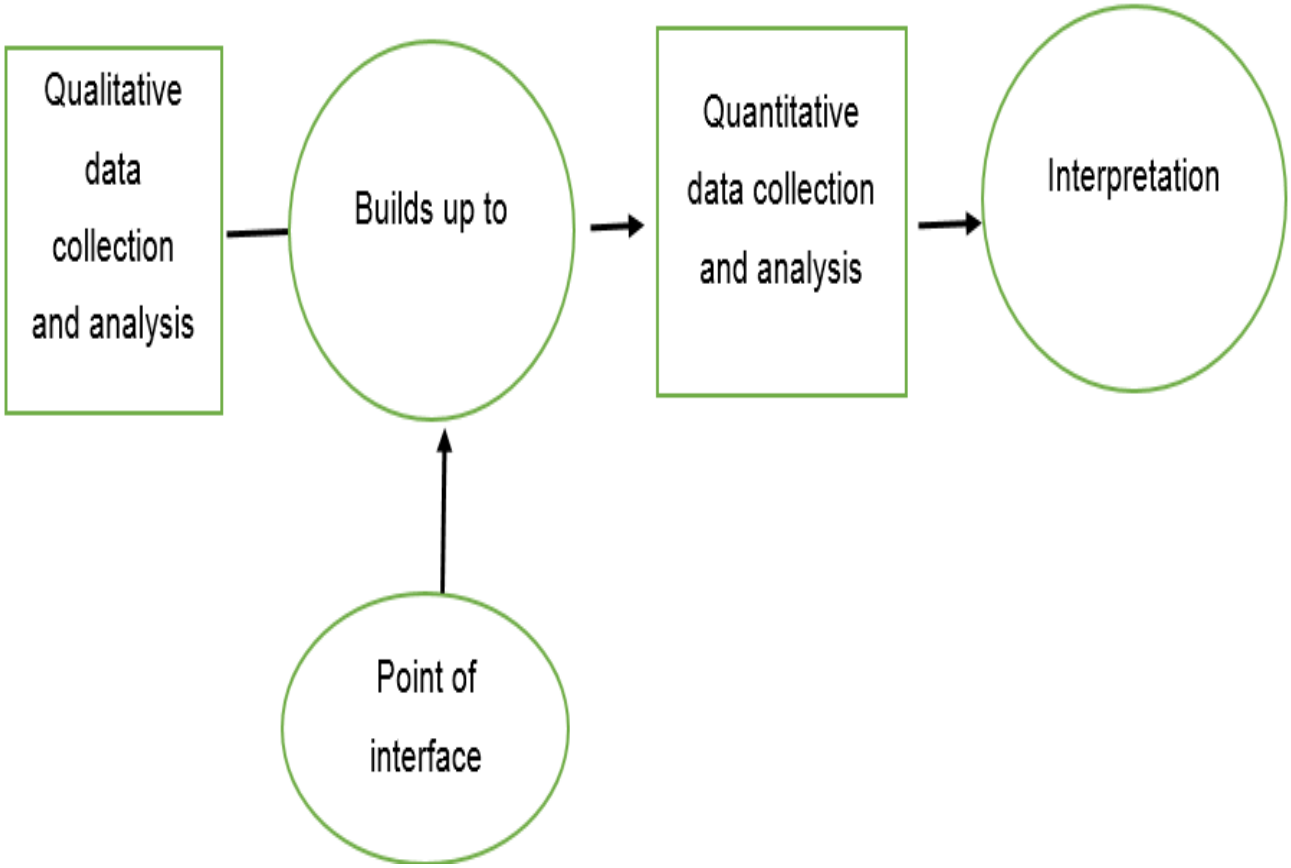

Figure 3.2 Exploratory sequentially integrated mixed methods design

Adapted from Nataliya & Stick (2007)

The explorative sequential design procedure highlighted in Figure 3.2 shows that qualitative data was collected first. Findings from the qualitative data were used to develop tools for quantitative data collection in phase two (*point of interface*). Phase one and two results were later merged to come up with the conclusions of the study. Applications of a sequentially flexible and iterative research design have yielded better results in understanding broad topics that involve various stakeholders (DeVellis, 2003). Although explorative sequential design is more biased to qualitative methods, Creswell (2013) further alludes that this form of mixed method make qualitative methods to be more acceptable to quantitative biased audiences. This is because qualitative and quantitative research approaches combined give more valuable and reliable results compared to using either one of them (Johnson & Onwuegbuzie, 2004; Creswell, 2013). The two approaches complement each other and limit bias (Nataliya & Stick, 2007). This was the case in this study because quantification of results was built from outcomes of qualitative data, which were the responses of the key informants.

3.4.1 Data collection

Data were collected in two phases. Firstly, key informants were interviewed using an interview guide (Appendix 4) and the results of the interview were used to model the questions that were asked during the FGDs using a prepared group discussion guide (Appendix 6). Direct observation and secondary data augmented the data collection process.

Key Informants Interviews

The major institutions that participated in the study had more male than female employees as evidenced by the fact that out of the eight key informants interviewed, six were male. The respondents comprised one representative from the DA's office, one from Insiza Rural District Council (IRDC), one from Zimbabwe Electricity Transmission and Distribution Council (ZETDC). One key informant was from Rural Electrification Agency (REA) Matabeleland South Region, two ward councillors and two village heads. All respondents were above the age of 36. Exclusion criteria used was to get people who had served in the institutions for more than 5 years. This was aimed at getting respondents who were knowledgeable on the programme. Three of the informants had secondary education whereas five had tertiary qualifications. Interviews were conducted during business hours at scheduled times. For time management purposes, interviews were recorded and later transcribed. Length of each interview ranged between 27 and 50minutes. For example, interviews conducted with REA, ZETDC, DA and IRDC representatives lasted 47,

40, 37 and 44 minutes respectively. Variations of time spent with each representative could be linked to the knowledge and interest the respondent had on RE. The ward councillor's and community leader's interviews lasted 27 and 33 minutes respectively. The ward councillor and the community member's interviews lasted for 27 and 33 minutes respectively. The interview time with the latter was shorter since they did not respond to some of the questions which they referred to administrative level, that is, IRDC, REA and DA's respondents.

Open-ended questions were used to interview the eight key informants. This required that the interviewee understood the REP, including when it was initiated in the district. The number of key informants was cut off at eight after reaching data saturation (Abbasi *et al.,* 2016; Tran *et al.,* 2016). Key respondents provided the objectives of the programme and identified the institutions that coordinated it. Key respondents further identified the role of electricity to the rural economy, social and technological spheres of the rural areas.

Collection of Global Positioning System (GPS) coordinates of electrified places

The IRDC and DA approved a transversal drive during which electrified centres in the wards were visited. Transect drive refers to a systematic cross sectional vehicular drive which was used, in this instance, to digitally identify and record electrified centres and households within the wards. This activity was done with assistance of a district extension worker who had knowledge of electricity areas in the wards. Global Positioning System (GPS) coordinates were recorded and presented to the University of Venda Geographical Information Systems Department to assist with the generation of a scatter map. Use of GPS was adopted because of its high degree of accuracy and fastness in identifying the exact position of a place (Shen & Stopher, 2014). This information assisted in determining the achievement of the objective of the REP. During the transect drive, community members who were met along the way assisted in identifying households that were electrified. The total number of electrified centres per category that were identified during this survey are shown in Table 4.3 and are categorised per ward. This exercise was done to complement information gathered during key informant interviews. Direct observation and collection of this information provided valuable evidence of electrified areas in the district which would in turn assist in the assessment of the extent of benefits of electrification amongst residents.

Interviews with residents of grassroots communities

Dates were scheduled through consultation with councillors for interviews with residents between 24 October and 2 November 2016. Interview tools for this phase were informed by the results obtained from phase one. One hundred and two residents participated in phase two of data collection. Residents firstly responded to a closed-ended individual questionnaire. This was aimed at grasping individual views about electrification in the ward. Upon completion of the questionnaire, it was collected and residents formed groups for FGDs. Ward 5 had 27 representatives, ward 7 had 48 whilst ward 12 had 27. Ward 5 and 12 had the same number of participants for the individual interviews. It should be noted that the call to attend the interview was voluntary. Information was disseminated through the ward councillors. Ward councillors tasked the village heads and the head men to further inform their constituents. Building trust and rapport in ward seven, the community leader further sent the message to the local school (Mkhwabene primary and secondary schools) which could have influenced the high attendance

Focus Group Discussions

Village heads and other community leaders mobilised residents to participate in the organised meetings that were held in ward community halls. Seven FGDs were formed in phase two. Two groups were from ward 5, two from ward 12 and the remainder from ward 7. Ward 7 had three groups because of the higher number of respondents. All groups had a fair representation of male and female participants of various ages. Residents formed groups comprising of males and females of various ages and responded to open-ended questions.

Due to varying times of arrival for the meetings, respondents for FGDs had a maximum of sixteen participants. Out of the total respondents, 45.1 % were male. Each group appointed a secretary to scribe responses which the group had agreed upon. Focus group discussions were applied in this study because of their usefulness in gathering opinions and group perceptions as compared to using one-on-one interviews. The groups used participatory method (scoring and ranking technique) in identifying the most accruing benefit (Krueger & Casey, 2014; Bryman & Bell, 2015; Guest *et al.,* 2016). This method of data collection is termed “moment of methodological innovation” by Onwuegbuzie *et al*. (2010) meaning that it is an approach that applies various means of data collection tools and techniques to understand a shared meaning in FGDs and phenomenon under study. In this case, such strengths were used to get the views and perceptions

on benefits accruing to residents as a result of electrification. A broad range of information was given by various ages who participated, ranging from sixteen to ninety-two years old.

3.5 Data Analysis

Data was analysed and interpreted to derive meaning from participants' responses. Methodical application of qualitative and quantitative methods, techniques and tools was used to understand the bigger picture of the data collected (Gelman *et al.,* 2014). The process described and evaluated the data to make sense of it and informed conclusions were made. Processed data were presented in themes, tables, diagrams and pictures which were anchored by explanations (Creswell, 2012). In this study, qualitative and quantitative data were cleaned, validated and categorised using thematic approach and IMB SPSS. Therefore, when data were collected they were taken through this process so that meaning, conclusions and explanations could be drawn in understanding the benefits accruing to residents of Insiza South from RE.

Although there are no universally established guidelines on data transcription, Mclellan (2003) posits that any method used should be systematic and help the researcher and allow the interactive process. With reference to this study, qualitative data were transcribed and responses categorised into subheadings. Personal observations and notes were made immediately after each interview. Personal observation and notes were used because it has been noted that non-verbal cues have a lot of meaning during data collection (Mclellan, 2003; Wigham & Chanier, 2013). Observed behaviour during data collection was used to determine factors that could have led to certain responses being made.

Quantitative data was coded and computed to Microsoft Excel package. It was further sorted before importing to International Business Machines, Statistical Product and Service Solution (IBM, SPSS) for analysis. Data were screened and cleaned so that given responses were complete and ready for analysis which would in turn lead to an informed conclusion. Missing values were imputed. Imputation was done because there were random cases which bore no significance to the study objectives. Data screening was informed by DeSimone *et al.* (2015) who described screening as ways of identifying errors, response patterns, and dealing with omissions before data analysis. Pallant (2013) stresses that understanding basic statistics improves efficiency of data analysis using IBM SPSS. Using this software made it easy to generate descriptive statistics such as means, cross tabulation and patterns.

Figures 3.3 and 3.4 highlights respondents participating in FGDs and Figure 3.5 shows individual respondents completing the study questionnaire. Inclusion of these images in this study further illustrates the authenticity of data collected and how the method of methodological innovation (Onwuegbuzie *et al.,* 2010) was used to substantiate data collection methods and techniques of the study.

Figure 3.3 Residents deliberating on research questions during Focus group discussion in ward 5

Figure 3.4 Residents deliberating on the research questions in a focus group discussion in ward 7

Figure 3.5 Residents of ward 5 completing a questionnaire individually

CHAPTER 4 DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.1 Introduction

In this chapter, the results of the study regarding benefits accruing to Insiza South District residents of Zimbabwe through rural electrification (RE) are presented, interpreted and analysed. The level of residents' participation in the study is discussed. Firstly, a qualitative discussion and interpretation is given followed by the quantitative description and discussion of results in a sequential integrated design was as applied in data collection. Residents ranked the benefits of electricity in order of priority. Cross tabulation was used to summarise categorical values of residents' perceptions on rural electrification benefits. Using the Chi-Square, determination of whether perceived rural electrification accrued to residents by gender and location in society was presented. An evaluation of the achievement of the original objectives of RE was made.

4.2 Research Participants

As reported in Chapter 3, there were eight key informants from various institutions who participated in this study during phase one. All participants were above the age of thirty-six. Six of the informants were male. The majority of officials in the district were male even though there were more females than males in the district population. One hundred and two residents participated in phase two of data collection from the three wards. Participants were from various age groups varying from as young as 16 years and as old as ninety-two. Forty-five percent of the respondents in this phase were male. This representation reflected the district population ratio (ZimStats, 2012b). Having various age groups and different genders was aimed at perceptions across these criteria. The majority of respondents were between the ages of 25 and 67. There were six representatives aged of 34, making it the most frequent age group followed by those in the ages 38, 68 and 78 which had four each.

Table 4.1 Village representation during Interviews and Focus Groups Discussion

Ward	Village	Number of participants
5	Mbabala	7
	Sababa	4
	Siyaphambili	4
	Thandabantu	6
	Qhubekani	6
	Village subtotal 1	**27**
7	Bambanani	6
	Mbembesi	9
	Sibantubanye	7
	Bambanani	4
	Zhombili	1
	Village subtotal 2	**27**
12	Phakama	6
	Mathabisa	9
	Phumelela	4
	Ukuthula	5
	Dewa	1
	Village subtotal 3	**48**
	Total Sample	**102**

Residents who participated in this study came from the villages within each ward. A summary of residents who participated in data collection from each ward and village is presented in Table 4.1. Mbembesi and Mathabisa villages from Ward 7 and 12 had the highest representatives of 9 each respectively. In this study, ward 7 had the highest number of attendees. One of the attendees explained that residents from Sibantubanye and Mbembesi villages were usually forced by their community leaders to attend ward meetings. Those who seemed not willing to participate were said to be eliminated on the government programmes and food aid from non-governmental organisations. It was noted that community leaders kept registers of individuals who regularly attended meetings who would then be considered as beneficiaries. Therefore, some respondents might have attended the organised meetings to secure their future food aid allocation. However, their contribution in the discussions and interviews was substantial because of the nature of the inquiry which was even welcomed by the local authorities. The Zhombili and Dewa villages in ward 7 and 12 had the least representatives. The low figures of representation from the two villages were explained by one respondent who said that despite the long distance to the centre, residents from the two villages were always reluctant to attend meetings. The resident pointed out that this was because of continued unfulfilled promises made by politicians when they called community meetings. These sentiments revealed that these villages were politically volatile while others had become apathetic. Those who were threatened with hunger by their leaders by way of omitting them from the donor food distribution list felt compelled by their situation to attend community meetings. These findings indicate the need to educate residents about the importance of participating in developmental activities. This also suggested a future research project – to explore how poverty and politics affect citizen participation.

Having various representatives from different villages of the wards was done to reduce bias. Mayer (2016) states that although it is a challenge to have representative participation on community engagement, general citizens have a deep interest and willingness to invest their time in representing community members who choose not to participate. The selected wards had such characters who showed interest and participated, for example Mbembesi and Sibantubanye villages had an outstanding turn up. Such zeal was appreciated for it helps drive a citizen-informed developmental agenda.

4.3 Perceived Benefits Accruing from Rural Electrification

Perceived benefits accruing from RE to residents were multi-faceted. It is instructive to be mindful of the observation of Cabraal *et al.* (2005) who argued that it was not an easy task to bracket benefits of electricity to certain spheres. Benefits of rural electrification go beyond generic welfares. Electricity has ripple effects in the lives of recipients. Hence in this study, focus was on residents' perception on electrification benefits.

Thematic content analysis was used to interpret data from key informant interviews and focus groups discussions. Thematic analysis is an accessible and flexible form of analysis that clarifies conceptual challenges (Braun *et al.,* 2014). This form of analysis was adopted because of its flexibility, particularly that it can be conducted in various ways. Through this form of analysis data were compared and themes were derived. Themes were further enhanced by categorisation and search for significance of the benefits to residents. Table 4.2 presents a summary of themes that emerged from each discussion.

4.3.1 Economic benefits of rural electrification

The main objectives of RE were to rekindle rural economy and create job opportunities for residents. Availability of electricity is presumed to enable business entities that can boost the economy of the area and the country at large. In this study, residents expressed various perceptions on benefits of electrification. The following section presents such perceptions following the main themes that emerged in this study.

Business ventures

Electricity was identified as one of the major ingredients of rural economic growth. Electricity was said to be an enabler or a catalyst for economic progress. The respondents emphasised how electricity could boost the rural economy which could enable the youths to be more economically active and add value to the economy.

> *Turning, pushing, building the economy, putting wheels to the economy, electricity is the backbone to the economy, enables youth to start micro businesses that generate income for their sustenance (ZETDC respondent).*

Solar powered water pump provided water for irrigation in Ward 5. Irrigated vegetable provided fresh produce for the surrounding communities thus boosting food security and nutrition. A community member who participated in the interviews indicated that there was evidence of frozen foods being sold at growth points within the ward. This had been made possible by the availability of electricity for refrigeration. This also assisted in improving food quality, variety and modern preservation. In this instance, the availability of electricity had multiple string benefits.

A key informant from ZETDC highlighted that residents had established micro business enterprises which included baking and rearing of poultry. He further linked this development to the time that electricity had freed up for female residents. This notion was also raised by an IRDC respondent who highlighted that women who had earlier been subject to “hard strenuous labour” in the sun could now get some of their manual labour done by electrified machines.

> *Women used to manually pound grain when preparing family dinner which was a strenuous exercise after a long busy day doing several family chores. Before electrification there were few diesel-powered grinding mills which were inefficient and expensive to facilitate grinding and milling. Currently there are electric grinding mills in every growth point and in some villages where there is electricity. Women are involved in baking, for example the bakery project at Avoca in ward 12 where they produce fresh bread and buns for the community. Beneficiaries earn a surplus income (IRDC respondent).*

Electric grinding mills were seen during the transect drive at Sidzibe, Fulunye, Avoca and Vokola growth points. The grinding mills provided quality and efficient grinding services, substituting manual pounding of grain by women. This was further confirmed by residents when they ranked milling (Table 4.3) as the foremost benefit of electrification in Insiza South. Findings from key informant interviews were complemented by residents who confirmed the value of electricity to their livelihoods. Self-administered questionnaire and FGDs conducted revealed that 94.1 % agreed that electricity was used for milling, 92 % of residents confirmed that electricity was used for irrigation purposes and 93.3 % highlighted the use of electricity for boiler-making. Cottage industries were cited as part of economic activities resulting from electrification for instance welding and sewing. The community respondents elaborated that such entrepreneurs had localised the production of door frames, wheel barrows, hoes, axes and many more tools used in a village household.

Table 4.2 Summary of objective-aligned themes and sub themes emerging from the study

Objective	Theme	Sub theme
1) Identify residents' perceived benefits accruing from Rural Electrification	Economic Social Environmental	i. Business ventures ii. Hygiene iii. Educational iv. Communication v. Reduction of pollution
2) Determine whether perceived rural electrification benefits accruing to residents vary due to gender and location	Variations in perception of benefits	i. Children ii. Youth iii. Elderly
3) Determine the extent to which the original objectives of electrification were achieved	Evaluation of electrification objectives	i. Provision of energy to rural homes ii. Equal distribution of energy to rural residents iii. Reducing poverty iv. Connecting institutions v. Enabling use of electric appliance vi. Communication and technology
4) Recommend interventions for enhancing the desired benefits of REPs	Interventions for improving electrification benefits	i. Institutional ii. Communal iii. Partnerships

Table 4.3 Important uses of electricity ranked by residents during FGDs

The importance of electricity in your rural area in order of priority	Group A	Group B	Group C	Group D	Group E	Group F	Group G
a. Milling	1	2	4	1	1	3	6
b. computer studies	2	4	3	4	3	2	4
c. lighting	3	-	6	3	2	1	1
d. cooking	4	-	8	5	4	5	5
e. welding	5	-	-	2	-	4	9
f. charging phones	-	-	1	-	5	6	8
g. Ironing	-	5	-	-	-	8	10
h. water pumping	-	3	5	-	-	-	-
i. business projects	-	1	-	-	-	-	-
j. prevention of environment	-	-	10	-	-	-	-
k. refrigeration of medicines and vaccines	-	-	2	-	-	-	-
l. communication	-	-	-	-	-	-	2
m. studying	-	-	-	-	-	-	3
n. helping mothers in labour	-	-	7	-	-	-	-
o. Security services	-	-	9	-	-	-	-
p. Radio and televisions	-	-	-	-	-	7	-

Cabraal *et al.* (2005) alluded to the fact that rural electrification has been narrowly linked to direct benefit regarding the improvement of gross domestic product of given communities. Muldera and Tembe's (2008) studies in Mozambique concluded that despite low quality institutional support, electricity was considered a necessity but it was not enough to complete socioeconomic development in rural areas. Its contributions are an important ingredient in human life because electricity has multiple uses that include cooking, ironing and refrigeration. Use of electricity cannot be entirely linked to improving economic activity or considered as an insignificant need. Its availability triggers and enables a variety of activities. In this case of Insiza South, entrepreneurs had been activated, further resulting in a multiplicity of social benefits. For example, communication through social media (Facebook and WhatsApp) marked a great improvement in rural Insiza.

Views were gathered from the key informants whilst residents in FGDs ranked the perceived benefits of using electricity in their communities. Table 4.3 shows results of this exercise. Prioritisation of benefits assisted residents to identify the most significant benefits among others. Following the table's scheme, the lesser the value allocated, the higher the priority of the benefit was. Perceived benefits with the least total became the best accruing benefit from the residents' point of view. In this case, residents viewed using electricity for milling as the best benefit followed by use of computers and for lighting. Security and use of broadcast radio were ranked the least important. Although groups had different views on benefits accruing to residents, using this scoring and ranking technique proved that milling was the ranked as the most important benefit by all residents.

4.3.2 Social benefits of rural electrification

The REP was found to have had significant social impact in rural areas. It was revealed that provision of clean water for household consumption had improved, which in turn reduced illnesses due to water-borne diseases such as cholera and typhoid. Figure 4.1 shows a community pump providing clean water closer to the Dekezi schools in Ward 12. During an interview with a key informant, the IRDC representative highlighted that there were several water purification plants which included the Siwazi Dam among others.

Although Siwazi Dam provided the wards with clean consumable water, not all surrounding residents accessed water from there. Some residents still fetched water from unprotected sources

such as open wells in seasonal, with few areas fetching water from boreholes. Avoca business centre, the chief's home stead, Avoca Hospital and a few households in Ward Six had access to piped water. Most residents still faced installation challenges which included the purchase of pipes, and other materials needed for water connection. The scattered (unstructured household distribution) settlement pattern resulting from colonial factors, augmented by rugged geographical landscape also presented physical challenges for the extension of such services to households.

During these FDGs, it was pleasing to note that women contributed and were given a chance to explain their choices. Uses of electricity were then arranged in order of significance within groups. Use of electricity for milling dominated all entire groups, having three of the seven groups choosing it as the most significant use of electricity. Electricity for educational purposes such as the use of computers, household lighting, cooking, charging of phones and welding were also popular choices in the FGDs. Uses of electricity for business projects, water pumping, refrigeration of drugs and medicines at clinics and communication had the least choices. There was a discrepancy between the FGDs and the objectives of RE in the sense that amongst other things, the government introduced electricity to create an enabling environment for the creation of business projects, education and household use. The group priorities did not recognise uses of electricity for business projects. Instead, the value of electricity was strongly associated with the processing of their farm produce and for schooling.

The respondent from REA was positive that access to electricity had improved health services in rural areas. This was corroborated during the interviews with the DA's representative and residents who stressed that electricity was an enabler of services which had previously been known to be provided in towns only. Figure 4.4 shows number of electrified institutions per ward. It was pointed out that rural clinics/hospital, had acquired refrigeration equipment to store and preserve drugs and vaccines (rabies and neonatal vaccines) that needed controlled temperature conditions. The ability to have such drugs in the rural health centres assisted in conducting safe births at any time of the day. Access to, and use of electricity, had thus improved health service delivery systems. Respondents further highlighted that health practitioners could sterilise health equipment, thereby reducing infections that could have resulted from sharing infected hospital equipment.

Table 4.4 Number of electrified institutions per ward

		No. of electrified centres			
Category		**Ward 5**	**Ward 7**	**Ward 12**	**Total**
Schools	Primary	2	3	3	**8**
	Secondary	1	2	2	**5**
Clinics/hospitals		1	1	1	**3**
Business centres		2	1	4	**7**
Government Satellite offices		0	0	5	**5**
Households		4	5	6	**15**
Other (specify)		1	0	2	**3**
Total		**11**	**12**	**23**	**46**

> *Saphila health centre offers a 24-hour service to our rural people. Pregnant women can now be assisted and nurses can conduct deliveries. In the 1990s, women in labour were sent to Filabusi District Hospital ahead of their due time so that they could be closer to professionals with relevant equipment (Resident).*

Although residents gave their perceptions on how electricity contributed to the reduction of such cases, there were no statistics provided to prove their argument. This presented a possible future research opportunity in which statistical evidence of these changes could be established to empirically measure the benefits of RE in the area.

Figure 4.1 shows the community water pump powered by electricity in Dekezi communal area. Installation of the pump has improved the quality of water for villagers. Figure 4.2 shows a teachers' cottage with a satellite dish on top of the roof, an indication that they could be accessing digital satellite television. Access to electricity in rural schools improved teacher retention and deployment of qualified teachers since most of the services such as communication services could be accessed even in the marginal areas of the country. Furthermore, cost of living in rural areas is far lower and affordable compared to urban areas. Therefore, some teachers could prefer to be deployed in rural areas which have electricity and running water.

Although adults also benefitted through accessing information about the economy and politics through radio and television, their benefits could not outweigh those for children and youths. A study conducted in Nicaragua (Grogan & Sadanand, 2012) discovered that availability of electricity was important to women as it extended their hours spent on productive activities. These conclusions concurred with key informants' observations in this study. Van de Walle *et al.* (2015) concluded that watching television improved knowledge and economic productivity of women. This could however be part of the "*string benefits"* of using sustainable energy sources in rural areas. Pachauri and Rao (2013) questioned rural energy benefits, especially to women because in most rural set ups, men are the decision makers about what should be done and how. This affects the economic participation of women. According to Duflo (2012) the extension of times spent by women doing household chores is a violation of women's freedom and rights. Although respondents in this study ranked women as the fifth benefiting group, their justification was not in line with what has been discovered by Dulfo (2012). This could be because there were few (15) households in the three wards that had electricity. Therefore, only a negligible number of women could benefit from using electricity in their households.

Figure 4.1 Electrified pump providing purified household water to residents in ward 12

Satellite dish

Figure 4.2 Staff cottage at Dekezi High School showing satellite TV connection

Despite limited access to electricity by individual households, IRDC affirmed that residents enjoyed communal benefits in schools and business centres. It was further noted that electricity provided efficient lighting that allowed churches to conduct services during the night, and families to organise parties and other social gatherings using community and school halls. Youths and children used social media such as Facebook and WhatsApp. In addition, they could watch their favourite videos and movies on YouTube and on television channels. It is important to note that although these perceived benefits had not fully materialised in most of the communal areas, improving electricity connections had proved to be key in improving rural people's lives. Through electricity connections in the wards, the developmental wave had left a positive mark that could not be denied.

Educational benefits of rural electrification

The key informant from the DA's office revealed that quality of teachers deployed in rural schools had improved. This was linked to the fact that most rural schools were currently linked to the grid, hence one of the motivating factors for professionals to teach at rural schools was the use of efficient a reliable source of energy such as electricity. An interviewed councillor and a resident further indicated that besides access to so social media, students could use internet when doing school work. This was identified as an improvement which never existed before the availability of electricity where students relied on scarce printed materials. As highlighted above, Figure 4.2 shows an electrified teacher's cottage observed during a transect drive at Dekezi High school, with evidence of connectivity to satellite television. The respondent further indicated that absence of such modern conveniences had been a hindrance in deployment of quality teachers to rural areas. Therefore, through this developmental programme, rural teacher retention had remained positive. Computer studies had also been introduced in rural schools through government assisted programs.

The REA representative further suggested that after the electrification of rural schools, teachers preferred to be deployed there. This was linked to affordability of basic services in rural areas as compared to urban centres. The World Health Organization (2010) highlighted that improving basic service and infrastructure in rural areas improves quality of professionals deployed in rural schools and clinics. This in turn positively affects service delivery efficiency.

> *Urban residents pay higher charges for all their services they use whilst rural residents do not pay rent and transport to school for example. They use free accommodation and subsidised electricity and water services. Such improvements have ripple effects to the society and the students. Thus, benefits derived from electrification goes beyond tangible and felt (REA representative).*

The Pearson Chi-Square (P < 002) shown on Appendix 1 indicates that there was statistically significant association between the wards and educational benefit from rural electrification. This implied that availability of electricity significantly contributed to education purposes. Under FGDs, education was enabled/ promoted by availability of electricity in schools, for example, introduction of computer studies, teacher retention in rural schools were improving. Findings of the current study concurred with the study by Mandelli *et al.,* (2016) who mentioned that over 80 % of rural electricity was used for domestic and food processing purposes.

Communication and technology benefits of rural electrification

Communication and technology access as already pointed out, had improved in the area of study because of rural electrification. The ZEDTC respondent commented that rural electrification had led to "*viral transmission of technology*" in rural areas. Use of phones, radios and television, and access to recharging services had improved communication and technology in Insiza District. The respondent from the office of the DA indicated that mobile telecommunication systems could cover more than 90% of the district, reaching as far afield as the Dolo Shamba Range and Gwatemba border with the Midlands Province of Zimbabwe. Mago *et al.* (2013) affirmed that through improved telecommunication systems in rural Zimbabwe, the country has become part of the "global village*".* Communication with anyone around the globe has been enabled. Residents have resorted to a smart way of communication. Ninety eight percent of the participants in Insiza said electricity was used for communication purposes, which included watching TVs, listening to radio and recharging cell phones.

> *I can say rural electrification has improved communication for everyone and has made us to keep linked to our relatives and friends staying far (DA representative).*

However, during FGDs, televisions and radios were ranked the least important benefit derived from the use of electricity. Electricity used for computer studies was ranked the second highest in

FGDs. To augment their responses on the uses of electricity, respondents identified places with electricity and gave examples of how electricity was used in those identified places. Table 5 shows identified places within the wards and the uses of electricity. This table was drawn up to show, at a glance, the perceptions of residents on how and where electricity was used in their specific wards.

4.3.3 Environmental benefits of rural electrification

The REA informant indicated that rural electrification was a national agenda in line with globalisation and attainment of Sustainable Development Goals (SDG2030) for providing energy to residents, reducing of deforestation and protecting terrestrial ecosystems. The respondent from the DA's office was confident that if all rural areas were to be electrified, dense forests would be rejuvenated. This showed an understanding and appreciation of the use of sustainable energy in restoring native ecosystems. The community should play their part in preserving the available natural resources for future generations.

4.4 Determinants of Perceived Benefits of Rural Electrification

As reported in chapter 3, determining the perceived benefits across various socio-demographic groups was conducted through FGDs. Firstly, the uses of electricity were identified by each group and they further elaborated on benefits they derived from the identified uses. From the information provided in Table 4.5, revealed that although groups, for example children, youths and adults had various benefits, it was found that increased involvement in income generation and service delivery were the overarching benefits. This was noted under youth, adults (men and women) institutions and farmers. To ascertain the best benefits, the FGDs ranked the perceived accruing benefits on a scale which considered 1 as the most benefiting group. Table 4.7 shows FGD results regarding perceived benefits per socio demographic group. This was to test whether perceived electrification benefits varied according to gender and location. Furthermore, groups provided many dimensions of electricity benefits because ideas were shared and this improved the general understanding of what could be considered as electricity benefit. Education and understanding of the use and value of electricity would improve its usage and the adoption of alternative forms of energy. However, individual responses showed evidence of no significance between variables (location, age, gender, education and employment). Considering the differences in individual and group responses, it was concluded that group responses were informed and balanced. Therefore,

consultation of majority citizens would contribute to improved decisions about development related issues.

Table 4.5 presents the uses of electricity in areas identified by residents during focus group discussion. The identified electrified institutions included schools, clinics, churches and business centres. Uses of electricity varied among the institutions and centres. For example, electricity was used for welding, lighting and for refrigerating food and beverages such as chicken and beer at business centres. In schools, it was used to light teachers' cottage and by students for studying purposes. In clinics, it was used for lighting, refrigerating medicines and the operation of electric equipment.

Table 4.6 shows the benefit of using or having electricity in identified areas. For example, when students used electricity for studying, their academic performance improved as they would have more time on their school work. When entrepreneurs used electricity for lighting and cooling, they extended hours of service and could provide a variety of products for their customers, hence increased sales. The benefit of using electricity to youths and adults included improved information sharing, social networking, improved school performances and increased business sales.

Table 4.7 shows how social demographic groups were ranked during FGDs in descending order on benefiting from rural electrification. For example, the most benefiting groups was ranked 1, the number increased as priority decreased. Each group made their own decision on which social group benefited from the programme.

Table 4.5 Uses of electricity in areas identified by residents during focus group discussion

Places with electricity	Uses of electricity in places identified
Avoca Hospital, Singwambizi Clinic	Lighting, cooking, refrigeration of medicines and vaccines, television viewing for patients
Avoka and Fulunye business centres	Milling, refrigeration of frozen foods and drinks, welding, hair dressing, poultry projects
Schools: Dekezi, Avoka, Denje, Godlwayo Schools, Fulunye	Computer studies, Water pumping, Lighting, Phone charging, PA systems, refrigeration
Godlwayo Culture Centre	Lighting, cooking, ironing, heating
Schools and clinics, (Mkwabene, Mbembesi, and Mapeume)	Computers, refrigeration, lighting
Vokola Business centre	Lighting, welding, milling, refrigeration and entertainment
Mkwabene BICC church	Lighting and charging
Households	Lighting, ironing, cooking and refrigeration
Sidzibe schools	Computers, cooking, lighting and refrigeration
Saphila clinic	Vaccine refrigeration, cooking, water pumping and lighting
Sidzibe Business Centre	Cooling, milling, refrigeration, welding, lighting, entertainment
Households	Cooking and lighting, water pumping, charging phones refrigeration and television.
Mkwabene schools	Lighting, refrigeration, cooking, computer systems
Vokola Business centre	Cooking, sewing, welding, peanut butter grinding, milling

4.4.1 Introduction of electrification in Insiza District

The ZETDC respondent indicated that RE was initiated by the Ministry of Energy Commission around 1980 soon after Zimbabwe's independence. The District Administration respondent indicated that REP was initiated after a research conducted by Water and Power Consultancy Services (WAPCOS) in the early 1980s. Water and Power Consultancy Services is an Indian Consultancy organisation that provides guidelines and research on energy and water infrastructure development (Koundanya & Gupta, 2011). The research findings gave guidelines on how electrification was to be extended to rural areas of Zimbabwe.

> *WAPCOS drew the master plan for the country on how electricity will be distributed across the country and other possible sources of energy to substantiate rural electricity. In the southern parts of the district, electrification was extended in early 2000 (DA respondent).*

The master plan was reviewed in 1998, which influenced the enactment of the Rural Electrification Act of 2002 by parliament of Zimbabwe which saw Insiza benefiting. There was strong argument around the years in which electricity was introduced. Residents in Ward 5 and 12 (47.5 %) strongly believed that their wards were linked between 1995 and1998. However, amidst such contentions, 27 % of the respondents who did not agree with the rest indicated that RE was an initiative of the then district Member of Parliament (MP) George Joe Ndlovu. Interviews conducted with REA staff revealed that the Zimbabwean parliament passed Rural Electrification Fund Act (Chapter 1:20 of 2002) in 2002 which improved the focus and recognition of the programme in the country. This was the time when then southern part of Insiza district benefitted. Residents and a respondent from REA concurred on the year when electricity was connected to their ward. Residents made reference to George Joe Ndlovu, former Member of Parliament, as the main actor in facilitating the connection of electricity to Insiza South. It was then concluded that although residents did not have an exact year, close analysis of events and interviews with leadership of those times could assist in identifying exactly when and how RE started in the study area.

Table 4.6 Uses and benefits of electricity and benefits identified per socio demographic group

Group	Use of electricity	Benefits
Children	Computers	Experience in using computers and education empowerment
	Reading	Improving school performance
Youth	*Boys and girls*: lighting, entertainment, phone charging, welding, hair cutting,	Studying and recreation, improvement in information and sharing/ communication
	Boys: welding, hair cutting	Income generation, studying and research
	Girls: dress making/ sewing	Income generation and employment
Adult	*Men:* Welding, hair cutting, boiler making	Improved income generation, reduced deforestation, reduced domestic labour.
	Women: cooking, milling and lighting, baking	
Institutions	*Schools:* lighting, computing, cooking, phone charging.	Improved pass rate, deployment of better qualified teachers. Improved teaching aids and extended times for closes
	Clinics: lighting, cooking refrigeration of vaccines, phone charging, use electrified equipment	Improved service delivery for maternity/labour, improved communication and security. Qualified
	Churches: lighting and PA systems	Extended church services, and improved worshiping
Entrepreneurs/ Business people	Refrigeration of frozen foods, milling, lighting, welding baking	Safe storage of stock, improved income, self-employment and able to pay fees for school children, extended service hours and attracting more customers
Farmers	Pumping of water	Improves production, mechanisation
Clubs and beerhalls	Entertainment	Socialising and spending time as groups and friends

Table 4.7 Social demographic group ranked in oder of priority in benefiting from rural electrification

Social group benefiting the most	FGD A	FGD B	FGD C	FGD D	FGD E	FGD F	FGD G
Business people/entrepreneurs	1	1	1	1	1	5	2
Students	2	2	4	4	2	3	3
Youth	5	8	5	5	7	2	6
Children	6	9	6	6	8	1	4
Women	3	6	3	2	3	-	1
Men	4	5	3	3	6	-	5
Farmers	8	3	2	8	4	4	-
Adults	7	7	3	7	5	-	7

**1 being the major benefit* FGD = Focus group discussion

It was further highlighted that Rural Electrification Fund (REF) was promulgated by parliament as the treasury for the programme. Rural Electrification Fund enabled equity in the distribution of electricity to remote areas, with the aim of empowering rural communities to enjoy socioeconomic benefits of this form of energy and improve rural livelihoods. Despite the enactment of the REF as the treasury to the programme, key informants indicated that the programme lacked strong financial and institutional support, hence the slow progress.

From the interviews and FGDs conducted, it emerged that REP was initially introduced soon after the country's independence in 1980. However, there was no consensus regarding the times when respective wards were connected. Based on the information provided by REA, ZETDC and IRDC who were the coordinating institutions, the REP was introduced in the Southern part of the district after the promulgation of REA Act of 2002.

4.4.2 Aims of the Rural Electrification programme in Insiza South District

The respondent from the IRDC highlighted that the government saw it fit to start by providing a sustainable and clean energy source to growth points and government centres in rural areas. This was to promote "a growing, viable socioeconomic climate" in the rural areas, aimed at *"*industrialising the rural areas". Respondents from REA and the DA's office expressed RE in terms of "linking rural reserves to a globalised village, making these villages socially and economically competitive". The IRDC informant also pointed out that electrification of public institutions and rural communities included schools, health centres, chiefs' homesteads and business centres as indicated by the policy objectives. Ninety eight percent of residents who participated in the interviews concurred with the sentiments expressed by the key informants.

To facilitate rapid provision of electricity to rural homes

It was noted that this programme was aimed at improving the provision of electricity to rural homes. The representative from REA indicated that the objective of providing sustainable energy to rural areas had been expanded to include any attempts to provide sustainable energy other than electricity. This meant that "electrification" became the provisioning of sustainable energy to rural areas but not exclusively hydro or thermal power.

> *[The] ministry has broadened the "energy mix" from only focusing on convectional electricity to including other forms of energy like solar, biogas as alternatives sources to conventional electricity (REA respondent).*

The REA informant further indicated that the expansion of the Energy and Development policy mandate aimed to tap other energy sources and increase overall use of clean energy in rural areas. However, the study found that 91.2 % of residents still used firewood as source of household energy. This was just above the national figure (90 %) of rural residents who still solely depend on wood fuel (Zimbabwe International Power and Energy, 2011). Linking, facilitation and provision of sustainable energy to rural households is yet to be fulfilled. Statistical evidence showed that the aim of the programme had been achieved when referring to the linking of rural growth points and institutions. This was because 97 % of respondents agreed to and on that point. FGDs identified schools, growth points (rural business centers) and other institutions which had been connected to the grid. Table 4.5 shows a summary of institutions and households connected to the grid as identified by residents and evidence found during the transect drive. The number of connected institutions and growth points versus connected households, reflects that this programme was targeted at rural institutions and growth points than households.

Key informants highlighted that REP aimed at facilitation of equitable distribution of sustainable energy in rural areas. To ascertain this, Geographical Pointing Systems (GPS) coordinates were collected from all connected areas within the wards to validate this objective on a scatter map. This information was presented to University of Venda Geographic Information System (GIS) department to prepare a scatter map (Figure 4.3) showing the distribution of electrified points across the wards. The scatter map indicated that although the objective was to equally distribute electricity to all rural villages, a certain linear distribution was observed linking rural growth points.

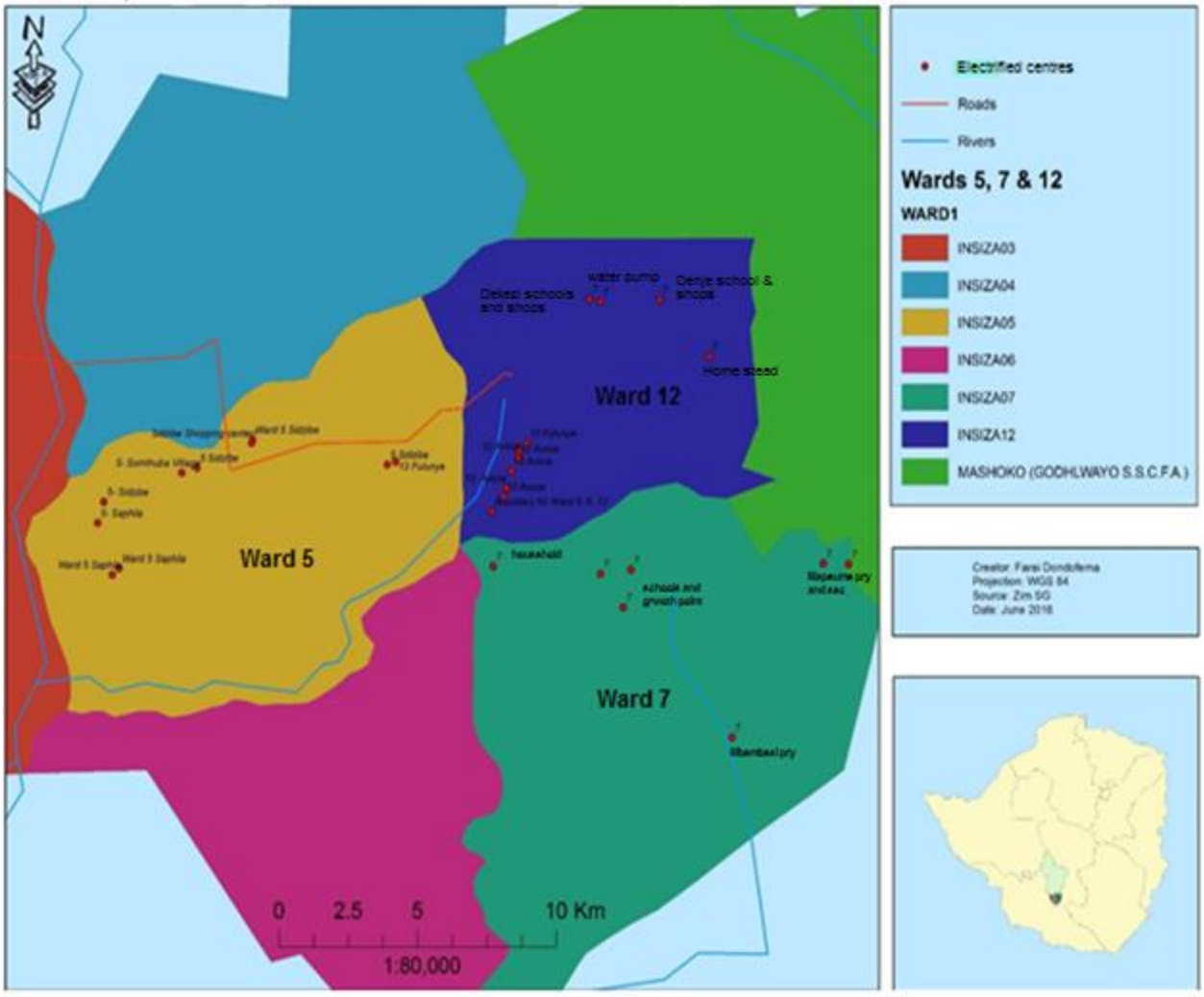

Figure 4.3 Scatter map showing electrified areas in wards 5, 7 and 12

To improve socioeconomic viability of rural peasants

A community member said the government through IRDC and ZESA had introduced electricity to growth points and schools to alleviate poverty, gender inequality, deforestation and improve food security. Entrepreneurial projects identified in the wards and in growth points were indicators of rural economic growth. The IRDC and World Vision International, Insiza Area Development support a vegetable garden which was identified in Ward 5 wherein electrified borehole is used to supply water for irrigation. Surplus vegetable was said to be sold and the benefiting families got financial income to cover other family needs like paying school fees for children and buying other household commodities.

To reduce deforestation

REA (2002) stated that more than 79 % of rural residents exclusively depended on firewood as a source of household energy. During the FGDs, it was also noted that more that 91 % of the residents used firewood as source of household energy. Although cutting down of trees for firewood was common, there was no sustainability plan to prevent complete deforestation since electricity was not linked to rural households. Introduction of electricity was an attempt to reduce such environmental menace. As an attempt to reduce deforestation, it was apparent that the objective had not been achieved yet. This was because 91.2 % of respondents were not connected to the grid. Therefore, this led to the conclusion that reduction of deforestation was not yet implemented achieved.

Individual perceptions gave different results from the FGDs. Individuals responses revealed that electrification objectives were not achieved. This could have been resulted in that the main aim of RE was not to link households but institutions such as schools, clinics and growth points which acted as access points. Through the transect drive it was found out that there were only 15 household connected to the grid. Although majority of household were not connected, communal benefits such as milling, computer studies and milling services were accessible. Based on the REA 2002 policy and findings from FGDs, it can be concluded that the objectives were achieved. Residents could have expected that electricity be linked to their households, however, such never existed hence their denial on the achievement. Therefore, it can be concluded that individual perceptions may not be the only way to understand developmental phenomenon.

4.4.3 Institutions coordinating the programme

The Zimbabwean parliament passed the Rural Electrification Fund Act (Chapter 1:20 of 2002 in 2002). Institutions coordinating the REP were the office of the DA, ZETDC, IRDC and REA. The Rural Electrification Agency informant indicated that parliament enacted a policy to guide the implementation and spelled out roles of stakeholders. The DA's office played a monitoring, evaluation and coordination role. The district council dealt with implementation whilst ZETDC under the national power authority (ZESA) spearheaded the execution of the programme. The IRDC indicated that residents provided labour during the execution, extension and maintenance of the grid in their communities. The informant also mentioned that the government subsidised the programme through the Rural Electrification Fund (REF) hence end users were paying reduced tariffs compared to urban residents. This subsidy was not evident because the residents and entrepreneurs complained about exorbitant charges which had forced several entrepreneurs to stop using electricity in the growth points.

The community representatives and the ward councillors indicated that the main institutions involved in the REP were the IRDC, the ZESA and ZETDC. This was supported by a community member who highlighted that IRDC and ZETDC were the main players in the REP because everyone who needed electricity connection got approval from these institutions. Respondents acknowledged the role played by different stakeholders in the implementation of RE. From the parliament going down to residents, their various specific contribution was significant in realising the goals of RE in Insiza.

4.4.4 Alternative forms of energy in the rural electrification matrix

The REA and IRDC respondents indicated that the expansion of the REA mandate created a platform for institutions to collaborate and apply alternative means of providing energy to rural residents. World Vision Zimbabwe, Area Development Programme (ADP) had partnered with the IRDC in several solar initiatives in Saphila (Figure 4.4), Avoca and Singwambizi rural health centres by installing solar panels to provide energy for lighting during load shedding on the national grid. The IRDC respondent indicated that besides the solar installations in the rural health facilities, provision of photovoltaic energy had been further expanded to support agricultural initiatives. The informant further mentioned that a pilot photovoltaic plan was underway in Gwanda, the provincial town of Insiza.

4.5 Description and Discussion of Results

As alluded in chapter three, data was collected in two phases where quantitative was built from qualitative responses. Quantitative data was analysed using the IBM, SPSS version 24.0. descriptive statistics was used to present the results. Descriptive statistics are convenient ways of presenting data and can be understood easily. They help to describe, summarise data in a meaningful way in a way that could make interpretation much easier (Cronk, 2016). Chi square was used to test the significance effect of accruing benefits of electrification (basic, productive and modern uses) and residents' demographic characteristics (gender, location). The test was done at 95% confidence level ($P < 0.05$). Confidence level is the proportion of all possible selections that are expected to contain the true population limitation (Hinton, 2014). In this study, samples were carefully chosen from the same population in the wards under study. The 95 percent ($P < 0.05$) implied that 95 % of the confidence intervals would include the true population selection of Insiza South District.

4.5.1 Benefits accruing to residents through rural electrification of Insiza South

Rural electrification results were categorised into three groups which are discussed hereunder. This categorisation was informed by the UN country analysis (AGECC, 2010). Although benefits accruing to residents may vary according the geographical area and the objectives of REP, the current study found out that the following were the major rural electrification components.

Basic uses of electricity

Findings from the study (Table 4.10) indicate that residents have a positive perception about benefits accruing through rural electrification. Majority (78.4 %) agreed that educational purposes and communication purposes (teacher retention and use of devices such as computer that solely depend on electricity) were the most perceived accruing benefits. Lighting and cooking purposes scored 68.6 % whilst use of electricity for community services such as churches was the least perceived benefits with 50 %. Statistically, basic uses of electricity had a higher significant compared to modern and productive uses. This confirmed the findings FDGs where uses of electricity for study purposes was ranked amongst the best perceived benefits. Bensch *et al.,* (2011) study findings of rural electrification in Rwanda reported that availability of electricity to Rwandans improved educational opportunities and access to information. It was further reported that availability of electricity in rural areas of South Africa has improved the acquisition of electric

appliances like electric kettle and geysers for heating water (Dinkelman, 2011). Chi Square results (P < 0.00; 0.01, 0.02 and 0.008) showed that the perception of basic benefits were significance of effect of availability and access of electricity in the area under study. However, gender had a slight significance (P < *005*) compared to geographical location.

In support of the study findings, Lehmann *et al.,* (2008) further argued that rural electrification has improved, health, education and communication in rural areas. The fact that rural life is cheaper compared to urban, teachers and nursed prefer to be deployed in rural areas. This phenomenon is gradually improving health and education standards of villagers.

Modern uses of electricity

Outcomes indicated that 57. 8 %, 91.2 % of residents perceived heating and cooling respectively as part of the accruing welfares from electrification. Although there were significant association between availability of electricity and modern uses, FDGs reported that residents were not connected to the grid which therefore reduces household to use modern appliances. This contends with Dinkelman (2011) who on the other hand argued that most rural people cannot afford modern equipment therefore, use of modern appliance in rural areas is minimal. In support of the challenges faced by Insiza South villagers. Spalding-Fecher (2005) cites that despite that fact that rural electrification is a government responsibility, acquisition of capital equipment and low returns from villagers presents a challenge to such a development oriented programme. The current economic situation in Zimbabwe which is characterised by high unemployment and under-employment rates, low levels of productivity complement the challenges identified by Spalding-Fecher (2005). These challenges further strains household income levels to acquire such equipment.

Productive uses of electricity

Results showed that productive uses of electricity in rural areas was among the least benefits to villagers. Although there was a significant number (94.1 %) of villagers who indicated that they use electricity for milling, this was because more that 93 % solely depend on subsistence (drought resident crops) farming for survival. The major obstacle to the attainment of benefits related to using electricity for productive purposes was identified as costs related since the majority (53 %) were not employed and slightly above a third (38.2 %) were identified as self-employed. Self-employed were described as self-employed were subsistence farmers who do not have a stable

and continuous income. Therefore, they could not manage to meet the expenses of electrical appliances. Moreover, an insignificant number (15) of households was connected to the electricity grid.

Achievement of rural electrification objectives

Results found out that there was no statistical significance (P < 0.85, 0.778, 0.885, 0.127) of effect of electrification to the achievement of REP objectives. Residents concluded that REP did not achieve the provision of electricity to rural areas, there was no equal distribution of electricity to rural areas especially in Matabeleland and Insiza in particular. From the inception of REP soon after independence to date, Matabeleland South was among the provinces with the lowest electricity connection (ZimStats, 2012b).

Figure 4.10 shows the relationship between benefits of rural electrification accruing to residents and its significance to ward and gender variables. The table also shows the extent of significance of benefits to residents expressed in percentages. Basic, productive and modern uses of electricity and their association to ward and gender is presented where Chi Square levels of significance values are computed. The table reflects that there is little statistical association between gender and accruing benefits (ns= not statistically significant). This means that residents could be enjoying the present welfares unanimously.

4.6 Challenges Facing Rural Electrification Programme

Bhattacharyya (2006), Pellegrini & Tasciotti (2013), Alstone *et al.,* (2015) state that despite the worldwide understanding of the importance of electricity, more than 1.6 billion world population still lack access to sustainable energy. In Zimbabwe, the main challenge facing REP is lack of capital resources and funding. Installation of power lines in rugged and scattered settlements of Insiza communal areas presented as a physical challenge. The key informants indicated there were little returns from the end users due to the economic crisis in the country. This was linked to the service costs to residents who relied mostly on subsistence agriculture with no surplus produce to sell and purchase electricity, among other services. Therefore, use of electricity to some extent, could be a luxury in the area. The ZETDC respondent highlighted that connection costs were expensive in a cash strapped economy.

Table 4.10 Benefits accruing to residents through rural electrification of Insiza South District of Zimbabwe

n=102

Benefits accruing to residents through rural electrification		Number of respondents	Significance of effect of		Extent of benefit/achievement			
			Ward	Gender	Yes (%)	No (%)	No data	Total (%)
Basic uses	Cooking	70	***	ns	68.6	25.5	4.9	100
	Lighting	70	***	*	68.6	25.5	4.9	100
	Heating and cooling	69	***	ns	67.6	24.5	7.8	100
	Educational computing	80	***	**	78.4	18.6	2.9	100
	Recharging phones	80	**	**	78.4	19.6	1.9	100
	Community services such as church	51	*	ns	50	48	2	100
Productive uses	Agriculture (water pumping and irrigation)	19	**	ns	18.6	80.4	1.0	100
	Manufacturing	09	*	ns	8.8	82.9	2.0	100
	Mechanised farming	12	**	ns	9.8	87.3	2.9	100
	Boiler making	19	***	ns	18.6	77.5	3.5	100
	Welding	57	*	*	55.9	42.2	8.8	100
	Milling	96	***	**	94.1	2	3.9	100
	Cooking food for sale	14	ns	ns	13.7	77.5	8.8	100
	Informal businesses (hairdressing)	33	*	*	29.4	62.7	7.9	100
Modern uses	Domestic equipment	97	***	ns	95.1	3.9	1	100
	Heating	21	*	*	20.6	68.6	10.8	100
	Cooling	77	*	*	57.8	36.3	5.9	100
	Conditioning	93	***	ns	91.2	5.9	3	100

***= P < 0.05 **= P < 0.01 *** =P < 0.001 ns = not statistically significant**

Figure 4.4 Photovoltaics system providing stand by energy for lighting in Saphila rural health centre

Most rural residents had no fixed income (52.9 % were unemployed whilst 38.2 % were self-employed). This could have presented a challenge for households to manage monthly electricity bills provided they were connected. The government subsidised the connection of institutions as per the policy objectives, but it was costly for residents to get connected without the government subsidy. Zomers (2014) observed that most successful REPs in the developing countries resulted from governments subsidising the process up to more than 50%. Ahlborg & Hammar (2014) concluded that proper planning and implementation of REPs yield success. Zimbabwe's economic conditions are not favourable for such capital investments. One of the respondents indicated that there were no grants to support the programme in 2016. The government experienced challenges in paying back debts incurred during planning and capital procurement for the project.

4.7 Conclusions

This chapter provided detailed data presentation, interpretation and analysis of results. The study objectives were addressed using the data collected and supported with literature. Analysis was done using content analysis of the interviews and descriptive statistics to substantiate qualitative conclusions. Key informants identified the benefits perceived to accrue to residents. Themes generated from the responses highlighted the benefits accruing in terms of improved economic participation of residents. Although it was noted that benefits were not fully enjoyed due to limited electricity connection and associated costs, social benefits outclassed other forms. This was because all age groups and genders had a stake in social benefits. Communication and technology was one of the key benefits identified and was linked to socioeconomic benefits. Although environmental benefits were said to be accruing, this was controversial because most residents were not yet connected to the electricity grid. They solely used firewood for cooking and gasoline and paraffin for lighting.

Determinants of accruing benefits varied within gender and age groups. This was because of the 'social entitlement activities' associated with each of these groups. Objectives of REA were discussed and some were said not to have been achieved. However, linking rural growth points and institutions showed a remarkable achievement. The challenge was the connection of individual households to the grid. Residents cited different moments as the times when electricity was brought in their wards. Information provided by key informants concurred with the timeframes regarding policy enactment. Institutions coordinating the project were identified and their roles

specified. Although these institutions operated separately, their roles and contributions played a significant part in the achievements that had been made so far. Alternative sources of energy that could be tapped into were identified. Challenges faced by the programme were also discussed. The next chapter comprises a general discussion, conclusion and recommendations of the study.

CHAPTER 5 GENERAL DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This study investigated the benefits accruing to residents from electrification of rural Insiza South District of Zimbabwe. Study respondents constituted key informants from the institutions that play a leading role in the implementation and monitoring of the programme. The majority of respondents were residents and community leaders. This chapter is a general discussion which in the end proffers a conclusion and recommendations for policy development, development practice and further avenues for future research.

The main objective of this study was to analyse the benefits accruing to residents from the rural electrification programme in Insiza South District of Zimbabwe. The specific objectives were to:

a) Identify residents' perceived benefits accruing from Rural Electrification;
b) Determine whether perceived rural electrification benefits accruing to residents varied with gender and in socio demographic groups, and
c) Determine the extent to which the original objectives of electrification had been achieved.

5.2 Residents Perceived Benefits Accruing from Rural Electrification

The study established that although most of the residents were not directly linked to the national grid resulting from the RE program, benefits accrued from a communal perspective. They stretched from social to economic, technological to spiritual. Residents benefited from using services powered by electricity, for example, clinics and schools. This was augmented by the transect findings where electricity connections in evidence mostly at growth points, schools and a few households. Zomers (2014) revealed that RE provided multifaceted benefits to end users ranging from social, economic, environmental and technological factors. This corresponds to the findings of the UN Rural Electricity Country Analysis which categorised uses under to a) *Basic:* for lighting, health, education, communication and community services; b) *Productive uses*: as fuels and energy services, agriculture, water pumping for farming, mechanised farming and commercial agricultural processes and, c) *Modern uses:* in domestic equipment, cooling, heating and conditioning (AGECC, 2010; Khandker *et al.,* 2013). Although residents and key informants agreed on the identified benefits, it should be acknowledged that some of the benefits were conceptual. This is because 93 % of households were not connected to the grid, they enjoyed

communal benefits only. Therefore, having domestic equipment, household lighting was non-existent for them.

Understanding the objectives of the REP and its associated meaning was crucial in this study because this would help inform policy makers and academics on how electrification programmes can contribute to rural development. These objectives were to connect rural schools, growth points, government satellite institutions and chiefs' home steads. To that end, residents perceived benefits accruing through harnessing services from the connected centres. For example, connected schools could provide computer studies to their children, hence this becomes a benefit. Buying frozen foods, and availability of milling services were other indirect benefits identified. However, it is important to note that there were few individuals who operated welding shops, hair salons and retail shops who directly benefited and improved their financial incomes. Their services trickled down to other residents who then professed beneficiation.

The rural electrification mandate (REA, 2012) and interviewed respondents assumed that when the electricity grid passes a village, households will take advantage and get connected and enjoy the benefits of using electricity. This assumption has roots in early developmental ideologies which postulated that implementation of development projects in developing areas would automatically lead to benefit for the entire citizenry (Aghion and Bolton, 1997; Rondinelli, 2013). Such scholars did not consider other factors such as the wiliness of the consumers to use and maintain the project, financial implications of using the project benefits and its sustainability to households. The main reason for limited number of household connections to the grid might be cost implications and knowledge of the value of electricity. The interview with the ZETDC respondent highlighted the costs of buying step down transformers, cables and grid extension would be exorbitant for individual connection. These costs were important to consider since the respondent indicated that a single step down transformer served and average one kilometre radius. Hence those who managed to get linked were affluent enough to balance such costs and the main grid passed adjacent to their homesteads. They pooled resources as neighbours and bought the necessary appliances. This explains why residents enjoyed communal benefits instead of individual connections. This study was an eye opener to residents. This was reiterated by one of the respondents who after the FGDs acknowledged that he was a different person in terms of knowledge on the value of electricity and how it can transform their lives.

5.3 Determinants of Perceptions regarding Benefits

Benefits of electrification are complex and cannot be viewed from one side. While others directly benefit from electricity, the benefits tend to trickle down and indirectly benefit others to support those who are on the margins and without access (Rondinelli, 2013). Although it is not the obvious case for development to spread as theorised by 1960s developmentalists, trickledown effect could be seen in some parts of rural communities through electrification. Sen and Grown (2013) highlighted that the trickledown effect failed the developing world in the 1960s, hence, adoption of an all-inclusive form of development is needed. A study conducted in Rwanda revealed that rural economic progress was evident in electrified centres. The young and old, male and female engaged in entrepreneurial activities which gave them financial gains, for example, those who engaged in baking and sewing. They could manage to recharge their mobile phones and computers for communication and were able to listen to and watching television for entertainment and information (Manning *et al.,* 2015). Based on the latter mentioned study, social benefits of electrification align to social duties ascribed to specific family members in a traditional family set up. It was observed in this study that the main groups benefiting from the electrification programme were entrepreneurs who engaged in income generating activities which included welding, hair dressing and baking. Their activities impacted their families and the community at large. Students benefited from using electricity at schools enabling them to use computers whilst availability of electricity also reduced household labour for women and improved teacher retention. Electricity reduced women's labour and diversified their socioeconomic activities. They became involved in sewing, baking and improved maternal health services and their productive times were extended.

5.4 A Synthesis of Benefits Accruing to Residents through Rural Electrification in Insiza District

Residents perceived various benefits resulting from rural electrification. Figure 5.1 presents a conceptual framework from the study findings. It is acknowledged that the society is characterised by various groups. Therefore, in this framework, residents are categorised into children, youths, and adults considering all genders in all groups. Urpelainen (2014) highlighted that sustainable electrification models should be supported by the government and the consumers. Therefore, for a successful REP in Insiza, government and residents should join hands. The government support should be in the form of creating an enabling environment where policies and regulations promote investor confidence (Herington *et al.,* 2017). Government initiated programmes should have a

stake in the national budget so that there is ease of implementation and execution. Residents should provide labour and other resources that may be necessary for the execution of these programmes.

It is envisaged that when residents access and use electricity, certain services are improved (Hirmer & Cruickshank, 2014; Zomers, 2014). Benefits of electrification are categorised into education, communication, entertainment, spiritual, health, hygiene and entrepreneurial projects. The above-mentioned categories are the broad benefits of electrification as it was found from this inquiry as well. These broad categories have “string benefits” for example, educational benefits include access to use and learning of computers (Jain *et al.,* 2016). Availability of electricity enables rural students to be exposed to modern computer technology. Availability of electricity and government support will promote an entrepreneurial culture in rural areas. An entrepreneurial culture is sought to bring about innovation and modern solutions of addressing rural challenges such as shortage of clean water and unemployment. Projects that can be developed which may include welding, baking, sewing and computer lessons could create job opportunities and connect rural communities to the global village. It is in the hands of the government and the residents to improve rural livelihoods through cooperation and working together for a developmental goal.

5.5 Evaluation of Rural Electrification Objectives

Availability and accessibility of electricity in rural areas is still an unfinished project. In this case, linking of schools, institutions and growth points was an undeniable success although the level of electricity usage in these centres is still minimal. Patel (2016) states that in India, statistics indicated that 98.7 % of villages had been electrified, yet 97.9 %, 99.5 % and 95.3 % of the villages in Bihar, Uttar Pradesh and Assam respectively, had been deemed ‘electrified’, as per the central government data. Research revealed that 82.84 %, 72.97 % and 62.93 % of Bihar, Uttar Pradesh and Assam had their rural households without any access to electricity respectively. This shows that governmental data is not reliable, particularly in its definitions and classifications of development in rural areas, for example, electrification in this case.

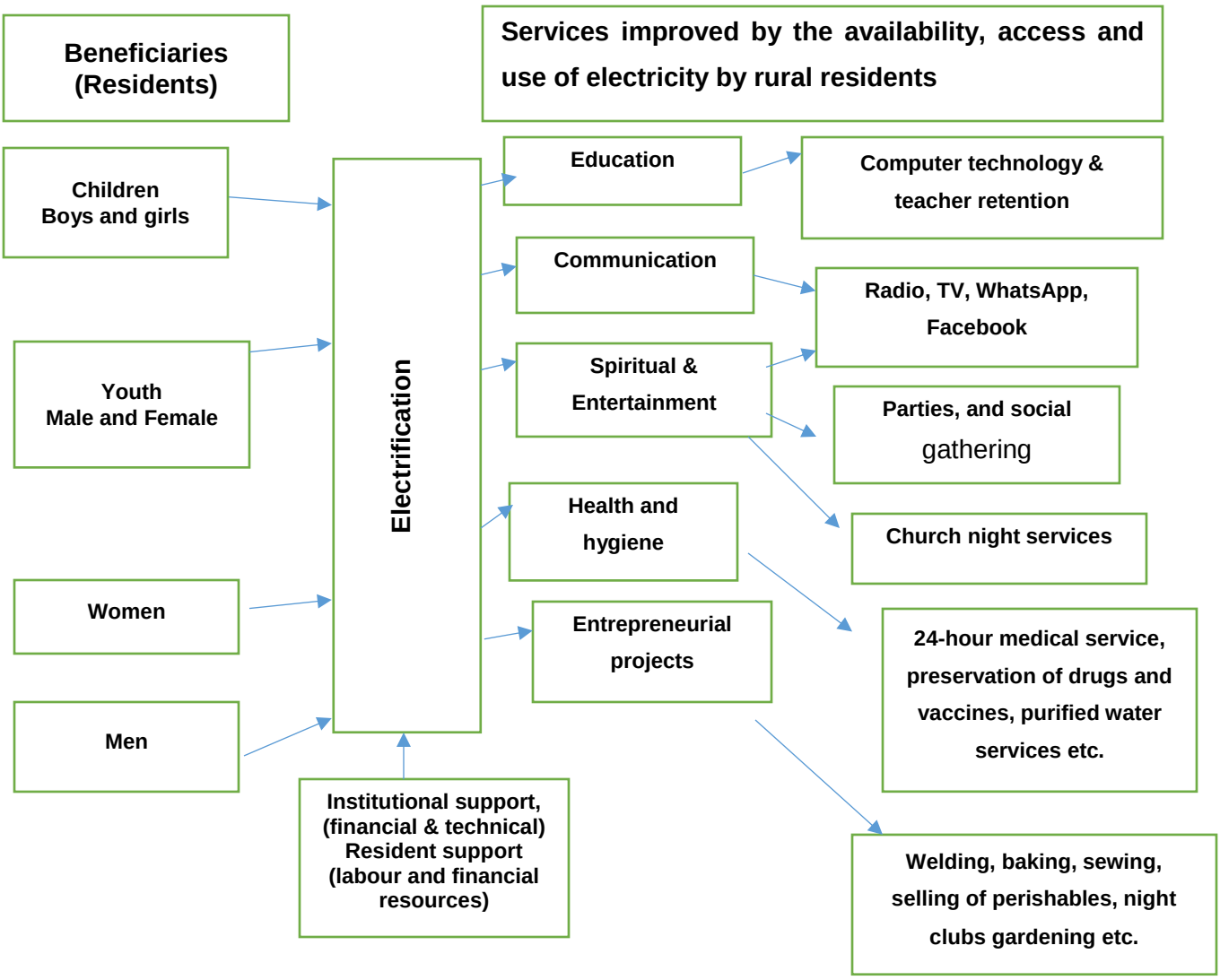

Figure 5.1 A synthesis of benefits accruing to residents through rural electrification in Insiza District

In this study, several factors which contributed to the failure of the achievement of the desired RE objectives were identified. Resource constraints and lack of institutional support contributed to slow progress and stagnation of rural development initiatives. It is still not clear whether availability means that electricity is accessible for use by residents or when there is an electricity grid passing by the village. This is because national reports give outstanding success percentages of the rural electrification programme yet the total usage is still very low. Economic meltdown and scattered settlement patterns in rural areas have contributed to slow progress of the REP. It was also noted that the government had for some time neglected the allocation of budgets for RE implementation. It also emerged that the electrification programme had been used as a campaign strategy. That being the case, movement in implementing the programme tended to be visible towards election time and stalled soon after elections. In this case, it could be seen that although RE aims at improving the socioeconomic viability of rural communities, such objectives are still politically inclined which also contributes to slow progress.

5.6 Key actors to be Actively Involved for a Sustainable REP in Insiza

There is an urgent need for 'strategic' actors to be wholly involved for a sustainable REP. Subsidiary companies and agencies need to support and regulate electrification in rural areas. These institutions, among others, are: REA, ZESA, ZERA, ZERC and ZEDTC They are highly recommended to play a leading role in licensing, regulating and giving policy support. Such institutional support will promote evidence based research that can change the energy matrix in the rural areas and promote the implementation of resident oriented solutions.

With regard to the residents, REA and REF should offer support grants, technology, and capacitate all stakeholders in the rural energy industry. Corporation with international institutions is also likely to contribute to success of rural development program. Table 8 presents residents' "mix" of stakeholders to be involved in the execution of certain responsibilities for the success of REP in the district. Government or residents alone cannot attain the desired goals, therefore working together will promote maximum achievement of target goals. There is a need for collaboration of various organs to achieve the best results.

5.7 Limitations of the Study

Mobilising residents to attend the FGDs presented a challenge. This was because data collection was done during farm preparation period ahead of early rains for rural subsistence farmers. The

study focused on three wards of the district. Views portrayed in this study may not universally represent how rural individual residents view benefits of electrification. However, due to the fact that district officials coordinating the programme were consulted and residents came from various villages from the wards, the results of the study therefore had a district representation. The sample was representative and comprised of various age groups. Representatives from the main coordinating institutions, including representatives from REA, IRDC and office of the DA were consulted. Village heads, councillors and representatives from 15 villages of the three wards participated and managed to give their perceptions on benefits of rural electrification. This made results of the study valid as it was informed by a wide range of representatives in various portfolios in the district. Findings of this study reflects the views of the residents and institutional representatives and might not give the same views if a similar study is done in a different rural set up.

5.8 Suggestions for Further Research

There is a growing need for resident-informed studies to ascertain the benefits of and alternative sustainable energy provisions to rural residents. Research on the most appropriate and affordable energy mix that could be rolled out in rural communities would be vital. This should be done through participatory rural appraisal methods and other techniques that would allow residents to give a correct view of their communal needs. Exploration of how poverty and politics affect citizen participation could be another angle to be considered for future studies. Finally, studies on strategy development that would enable other organisations to partner with rural communities in identifying alternative sources of energy to avoid energy crisis are needed. Implication of policy on energy provision in rural areas is recommended for future research.

5.9 Conclusion

Access to sustainable green energy is a human right. However, enabling holistic access to all rural residents is a challenge all governments and institutions are battling with. This study focused on benefits accruing to residents of Insiza South District of Zimbabwe through rural electrification. Although there were few households connected to the national grid through this programme, residents enjoyed communal benefits. Objectives of RE should expand and target individual households to maximise residents' benefit. The government should play a leading role in subsidising the programme and educating residents about the value of electricity in the modern era. Residents should also form cooperatives, mobilise resources, provide labour and assist in

the extension of the grid in their respective areas. It is further concluded that benefits accruing to residents through rural electrification are multifaceted and electricity may not always be a priority to rural residents when put against some of their pressing needs.

5.10 Recommendations

There is no single way of describing benefits of electrification as they tend to be subjective. Thus, development practitioners implementing such programmes should conduct a people centred research before implementing a development programme of this nature. It is also recommended that collection of data through groups where all genders and age groups participate could lead to a more informed conclusion. This was evident from the responses given by individuals compared to group responses. Also, collecting developmental data through group discussions is cost effective and processing of such data is simple. Residents can provide and sort data on the ground and becomes ready for decision making provided the researchers use the most recent, interactive forms of data collection.

5.10.1 Interventions for Enhancing the Desired Benefits of Rural Electrification Programmes

The grid has potential of expanding to remote households. However, there is need to restructure power administration in the country. Clear policies and guidelines on which institution should be put in place. Results from the study revealed that there was an overlap of responsibilities which as a result reduced accountability. It is recommended that the Ministry of Power and Development is recommended to effectively plan and budget for the programme.

Attraction of investors and independent energy suppliers could also ease the challenge of administration and supply of energy to residents. Involving independent micro energy service providers would mean that the guiding policy should be investor friendly yet safeguarding residents from being ripped off by unscrupulous private organisations. Educating the youth about the importance of using sustainable energy to save the environment is crucial. Investing in programmes that promote restoration of rural forests could also ease other environmental challenges resulting from deforestation of bushes for wood fuel. Young people in the diaspora should be urged to play a leading role in providing their family members with photovoltaic solar systems. This is because photovoltaic solar systems are easy to manage and have no monthly payments like electricity.

Tapping into alternative power sources in rural areas is key and aligned to the expanded energy development policy. Councillors and traditional leaders should avail land for establishment of photovoltaic plants. Resident participation is critical in developmental programmes. Residents' participation should go beyond attending meetings to taking part in action, provide labour and other resources that will enable the success of the programme. Education and enlightenment of residents is crucial in the district. Residents are recommended to also unite in pooling resources to enhance household connection. Evidence of a success community collaboration was in Nkankezi in the northern part of the district. It was also noted that residents were intimidated to attend meetings and they did so to benefit from food aid since the district usually experienced perennial drought. This presents a need to change this kind of threat to a positive developmental aspect in attending meetings.

From the residents' perspective, it is also recommended that the ministry minimise load shedding and reduce bills. This could be achieved by introducing the use of cost-effective photovoltaic, biogas and wind energy. Photovoltaic power would be possible to harness because Insiza has abundant sunshine throughout the year. Education on the use and value of electricity would be a key ingredient in improving understanding of the value of sustainable energy. Knowing the value of electricity would probably motivate residents which in turn would reduce deforestation if majority households are connected to any sustainable energy. Furthermore, residents appreciated the data collection programme because it was an eye-opener and educative. It is therefore recommended that future developmentalists should adopt a more engaging form of engagement with residents when discussing development issues for ownership and buy in.

Table 5.1 Interventions of specific stakeholders for improving access to electricity

What can be done to improve energy access	By whom
Contributing cash (pooling of resources together) in groups to connect electricity (cooperation)	Community residents
Reforestation	Community supported by the government
Subsidise electricity bills	Government/ council
Use of solar	Community and NGOs
Increase access to household level	ZESA
Government to give grants and loans	NGOs and government
Free connection to households	Government
Combined effort in electricity connection	Community and council
Supply of solar equipment	Business people

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APPENDICIES

Appendix 1 Sample of Results

Ward * Educational Benefit Cross Tabulation

			Educational Benefit			
			Yes	No	No data	Total
Ward	5	Count	14	12	1	27
		% within ward	51.9%	44.4%	3.7%	100.0%
		% within education	17.5%	63.2%	33.3%	26.5%
		% of Total	13.7%	11.8%	1.0%	26.5%
	7	Count	42	5	1	48
		% within ward	87.5%	10.4%	2.1%	100.0%
		% within education	52.5%	26.3%	33.3%	47.1%
		% of Total	41.2%	4.9%	1.0%	47.1%
	12	Count	24	2	1	27
		% within ward	88.9%	7.4%	3.7%	100.0%
		% within education	30.0%	10.5%	33.3%	26.5%
		% of Total	23.5%	2.0%	1.0%	26.5%
Total		Count	80	19	3	102
		% within ward	78.4%	18.6%	2.9%	100.0%
		% within education	100.0%	100.0%	100.0%	100.0%
		% of Total	78.4%	18.6%	2.9%	100.0%

Appendix 2 Information Sheet for Respondents

University of Venda

SCHOOL OF AGRICULTURE
INSTITUTE FOR RURAL DEVELOPMENT

INFORMATION SHEET

INTRODUCTION

My name is Crespen Ndlovu. I am a student at the University of Venda. I am currently pursuing a Master's Degree in Rural Development (MRDV). One of the main requirements for the degree is to conduct a research in rural development. I am therefore carrying out research on *Benefits Accruing to Residents of Insiza South District through Rural Electrification in Zimbabwe***.**

The purpose of this study is to understand the benefits accruing to residents from Rural Electrification programme in Insiza South District of Zimbabwe. I am also interested in finding out how these benefits can be improved to further address socioeconomic challenges faced by the rural people.

Kindly note that all views gathered in this study will be handled in a strictly confidential manner. No names or any form of identification will be disclosed in the report. Information collected will only be used for academic purposes and will not be disclosed to any unauthorised people. You will also be given feedback of the consolidated results of the study through an organised gathering when the research has been completed**.**

I therefore kindly request for your participation in this research by responding to questions related to the research topic. The interview will take about 20-30mins. The discussion is not an oral examination and therefore all views expressed will be treated with respect and accepted as individual's perceptions about the benefits of Rural Electrification. However, your participation is voluntary. Should you at any stage wish to withdraw from participating further, you may do so without negative consequences.

Appendix 3 Consent form

University of Venda

SCHOOL OF AGRICULTURE
INSTITUTE FOR RURAL DEVELOPMENT

CONSENT FORM

In terms of the ethical requirements of the University of Venda, may you complete this form as an indication of your permission to voluntarily participate in this study.

I _____ hereby confirm that I have been fully informed about the purpose, procedures, and activities of the study. I was given the full opportunity to ask any questions. I understood that my participation in the study was voluntary and that I could withdraw from the study at any time.

I therefore hereby freely **Give/Do not give** my consent to voluntarily take part in the study as outlined ***(Delete the inapplicable).***

Respondent's Signature: _____ Date: _____

Researcher' signature: _____ Date: _____

Appendix 4 Key Informant Interview Guide

University of Venda

SCHOOL OF AGRICULTURE
INSTITUTE FOR RURAL DEVELOPMENT

BENEFITS ACCRUING TO RESIDENTS THROUGH RURAL ELECTRIFICATION OF INSIZA SOUTH DISTRICT IN ZIMBABWE

INTERVIEW GUIDE

*Date*_____ Time_____

Venue_____

Section A

1. Demographic information

Instructions: Please tick (✓) on the box next to your appropriate selection.

i. Gender

Male		Female	

ii. Age

a) <18		b)18-25		c) 26-35		d) 36-45		e) 46-59		f) 60+	

iii. Level of education attained

a) None		b) Primary		c) Secondary		d) High school		e) Tertiary		f) Other	

iv. Employment

a) Formal employed		b) Not employed	
c) Casual		d) Self employed	
e) Other (specify)			

Section B

Questions guiding the interviews with the key informants

1. In your understanding, what is Rural Electrification?
2. When was rural electrification instituted in Insiza?
3. Which institutions were coordinating the programme?
4. What do you think were the aims of the Rural Electrification programme in Insiza Rural?
5. What do the following both male and female use electricity for?

a) Children b) Youth c) Adults

d) Women d) Men e) Students

f) Entrepreneurs/business people g) Farmers h) Miners

i) Other (Specify)

6. What do you think are the impacts of electricity to the following;
   a) Rural economy (business investment, infrastructure)
   b) Social
   c) Environment
   d) Communication and technology
   e) Other
7. Which other forms of clean energy can be tapped to improve access to clean energy in rural areas?
8. What can be role of the council and residents in improving access to clean energy in Insiza

End Time_____

Appendix 5 Individual Resident Questionnaire

Time _____

Ward_____ **Village**_____

Gender	Male		Female		Age in years_____								
Level of education attained													
a) None		b) Primary		c)Secondary		d) High school		e) Tertiary		f) Other			
Employment													
a) None		b) Self employed		c) Temporary		d) Formal and permanent		e) Other (specify)					

Note: Study the tables below and mark with an X your preferred answer

1. Availability of electricity	Yes	No
a) Does your ward have electricity?		
b) Is your house/home connected to electricity grid?		
c) Is there an electricity line passing close by your house/home?		
d) When was electricity linked to your ward? _____ *(put the year)*		
e) When was your household connected to electricity? _____ *(put the year)*		
f) How many households do you know have electricity in your community? _____		

2. Which of the following forms of household energy is commonly used in your household?	Yes	No
a) Firewood		
b) Solar		
c) Biogas		
d) Paraffin		
e. Electricity from the national grid		

3. Is electricity commonly used for the following in your area?		Yes	No
3.1 Basic uses:	a) cooking		
	b) lighting		
	c) heating and cooling		
	d) education (computing)		
	e) communication (recharging phones)		
	f) community services (church services and street lighting)		
3.2 Productive uses:	a) agriculture water pumping for farming		
	b) Manufacturing		
	c) mechanised farming such as sprinkler irrigation		
	d) commercial agricultural processes		

	e) boiler making			
	f) welding			
	g) bakeries			
	h) Small-scale mining			
	Cooking food for sale	Restaurants and hotels		
		Small-scale food vending		
	Informal business service e.g. hair dressing			
3.3 Modern uses	a) domestic equipment ironing			
	b) heating e.g. heaters			
	c) cooling e.g. refrigeration			
	d) conditioning e.g. air condition			

4. What are the aims of rural electrification?		Yes	No
a) To facilitate rapid provision of electricity in rural homes			
b) To facilitate equitable distribution or access of electrification in rural areas			
c) For domestic lighting			
d) To connect rural institutions such as schools, business centres and clinics with others			
To e) To enable use of electrical appliances	i) Television and radios		
	ii) Recharge phones		
	iii) Use electric irons		
	iv) Electric stoves		
	vi) Air conditioning		
f) To improve viability of socioeconomic projects and business units such as the following:	i) Broiler keeping		
	ii) Water pumping		
	iii) Welding		
	iv) Boiler making		
	v) Milling		
	vi) Manufacturing		
	vii) Irrigation		

Appendix 6 Focus Group Discussion Guide

Attendance Register

Date _____ Starting Time _____Time of completion _____

Ward_____ **Village**_____

Venue_____

Activity_____

Surname and Initials	Gender	Phone Number	Email Address	Signature
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				

1. List all places with electricity in your ward	Uses of electricity in the places identified
Enter name of the place/institution/centre a) _____	
b) _____	
c)_____	
d)_____	
e) _____	

In the space provided below, list down what you think is the importance of electricity in your area. Rank your answers, starting with 1 being the most important aspect

2. List the importance of electricity in your rural area in order of priority	Ranking
a.	
b.	
c.	
d.	
e.	

3. Benefits accruing to various groups			
Group		What does this group of people use electricity for?	What benefits accrue to the group through using electricity
a) Children			
b) Youth	Boys		
	Girls		
c) Adults	Men		
	Women		
Institutions	Schools		
	Clinics		
	Churches		
g) Entrepreneurs/ business people			
h) Farmers			
i) Others (specify)			

B: Rank your answers 1 being the most benefiting

4. Which social group enjoys the most benefits of rural electrification		Explain the reason for the way you have ranked
a) Children		
b) Youth		
c) Adults		
d) Women		
e) Men		
f. Students		
g) Entrepreneurs/business people		
h) Farmers		
i) Miners		
j) Other (Specify)		

5. How can benefits resulting from electrification in your areas be improved?
a)
b)
c)
d)
e)

6. List down the advantages and disadvantages of using the following as household sources of energy		
Source of Energy	Advantages	Disadvantages
a) Firewood		
b) Solar		
c) Biogas		
d) Electricity		
e) Paraffin		

7. What can be done and by whom to improve access to energy in your community?	
Action or activity	By whom?
1.	
2.	
3.	
4.	
5.	
6.	

Appendix 7 Ethical Clearance Letter

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:
Mr C Ndlovu
Student No:
11613002

PROJECT TITLE: **Benefits accruing to residents through rural electrification of Insiza South District in Zimbabwe.**

PROJECT NO: SARDF/16/IRD/05/1404

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof J Francis	University of Venda	Supervisor
Ms G Olo	University of Venda	Co-Supervisor
Mr C Ndlovu	University of Venda	Investigator - Student

ISSUED BY:
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: April 2016
Decision by Ethical Clearance Committee Granted
Signature of Chairperson of the Committee: .....
Name of the Chairperson of the Committee: Prof. G.E. Ekosse

UNIVERSITY OF VENDA
DIRECTOR
RESEARCH AND INNOVATION
2016 -04- 18
Private Bag X5050
Thohoyandou 0950

University of Venda
PRIVATE BAG X5050, THOHOYANDOU, 0950λ LIMPOPO PROVINCEλ SOUTH AFRICA
TELEPHONE (015) 962 8504/8313 FAX (015) 962 9060
"A quality driven financially sustainable, rural-based Comprehensive University"

Appendix 8 Approval Letter to Conduct Study from the DA

MINISTRY OF RURAL DEVELOPMENT, PROMOTION AND PRESERVATION OF NATIONAL CULTURE AND HERITAGE

Reference: **ADM4/4**

OFFICE OF THE DISTRICT
Fax: (017) 276
All communications should be addressed to

ADMINISTRATOR
INSIZA DISTRICT
P.O. BOX 2
FILABUSI

19 October 2016

To whom it may Concern

Dear Sir/ Madam

RE: PERMISSION TO CARRY A RESEARCH IN INSIZA DISTRICT

Crespen Ndlovu is a student from University of Venda in South Africa. He has visited the District Administrators Office requesting for permission to carry out research a research on Rural Electrification in Insiza district.

Please be advised that he has granted permission to carry out the research as per his request.

May you please assist him accordingly.

Yours Faithfully

Z. Maphosa

ACTING DISTRICT ADMINISTRATOR

DISTRICT ADMINISTRATOR
INSIZA DISTRICT
19-10-16
P.O. BOX 2, FILABUSI
ZIMBABWE TEL. 209/252

Appendix 9 Approval Letter to Conduct Study from IRDC

INSIZA RURAL DISTRICT COUNCIL
P O BOX 53, FILABUSI, email insizardc@gmail.comTel: 017-240, 237,542

08 June 2016

To whom it may Concern

Dear Sir/ Madam

RE: PERMISSION TO CARRY A RESEARCH IN INSIZA DISTRICT

Crespen Ndlovu is a student from University of Venda in South Africa. He has visited Council offices requesting for permission to carry out a research on Rural Electrification in Insiza district.

Please be advised that he has been granted permission to carry out the research as per his request.

May you please assist him accordingly.

Yours Faithfully

CHIEF EXECUTIVE OFFICER
INSIZA RURAL DISTRICT COUNCIL
08 JUN 2016
P.O. BOX 53, FILABUSI
TEL: 017-240, 237-264

F. Manombe
Chief Executive Officer