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DECLARATION FORM

I do here by declare that this work is my own original work, that it has not been plagiarized nor submitted for similar degree in any other University. The signatories below verify that student Simbi Ceasar has been supervised the dissertation entitled. The contribution of rural energy technologies in the reduction of poverty. A case of Zhombe Communal Area. The project is submitted in partial fulfilment of the Bachelor of Science (honours) degree in Peace and Governance at Bindura University of Science Education.

Student Signature ……

Date ……..… 2023

Signature of Supervisor ……..

Date…….

Signature of Chairperson……..

Date……

DEDICATION

I dedicate this project to my father and mother Mr and Mrs Simbi for their financial support and love. I would also want to thank my supervisor for her guidance and advice during the course of the research. To Bindura University of Science Education I would like to offer my gratitude for according me the chance to embark on this journey. Above all the Lord Almighty for taking me this far.

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ABSTRACT

This research was carried out in Zhombe Communal Area Communal Area .The research was mainly focused on the contribution of rural energy technologies in poverty alleviation .The statement of the problem of the study is that, we cannot overlook the contribution of rural energy technologies to poverty alleviation .The research objectives are to identify rural technologies in the reduction of rural poverty in Zhombe Communal Area ,to investigate the impact of rural technologies in the reduction of rural poverty in Zhombe Communal Area, to understand the contributions of the government and other funding partners in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area and to proffer recommendations in improving rural technologies in the reduction of rural poverty.The researcher used the consecutive random sampling technique to select the targeted population. Scheduled Interview guides and Focused Group Discussion Guide was used to collect primary data. In a nutshell, the main research findings concluded that, social media marketing have a positive impact in product promotion. Recommendations to address the identified areas were put across and they include more focus on the sustainability issues of rural energy technologies and business approach on rural energy technologies.

LIST OF ACRONOMYS

BUSE Bindura University of Science Education

NGO Non-Governmental Organization

REF Rural Electrification Fund

RET Renewable energy technologies

SDG Sustainable Development Goals

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CHAPTER ONE

INTRODUCTION

The chapter gives an introduction and discusses major components such as the background of the study, unfolding the problem at hand, statement of the problem, justification, the aim and objectives of the study which are used that assist in highlighting the contribution of rural energy technologies in the reduction of rural poverty. Furthermore, the chapter gives an insight of the study and exploring some of the key areas of the study.

1.1 Background to the study

Poverty is regarded as one of the world's most fundamental burning issues, which needs to be addressed through socio-economic development. Poverty is conceptualized in material terms as not having access to adequate levels of food, water, clothing, shelter, sanitation, health care and education. This can be translated into people having insufficient income, a better life and an improved standard of living as fundamentals. However, despite the fact that around 2 billion people use biomass fuels, there have been little attempts to analyse the energy-poverty nexus in depth (James and Hidieki, 2007). Partly, this can be explained by the fact that the technologies in rural areas is collected at zero monetary cost. As a consequence, decision makers are not aware of the full significance of biomass energy and policies and strategies fail to address the issues.

Absolute poverty was defined as a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services (Ncube,2019). Overall poverty takes various forms, including lack of income and productive resources to ensure sustainable livelihoods; hunger and malnutrition, ill health, limited or lack

of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing, unsafe environments and social discrimination and exclusion.

Extreme poverty in rural areas is related to the lack of income earning opportunities, and the productive use of electricity would help reduce poverty by providing alternative sources of livelihoods (Mackenzie, 2019). The power infrastructure consists primarily of three isolated power systems. Electricity networks are located around major urban centres. The remoteness of rural locations and the country's topography would make an expansion of the electricity supply in these areas through a centralized grid system difficult, and such an expansion may not be economically feasible (Manakire, 2020). Therefore, an exploration of renewable, sustainable, alternative energy sources that can be maintained at a decentralized level and that the poor can afford is urgently needed. The Government's program for environmental preservation and regeneration envisages promoting renewable energy in the private sector. An increase in the use of renewable and more efficient energy resources would result in less reliance on conventional sources of energy, such as electricity, coal, oil, and gas.

It is also characterized by lack of participation in decision making and in civil, social and cultural life. It occurs in all countries: as mass poverty in many developing countries, pockets of poverty amid wealth in developed countries, loss of livelihoods as a result of economic recession, sudden poverty as a result of disaster or conflict, the poverty of low-wage workers, and the utter destitution of people who fall outside family support systems, social institutions and safety nets (UN, 1995).

Fifteen (15) years ago, in Copenhagen, global leaders at the World Summit for Social Development described poverty reduction as an ethical, political and economic imperative, and identified it as one of the three pillars of social development. Poverty reduction has since

become the overarching objective of development, as reflected in the internationally agreed development goals, including the Millennium Development Goals (MDGs), which set the target of halving global extreme poverty by 2015. Yet, global rural poverty levels have changed very little over the past two decades except in China and East Asia, the total number of people living in poverty has not changed much but the living standard of those integrated in the economic process has improved considerably and to some extent, in India (Addison,2007).

Viewed in terms of the wider definition of poverty adopted by the 1995 Social Summit a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information, which includes deprivation, social exclusion and lack of participation, the situation today may be even more deplorable than a money income poverty line would suggest (UN, 2009).

The research question for the current study is: 'To what extend is contribution of rural technologies in the reduction of rural poverty?' The identified factors will be used in recommendations aimed at enhancing poverty reduction levels, in order to improve the rural technologies programme's effectiveness.

Numerous research reports have been published regarding the contribution of rural technologies in the reduction of rural poverty in many countries. However, limited information has been published about contribution of rural technologies in the reduction of rural poverty among rural areas. The results of the current study could add to the existing body of knowledge regarding rural technologies in the reduction of rural poverty in many countries in sub-Saharan Africa in general, and particularly in Zimbabwe. Policy-makers could consider the importance of the results of the present study for improving rural technologies in the reduction of rural poverty. Therefore, the study seeks to highlight the contribution of rural energy technologies in the reduction of rural poverty

1.2 Statement of the problem

For people living in poverty, the most pressing priority is the satisfaction of basic human needs, which includes access to food, shelter, water supply and sanitation and other services that will improve their standard of living, such as healthcare, education and better transport. But it is generally recognized that although energy is not a basic need, it is required as a crucial input for providing other essential human needs. The satisfaction of the basic needs and poverty alleviation efforts cannot be achieved without improving access to rural technological services (Mashaire,2018).Access to modern energy services can contribute directly to poverty alleviation by improving the quality of life through better lighting, access to cleaner cooking fuels and safe drinking water and improving effective delivery of social services through ensuring reliable heating, lighting, refrigeration of vaccines and other medicines, sterilization of equipment in health centres, as well as providing lighting to schools, thereby allowing people to study at night, and improving their employment prospects (Chen,2008). Access to modern technology services can also contribute indirectly to poverty alleviation by improving productivity and enabling income aspirations (Weyne,2019). But for billions of people a better life means getting access to basic needs such as food, health services, housing and clean water. None of these basic needs can be provided without energy. Energy is one of the most essential inputs into sustaining people's livelihoods, at the most basic level it is a precondition of cooked food, boiled water and warmth. Lack of access to clean and affordable energy is considered a core dimension of poverty. It has been well known for a long time that poor people tend to use biomass as their energy carrier. In many rural areas, there are increasing biomass supply shortages, which add to women's burden whose responsibility is to collect fuel. Therefore, the study seeks to explore the contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area.

1.3 Research objectives

- To identify rural energy technologies in the reduction of rural poverty in Zhombe Communal Area.
- To investigate the impact of rural energy technologies in the reduction of rural poverty in Zhombe Communal Area.
- To assess the contribution of the government and other funding partners in implementing rural energy technology in the reduction of poverty in Zhombe Communal Area.
- To proffer recommendations in improving rural energy technologies in the reduction of rural poverty.

1.4 Research Questions

- What are rural energy technologies in the reduction of rural poverty in Zhombe Communal Area?
- What is the impact of rural energy technologies in the reduction of rural poverty in Zhombe Communal Area?
- What are the contributions of the government and other funding partners in implementing rural energy technology in the reduction of rural poverty in Zhombe Communal Area?
- What are the recommendations in improving rural technologies in the reduction of rural poverty?

1.5 Assumptions

The sample inclusion measures are applicable thus, assumes that all participants have experienced the same or similar phenomenon of the study. The participants will also openly participate as the researcher seeks to use the ethical consideration of informed consent and voluntary participation. Most notably, the research will not only benefit stakeholders in rural technologies but also the status of economic growth in Zimbabwe, hence based on this, the participation can be based on sincerity.

1.6 Significance of the study

To date, studies in Africa and in developed countries in other continents have mainly reported on contribution of rural technologies in the reduction of rural poverty. Therefore, qualitative studies are required to identify the barriers to, and facilitators of, rural technologies among rural technologies on such continents and in such countries. Technology can have major favourable effects in remote rural areas and renewable energy technologies offer a key prospect in areas where the grid cannot reach. Reliance of the poor on their natural surroundings indicates that any step towards poverty alleviation should incorporate environmental and economic sustainability as a priority for sustainable livelihoods. This paper is a contribution in a process towards the use of rural technologies to be one of the instruments to reduce poverty in developing countries especially in Africa. Therefore, the study seeks to explore the contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area.

1.7 Delimitations of the study

Even though the contribution of rural technologies in the reduction of rural poverty, this study will focus mostly on Zhombe Communal Area.

1.8 Research Project Outline

The research study was organized in the following sequence:

i. **Chapter One (Introduction)** -This chapter includes background of the study, problem statement, the objectives, research questions and justification of the study.

ii. **Chapter Two (Literature review)** -This chapter introduces other related authors and studies regarding rural technologies and poverty reduction. It will also review empirical evidence on the subject area.

iii. **Chapter Three (Methodology)** - This chapter outlines the techniques, tools, methods used in collection of data. Further, it discusses the issues to do with ethics, validity and reliability of the research.

iv. **Chapter Four (Data Presentations)** –this chapter focuses on data presentation, analysis and interpretation.

v. **Chapter Five (Conclusions and recommendation)**-this chapter gives a summary and recommendations and further gives suggestions for research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section offers an overview of rural energy technologies relevant literature on the effectiveness of rural energy technologies in alleviating rural poverty. The setting of the investigation consists of the theoretical framework. The chapter also includes related literature in the form of survey books, scholarly articles and other sources relevant to the research under

study. Another highlight in this chapter is a section on prior studies which seeks to determine the academic gap for the research. It also presents the conceptual framework that helps to delineate the relationships and inter relationships between concepts.

2.2 Purpose of literature review

Literature review is the process of investigating, analysing and scrutinising data and information which is related to the topic under review. According to Robertson (2018) literature review is aimed at establishing a comprehensive idea or study through the use of secondary and published data or using different ideas from already established body of research. It is important to research in that it provides the researcher with the ability to identify relevant information to the study.

2.3 Theoretical Literature

2.3.1 Human Needs Theory

The researcher is using the human needs theory which was propounded by Abraham Maslow and hierarchy of needs. Maslow's hierarchy of needs states that at the bottom of the pyramid there are physical needs, followed by safety needs, love and belonging needs, self-esteem needs, self-fulfillment needs. Maslow in his hierarchy of needs argue that these needs are satisfied in soaring order such that one cannot satisfy a higher level need until all lower needs have been satisfied. This derives attention first to the physiological needs. Thus Maslow suggests that the first and basic needs people (residents) require are the need for survival which implies the physiological requirement for food, water and shelter (services). This implies that the residents should have better services in housing facilities, portable water and sanitation, a litter free environment and so forth. Providing water, sanitation, refuse collection, accommodation and movable roads is the first stride in providing physiological needs for residents. Residents are an important figure to Zhombe Communal Area neither it is that cannot

function without its residents so one can say that Residents are the heart and the Zhombe Communal Area Council is the main body without the functioning of the heart the body will also not function. In this case since the theory talks of technological needs whereby the researcher can relate it with here research topic.

2.4 Conceptual Framework

2.4.1 Conceptualizing rural development

The world bank (2020) also define rural development as a strategy aimed at the improvement of economic and social living conditions focusing on a specific group of poor people areas. In this regard, the process of rural development is more of improving rural people's quality of life by improving their standards of living through access to basic needs and wants of individuals and the community at large in ways that are economically, socially and environmentally sustainable. The process should also improve the quality and quantity of labour, empower women and other marginalised groups towards the attainment of equality in the community and enterprise development should be part of the whole process giving the people in rural areas an opportunity to participate in all efforts at all levels on issues concerning the development of the community. Such a development can be realised when the community has access to modern clean and affordable energy, is food secure, the community is health and safe, receiving clean safe water, which improves hygiene. There is peace and security, use of Morden machinery for production, children are going to school and are healthy, public service institutions like clinics and schools are offering services effectively, there is enterprise development and the people are able to save and invest. All this will improve the standard of living, reduce poverty and is giant step toward rural development. Such a development is aimed at developing communities that are nonurban with little or no urban infrastructure such as tarred roads, piped water and electricity, the population is usually sparsely distributed with a heavy reliant on primary

sources of economic production particularly agriculture. Such areas in Zimbabwe constitute of communal areas and those areas formerly colonial reserves, resettlement area as well as farming communities both commercial and communal farms. The most critical aim of development is to eliminate poverty.

2.4.2 Conceptualizing Poverty

Poverty according to Todaro (2019) is the situation of being unable or barely able to meet the subsistence essentials of food, clothing and shelter. World Bank (2020) concluded that poverty is a multidimensional problem, which requires a holistic but integrated solution. Some of its characteristics include low levels of income, lack of basic needs among others hence if such a situation exists in a rural setup it becomes rural poverty. On the other hand, Energy poverty is the lack of adequate modern energy for basic needs of cooking, warmth and lighting and essential energy services for schools, health centres and income generation (Practical Action). It is lack of or poor access to energy resources that are important for day-to-day services such as cooking, heating and lighting. People are regarded energy poor when they do not have access to energy services completely or have limited access to traditional fuels, which are not efficient enough to meet their energy needs such as wood, cow dung and plant residue. Sustainable energy on the other hand is energy from sources that replenish themselves naturally, for example, energy from the sun, wind, water, earth's heat and plants. Renewable energy technologies (RETs) turn these fuels into usable forms of energy such as electricity, heat, chemicals or mechanical power. Hence renewable energy technologies are energy providing technologies that utilise energy sources in ways that do not deplete the earth's natural resources and are environmentally beginning as possible. These sources are sustainable in that they can be managed to ensure they can be used indefinitely without degrading the environment (Renewable Energy Association, 2019). Renewable energy has gained popularity because it is

cheap, clean and sustainable. Access to Morden energy is the household's ability to obtain an energy service, should it decide to do so. Access is a function of availability and affordability, for energy to be considered available to a household, the household must be within the economic connection and supply range of the energy network of supplier. Affordability refers to the ability of the household to pay the upfront connection cost and energy usage costs (UNCTAD, 2020).

2.4.3 Conceptualizing energy technologies

Energy technologies sources include solar, wind, electricity, biogas, ocean resources and liquid biofuels (OECD, 2019). Renewable sources of energy are also referred to as modern or alternative energy sources.

2.5 Types of rural energies

2.5.1 Wood-fuel

Wood fuel is the most important prominent fuel for domestic fuel use in rural areas. In 2017 it was estimated that wood fuel accounted for about 60% of the total consumption (UNEP Report, 2017). This has come with huge environmental costs such as extensive erosion and diminishing wildlife populations due to habit destruction through deforestation.

2.5.2 Solar electricity

According to UNEP (2018) solar power presents opportunities for both small scale and industrial production in rural areas. However, under the current economic climate, there are fewer incentives for large scale investments including construction of solar power plants. There is a general shortage of capital and reluctance by developed economies to engage in technology transfers to developing countries. The solar power industry in Zimbabwe is however thriving

with several companies providing solar energy solutions for domestic and commercial enterprises. There is potential for construction of what could be the largest solar power (2000 MW) plant in the world if the project by government in partnership with the United Arab Emirates is successful.

2.6 The benefits of rural energy technologies

According to the World Bank (2017) report, estimates show that demand for energy is expected to increase by about 60% by 2030. In this context, the need to expand solar electrification programs becomes urgent. Renewable energy can improve energy security by reducing reliance on grid expansion initiatives and volatility of fossil fuel prices. Furthermore, renewable energy can support productive activities while contributing towards electricity portfolio diversification.

2.6.1 Economic benefits

Renewable energy industries are a significant source of employment with currently over 5 million jobs. It is estimated that investments in renewable energy is likely to increase jobs by 5-7% by 2050 (UNEP Report, 2018). Therefore, job creation and the introduction of new innovative technologies to potentially attract investment and new areas of technical expertise can be an additional positive outcome. Heggie (2017) states that Africa has potential to generate off-grid renewable energy through solar power. The costs associated with installing the solar panels continue to drop and in the last decade they have dropped by 80 percent. Solar energy offers medical facilities reliable low-cost and independent sources of electricity in the remote rural areas.

2.6.2 Environmental benefits

In general, most people in developing countries cannot afford modern fuels and energy efficiency technologies (Norman 2018). The use of renewable energy will most likely reduce air pollution. According to the United Nations Secretary General's Report, climate change is a major threat to food and water security globally, especially for rural households in developing countries. As a basic human right, access to reliable and affordable energy should be promoted to ensure social and economic stability. Furthermore, strategies for providing access to sustainable energy ought to contribute towards economic growth and environmental sustainability for future generations. According to UNICEF (2018), mini-grid systems to electrify small villages and sparsely populated communities have become popular. Off-grid solutions are a cheaper alternative to grid expansion and also sustainable. Besides, there are investment opportunities in the “green" energy sectors with potential to create more jobs. The United Nations General Assembly declared 2012 the International Year of Sustainable Energy for All in recognition of the role played by solar energy in rural development. The focus was on increasing access to solar panels and clean energy technologies in order to promote sustainable development. This message has been taken up in most regions and countries across the globe with effort to scale up energy access intensifying.

2.6.3 Health benefits

Access to electricity is increasingly driving provision of healthcare in Africa where energy tends to be inaccessible and unreliable (Heggie, 2017). In high income countries, hospitals consume a lot of energy to power medical equipment as well as to supply lighting, heating and ventilation. On the contrary, in Africa hospitals and clinics lack access to electricity. This creates numerous problems including inability to use essential medical equipment and spoiling of medicines due to poor storage conditions. This has led to limited opening hours for clinics as well reduced potential to deliver adequate healthcare to the communities. Moreover; this has

enabled the hospital to save costs and thereby allowing for the channelling resources to other healthcare programs. For Ethiopia, as for all of Africa access to modern healthcare depends on availability of electricity. Therefore, Matobo as a growing rural community among several other African rural communities is realizing the need for solar energy to promote good health as is the case in Wolisso Ethiopia. The use of coal and firewood at household level has negative health effects. For instance, the risk of pneumonia has been reported to increase by 80% when cooking using biomass compared to the use of electric stoves for cooking (Kohlin et al., 2020). More so, other medical conditions such as heart disease, stroke, lung cancer and chronic obstructive pulmonary disease have been known to be caused by indoor pollution from the use of biomass (WHO, 2018). Women are traditionally ascribed domestic roles including cooking which exposes them directly to this pollution. Therefore, access to electric stoves can contribute towards the improvement of the health of women, especially in rural communities. Furthermore, at community level, powering health clinics can yield positive effects on women's wellbeing and maternal health (IBRD,2017). In a study conducted by Essendi et al. (2019), mothers, their partners and healthcare workers stated that lack of access to electricity was the major threat to the delivery of health services, such as safe storage of medicines, safe delivery of babies and the functioning of resuscitative and new-born care services. The findings reveal that the provision of sustainable solar electricity to health institutions has a positive impact on maternal health and infant care.

2.6.4 Benefits for Women

Energy prosperity is one of the requirements in rural areas as it seeks to improve access to energy in peripheral places in an effort to improve people's lives (Pact, 2020). Misra (undated) maintains that energy prosperity has the face of a woman. The implication of this assertion is that women as primary caregivers carry the burden of creating a home as they juggle tasks

including tending to their children, husbands, cooking, cleaning, fetching water and firewood. However, women from households with access to solar electricity seem to have an easier and more balanced life than those from households without electricity. According to Gaure (2021), time poverty refers to scarcity of time for rest as a result of too much time spent working on household chores and other traditionally ascribed gender roles. Therefore, rural electrification can potentially eliminate certain tasks or at least reduce the time required to complete them. These tasks and the time it takes to complete them are referred to as "drudgery" (Winther et al., 2017). Access to energy will thus reduce the drudgery and alleviate women's time poverty. In most developing countries women spend approximately 4 hours on unpaid household chores and care work per day. In Sub-Saharan Africa (SSA), women spend three times more the amount of time on unpaid household chores (Jagoe et al., 2020). In Nigeria, women spend about 3 hours a day preparing grains for pounding; over 2 hours grating a basic of cassava and over 80 hours processing a drum of oil palm fruits (IBRD, 2017). Access to and use of electrical appliances such as, cookers, food processors and refrigerators can significantly reduce time spent on household chores. This shows that ownership of solar systems will improve the lives of women and thus lead to energy prosperity. The safety of women is also at risk due to lack of access to solar energy. According to World Bank (2018) availability of electric water pumps in communities provide women with quick and reliable water supply within reasonable distance. Access to water is a challenging issue in Matobo district which suffers from perennial drought owing to poor and erratic rainfall patterns. As a result, women have to walk long distances and spend many hours fetching water from dams and other available water sources. Evidence shows that in Sub Saharan Africa, it takes on average 33 round trips to draw water in rural areas and 25 minutes in urban areas (UNICEF, 2019). These long distances and many hours leave women vulnerable to attacks and sexual abuse. Sommer et al. (2017) highlights instances where women have been sexually harassed while standing in line for water, or raped

on the way to and from fetching water and firewood. Reducing the time and distance required to fetch firewood and water by using solar powered appliances may therefore reduce time and safety costs to women in rural areas.

2.6.4 Educational benefits

Household electrification can be a substantive catalyst to educational attainment for children living in rural communities. Studies in India and Kenya have reported positive correlation between school attendance and study time with household electrification (Lee, Miguel & Wolfram, 2020). In a survey of 100 households in Madagascar, findings revealed that children have more study time when their homes have electricity lighting. Girls were noted to benefit more as they assist with household duties during the day and are still able to study at night (Mhakure, 2021). They found that children practice shifts studying into the night when they have electricity lights in the home. This therefore accommodates the girls that are usually disadvantaged not only by lack of lighting, but also by socially ascribed gender roles and chores while benefiting the boys who often have more time to study.

2.7 Empirical literature

Recent interests in rural development has emphasised the importance of improving rural energy technologies as the mainstay in promoting rural development, this influenced research on rural development to such an extent that much of the literature on rural development is concentrated in this area. On the other hand, literature on promoting rural access to energy is also much concentrated on rural electrification even though interest is now shifting towards more sustainable sources of energy, which include renewable energy sources. Most insight on the economic benefits of rural electricity comes from literature on rural electrification through extension of central power grids. Studies clearly show the consumption benefits and improvements in quality of life through electrification (Zhong et al. 2016) Published studies of

income generation and economic benefits from renewable energy are still limited and call further research (Kaundinya, et al, 2019.).

From independence in 1980, the government of Zimbabwe with support from various development partners has come up with various programmes aimed at improving the lives of rural people to raise them out of poverty. Such initiatives managed to make reasonable impact but it was not enough as shown by Zimstats statistics that out of the estimated 12 million Zimbabwean population, 62,2% households are living in poverty while 16, 2 households are extremely poor. In rural areas, five out of every ten rural households are regarded as extremely poor making a total of 76 % poor households and 30, 4 % of the total rural population extremely poor (Zimstats, 2018). The same report also established that in those rural areas, communal lands and resettlement farms have the poorest people as they all rely on unpaid family labour, 84,1% of the economically active population while 83% households are headed by communal farmers makes them more prevalent to poverty. Zimbabwe is dependent on hydroelectric power generated from Kariba Dam on the Zambezi River. However, the majority of people in rural Zimbabwe depend on wood-fuel and kerosene (commonly known as paraffin) for cooking and lighting (World Factbook Zimbabwe, 2019). According to The Zimbabwe (2021), the task of processing food, such as milling and grinding, is widely carried out through the use of diesel-powered machinery. Additionally, it postulates that of the 7,900 gigawatt hours (Gwh) of electricity generated in 2009, 53% was produced from renewable sources. According to an article by The Herald (2019), in April 2018, the Rural Electrification Fund (REF) in Zimbabwe announced an initiative to electrify all public institutions, such as 20 government extension offices, schools and clinics at no charge. The REF only required these public institutions to pay for the internal wiring and connection fees. The REF subsidized the connection fees for schools but also indicated that they were required to pay for the internal wiring of administration block, science laboratories and computer laboratories. Since 2002, the REF has electrified 2 699

primary schools, 1 359 secondary schools, 1175 villages, 952 business centres, 874 rural health centres, 774 small scale farms, 411 government extension offices, 244 chiefs' households and 803 other public institutions (The Herald, 2019).

According to Jagoe et al. (2020), women spend more time doing unpaid domestic work, especially in Southern Africa. In the study area participants confirmed that they walked long distances and spent many hours collecting firewood and water for domestic use meant that household members, especially women would have little time with their children. At the end of the day they would be very tired and unable to assist children with their school work. When the bush pump was broken, in addition to walking long distances to nearby farms to fetch water, most households would be forced to buy water for 40 domestic use. The research participants reported that they would buy a 20 litre gallon of water for $1. Those households that could afford would buy more water per trip in order to limit the number of trips they have to make. This water was also only reserved for cooking given the cost and scarcity. These challenges were experienced by almost all households in the villages prior to having access to solar panels that were used to pump water from boreholes thereby making it relatively easily available. According to Ndlhovu (2019), the Zimbabwe government made significant effort to promote the provision and access to solar energy in rural areas. Such efforts included the removal of import duties solar batteries and other solar-related products and mandating new buildings to make provisions for solar installation. The Zimbabwean government aims to produce 1575 MW of power from solar by 2030. Ndlhovu (1029) adds that the government also rolled out innovation mechanisms such as net metering and feed-in tariff for clean energy to enable Independent Power Producers (IPP) to add their excess electricity to the national grid; the latter initiative is what has led to this research as provision of energy is no longer the sole mandate of the government and also the fact that clean energy sources have become the answer to assist the nation and mostly individual homes and communities to improve their livelihoods through

the use of solar energy. The Sustainable Livelihood Framework enhances the understanding of the livelihoods through organizing factors that constrain or enhance livelihood opportunities and the relationship between the factors (Serrat 2017). The sustainable livelihoods model is an asset-building approach to poverty reduction based on the premise that everyone has assets on which to build and that strengthening a number of asset areas can enable people and families to not just get by, but to actually get ahead. Serrat (2017) asserts that the Sustainable Livelihoods Framework can aid in the designing of development activities and evaluate the contribution that existing activities have made to sustain livelihoods. This framework is appropriate to this research as it unearths possible constraints to livelihood opportunities resulting from lack of access to solar energy systems while showing the benefits to livelihoods realized by the rural people of emanating from using solar panels.

2.8 Literature gaps

Despite the importance of rural technologies, fewer studies have focused on the the contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area. With technology implementation, a new phenomenon in Zimbabwe's rural technologies has not yet embraced it, this study was conducted to contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area.This study will encourage several fresh ideas that are stated and shared in rural energy technologies in alleviating poverty.

2.9 Case studies

2.9.1 South Asia

The rural poor in South Asia are characterized by a number of general economic, demographic and social features, the most common one being lack of modern energy technologies. Without access to modern energy services women and girls spend most of their day performing basic

subsistence tasks, including time consuming and physical draining tasks of collecting biomass fuel, which constrain them from accessing educational opportunities and livelihood enhancing options as well as limits their options for social and political interaction outside the household (Danielson, 2019). At the same time, cooking from biomass is particularly detrimental to the health of women and children of the estimated two million annual deaths attributed to indoor air pollution generated by fuels such as coal, wood, charcoal and dung, 85% are women and children who die from cancer, acute respiratory infections and lung diseases (WHO & UNDP, 2019). Poor rural households tend to have larger families, with higher dependency ratios, lower educational attainment and higher underemployment. The poor also lack basic amenities like piped water supply, sanitation and electricity. Their access to credit, inputs and energy technology is severely limited and certain constraints, such as lack of information about markets, lack of business and negotiating experience and lack of a collective organization, deprive them of the power needed to interact on equal terms with the other, generally larger and stronger market intermediaries (IFAD, 2021). Cultural and social distance and discrimination are other factors that may also at least partly exclude the poor from markets. While poverty may be a transitory phenomenon for many of the poor, it is more or less a permanent one for many more.

2.9.2 Ethiopia

Access to electricity is increasingly driving provision of healthcare in rural areas in Ethiopia where energy tends to be inaccessible and unreliable (Heggie 2017). In high income countries, hospitals consume a lot of energy to power medical equipment as well as to supply lighting, heating and ventilation. On the contrary, in Ethiopian rural hospitals and clinics lack access to electricity. This creates numerous problems including inability to use essential medical equipment and spoiling of medicines due to poor storage conditions. This has led to limited opening hours for clinics as well reduced potential to deliver adequate healthcare to the

communities. A case in point is that of the project initiated by Enel Green Power (EGP) in Wolisso Ethiopia. According to the EGP report (2019) St. Luke hospital in Wolisso Ethiopia, despite catering for over a million patients endured perennial power outages. As a result, EGP had to build an innovative solar hybrid system which produces about 320 kWh of electricity to ensure that the hospital has access to uninterrupted electricity supply. This initiative has led to approximately 79,000 outpatient visits, 15,000 hospitalizations and 4,000 births annually. Moreover, this has enabled the hospital to save costs and thereby allowing for the channeling resources to other healthcare programs

2.9.3 South Africa

In South Africa, in the context of energy poverty alleviation two niches for fuel wood have been identified that is the rural and the low-income peri-urban market (Kyles, 2019). In the past years access to electricity has increased from 36% to 70%, bringing electricity to many disadvantaged communities. In the early years of the accelerated national electrification program, it was thought that households would switch to electricity when they obtained a grid connection or that those not yet connected would use other modern fuels such as kerosene or LP Gas. As a result of such views, the provision of fuel wood was no longer considered a priority. But many poor households cannot afford the electrical appliances and the monthly cost of electricity for cooking, in spite of the fact that South Africa has relatively low tariffs and the poor receive 50 kWh per month of free basic electricity. Many poor households still depend on fuel wood for their most energy intensive activity: cooking. In 2001, 69% of households used electricity for lighting and only 51% used it for cooking (ERC,2018), indicating that 18% of those households that were connected to the grid did not use it for cooking. Very poor households use fuel wood and kerosene because they perceive these fuels to be cheaper. Overall, 21% of South Africans use wood for cooking and 64% of these households are in the lowest income brackets (annual household incomes from R0 to R9600)

(ERC,2019). The use of fuel wood for cooking is clearly correlated to poverty. Many of the poorest people live in remote rural areas which have not yet been reached by the electricity grid, and therefore they miss out on electricity for lighting and also the free basic electricity subsidy. Fuel wood strategies could explore how poor people without access to electricity could benefit from free basic energy.

2.10 Chapter summary

Rural technologies have potential to significantly improve socio-economic conditions of rural communities. This chapter consists of theoretical framework, related literature that explains the importance of rural technologies in alleviating poverty. It also involves prior studies whose aim is to analyze results of other researchers relating to the topic. Discussed in this chapter is the conceptual framework that seeks to establish the relationships that exists amongst different variables leading to customers' satisfaction. The chapter also reviewed literature related to the benefits of rural technologies being provided to rural people.

CHAPTER 3

METHODOLOGY

3.1 Introduction

Research methodology alludes to ways to logically elucidate the research problem as a skill of learning exactly how research is carried out scientifically. Therefore, this chapter will provide numerous steps that the researcher adopted in reviewing the research problem alongside with the sensibleness behind. In the chapter also are the research or data collection instruments, including the procedure and administration of the instruments and the data analysis methods used. The main thrust of the chapter is to give an overall perspective of how the study was conducted with justifications.

3.2 Research Methodology

The research is based on the qualitative research methodology. This is not the first time the design has been used in one study as previous studies by Mbufu (2013) in the related field show highly significant findings from the use of such approaches. The approach has been used so as to expose bare narrative of social nature which are usually of policy background, therefore enhance validity. Qualitative research has been selected specifically because it is effective in obtaining culturally specific information about the values, opinions, behaviours, and social contexts of particular populations which is what this study seeks to relate to as it unfolds. While mixed approach is preferable it will be selected for this report because qualitative approach helps in the transferability and dependability of the data being collected and generated. On the other hand, quantitative approach will help since its numeracy based in enhancing reliability and validity of the data to be collected. Qualitative research design involves all non-numeric data or data that has not been quantified and can be a product of all research strategies (Supino

& Borer 2019). While a Quantitative approach involves collection of quantifiable data which is normally numeric, tabulated, on charts and or figures. It is the approach which produces findings arrived at by means of statistical procedures or other means of quantification

3.2 Research Design

Qualitative research approach research paradigm and a case study research design shall be used. Within the field of qualitative research, the case study methodology is the most prevalent method (Almarshad, 2015). In this study, the researcher will employ the descriptive case study. It will use descriptive because it will focus on the systematic description or exposure of the salient aspects of quality with a focus on patterns that emerged. A case study that the researcher will employ in this study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence (Benyera & Nyere, 2015). The intention will be to provide a rich or thick description, which interprets the effectiveness of rural energy technologies in alleviating rural poverty in Zhombe Communal Area.

3.3 Population and Sampling

The study targeted all people but mostly women in Zhombe Communal Area.Nachmias and Nachmias (2018) define population as the aggregate of all cases that conform to some designated set of specification. The researcher used non-probability sampling method which does not allow every member of the research population to have the same chances of being selected (Cooper & Schindler 2014). This sampling method was selected for the study because it is simple to use thus selection of respondents using non-probability sampling is not time-consuming.

The researcher used consecutive sampling technique because it includes all subjects that are available that makes the sample a better representation of the entire population. The researcher also used this sampling technique because it is appropriate. Gill and Johnson (2002) and Saunders, Lewis and Thornhill (2007), concur that it is impracticable to pull together data from the entire research populace and therefore there is a need to select a sample. A sample refers to a subset of a larger set which is the research population and from this subset, the researcher ought to draw deductions that can be generalizable to the whole population. Gill and Johnson (2002) and Saunders, Lewis and Thornhill (2007), concur that it is impracticable to pull together data from the entire research populace and therefore there is a need to select a sample. A sample refers to a subset of a larger set which is the research population and from this subset, the researcher ought to draw deductions that can be generalizable to the whole population

3.4 Data collection methods and Research instruments

Data collection is essential for the maintaining of the integrity of research. Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes (Punch, 2006). On the other hand, Moore and Llompart (2017) purports that data collection tool refers to the devices or instruments used to collect data such as surveys or questionnaires, interviews, and checklists. The researcher seeks to gather her data by contacting interviews with the people living in Zhombe Communal Area through the use of interview schedule guide. Researcher will also make use of document review as a way of data collection.

3.5 Ethical Considerations

Ethics are norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others, the Dos and Don'ts, the moral principles, conduct or standards adhered to when conducting research and the ethical practice concerns the personal behaviour of the researcher. The purpose of ethics in research is to ensure that no one is harmed or suffers adverse consequences from the research activities (Lapan, Quartaroli, &Riemer 2019). A number of key issues are related to ethical protections and the contemporary researcher should adhere to protect the rights of their participants. Therefore, this research will consider a number of different ethical issues which are a set of principles to assist community of experimenters in deciding which goals are most important in reconciling conflicting values. The researcher shall have a moral and professional obligation to be ethical, even when research subjects will be unaware or unconcerned about ethics and these shall begin and end with the researcher.

In this study, the researcher shall seriously take into account issues of confidentiality, informed consent, privacy, anonymity, no coercion or humiliation of subjects, feedback or debriefing, not conducting the research secretly and seeking of authority prior to undertaking of any activity. These include:

Voluntary participation: shall be respected and respondents will not be coerced into participating in research. Closely related to the notion of voluntary participation is the requirement of informed consent. Essentially, this means that the prospective research participants will be fully informed about the procedures and risks involved in research and will give their consent to participate.

Informed consent: When gathering information, respondents will be informed of the study; its purpose and who will be conducting it and their objective responses will be sought when answering the structured interview questions.

Privacy: All data collected will be strictly treated with confidentiality and anonymity and will only be shall use for academic purpose.

Feedback: On the completion of the study, respective institutions and their respondents will be furnished with the results and the recommendations of the study in form of research report.

The researcher will not use names, addresses and area of origins of the respondents. The researcher will also assure the interviewees that names will not be going to be mentioned since the research is for academic purposes only. The researcher will promise ethical behaviour, assure honesty and conduct the research decently during and after research. Actually the researcher will conduct the research honestly displaying integrity, responsibility, respect whilst pursuing excellence, reliability, loyalty and fairness. The researcher will also acknowledge information borrowed from other people's works to avoid copyright infringement, avoid bias selecting interviewees or respondents and in data presentation, protected confidential information by avoiding capturing information that the respondents will not want to be published in the research.

3.6 Chapter Summary

The third chapter was a discourse on the research methodology the researcher implemented in the research. It presented first the research philosophy which influenced the research design, data collection method, and the research instrument of the study.

CHAPTER FOUR

DATA PRESENTATION, DISCUSSION AND ANALYSIS

4.0 Introduction

This chapter presented, analysed and interpreted the collected data. This chapter focused on highlighting the contribution of rural energy technologies in the reduction of rural poverty. It was presented according to the sequence of the objectives which were the main themes of the study and other themes which came out also as data was collected. These objectives or main themes included to identify rural technologies in the reduction of rural poverty in Zhombe Communal Area ,to investigate the impact of rural technologies in the reduction of rural poverty in Zhombe Communal Area, to understand the contributions of the government and other funding partners in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area and to proffer recommendations in improving rural technologies in the reduction of rural poverty .There was also the discussion of findings and these were linked to the theories of study and the available literature.

4.1 BIOGRAPHICAL INFORMATION

The section presented the demographic information of the participants. The profile is of great significance as it will assist in contextualising the concepts under study.

4.1.2 Gender of respondents

4.1.1 Gender of respondents

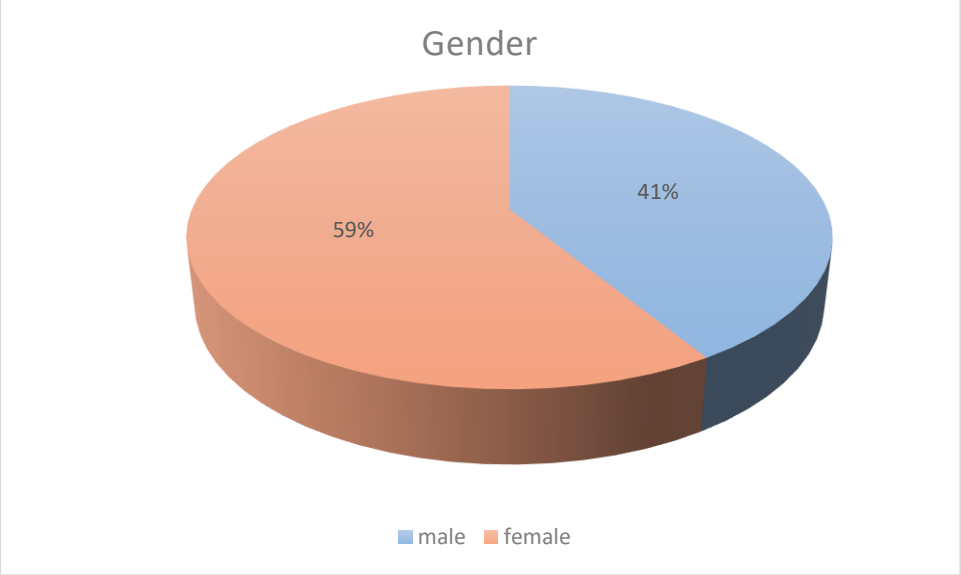

Figure 1: Gender

Source: Own calculations (2023)

Figure1, reveals that most of the participants in this study were women with 59% and 41% were male with a comparatively low rate. The outcomes of the study reveal that the demographic distribution in Zimbabwe is constituted of more females than males and also the issue of women empowerment at work. Donthu (2010) explained that, the majority of people in Sub Saharan Africa are likely to be women. However, under this research study, there is a relatively balanced gender representation that will yield results that are not inclined to gender.

4.1.3 Categories of respondents

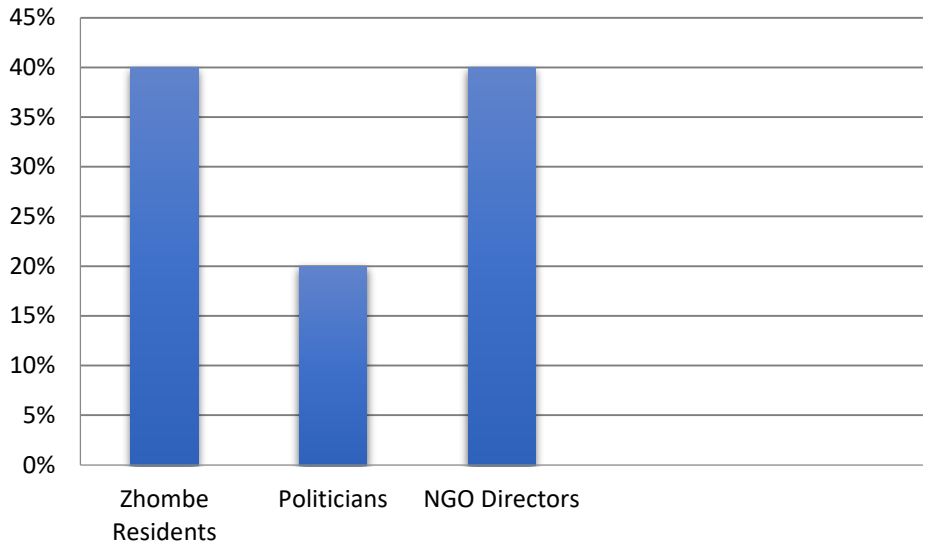

Figure 2: Age of respondents

Source: Own calculations (2023)

Figure 2 shows that Zhombe residents and NGO Directors have the majority representation of 40% followed by Politicians that scored 20%.

4.2 Identifying rural technologies used in the poverty alleviation in Zhombe

This section identified rural technologies in the reduction of rural poverty in Zhombe Communal Area.

1 Solar

According to respondents, solar has been able to develop welding, providing power to homesteads, carpentry and baking projects and the importance of external funding in Zhombe Communal Area. According to one of the respondents

'*Purojekiti ye masolar yakatibatsira zvikurusa kufambidzanawo nenguva mutekinoroji munzvimbo yedu ino yeZhombe. Yakatibatsirawo zvikurusa kuchengetedza nharaunda yedu*

uye kutibatsira kubva muhurombo uye hazvisi kuzobetsera isu toga asi nevana vedu uye vazukuru vedu munguva ichatevera'.

In translation the aforementioned statement reflects that: (*The solar project promotes clean and modern/sustainable energy technology for poverty reduction and environmental protection in Zhombe. The aims of the project are to enhance the understanding of the relationship between access to energy and poverty reduction and environmental sustainability, to ex-post evaluate energy technology, to recommend appropriate clean energy technology options in future poverty reduction energy development policy, and to raise the benefits users may accrue from the installed energy systems in remote rural areas).* The project's remit of poverty eradication is in line with the Sustainable Development Goals (SDG) and these projects are environmental friendly.

2 Electricity

Research finding reflects how electricity has made significant paths into an area that has huge potential to contribute to poverty reduction. The underlying criteria are based on the five forms of capital required for sustainable livelihoods human resources (health and education), financial, natural or environmental, physical infrastructure, and social networks. The rural electrification notion has also been warmly welcomed in the Zhombe community and some of the projects under implementation includes solar plants and hydro-thermal electricity in which if completed, Zhombe area will be transformed into a business and industrial site and the benefits of such initiatives will mostly benefit the youth as a majority of them are unemployed.

4.3 The impact of rural technologies in the reduction of rural poverty in Zhombe Communal Area

The research established that the introduction of rural technology in Zhombe areas has often been compared to providing space age technology to the least developed populations. In many cases the technology gap and the problems related to service delivery had not been identified as one of the potential major barriers to successful implementation. This knowledge gap extends into two directions. The service provider does not understand the needs and conditions of the customers and the customer does not understand the technology and the often complicated agreements that go with it. According to one of the respondents:

'*Masolar akatikoshera nekuti haadhure pamitengo uye akanakira kuti mitengo yavo inokwaniswawo nevanhu vemuma ruzevha zvichifambirana nenguva'.*

When translated this meant: '*The solar technology is quite likely that cheaper and/or more efficient panels will be developed within that time period, locking the poor into a system of obsolete expensive technology'.*

1 Gender roles

There are examples of changing gender roles in the household with new energy sources, with men sharing domestic technology use more. But there are many examples of the opposite. There is mixed evidence on control over and access to modern energy equipment, with men normally remaining in the decision making seat. In energy projects where a strategy to involve women has been deliberately pursued, this has often improved their status and voice in the community as well. According to another respondent:

'*Changing gender roles in the household and voice and participation by women in Zhombe Communal Area in energy transitions tend to be extremely variable and likely depend on many factors that we would like to know more about'.*

2 School enrolment and rural energies

There is some evidence for an increase in girls' schooling when their time in domestic chores, especially water fetching, is reduced. The effects of saving women's time (in general) and of adoption of improved stoves and cooking fuels (specifically) on girls' education, are not known though.

Rural inhabitant's well-being, empowerment, and education are driving factors in other SDGs, such as reducing children's malnutrition. There are good examples where energy access has empowered women by giving them more choices about how to organise their work more effectively. Most studies show that women usually choose to devote their extra time due to reduced drudgery or a longer day with electric lighting) to increasing their other productive and reproductive work hours. Although women do sometimes increase their time in leisure an important indicator of women's empowerment, entertainment or social recreation, the studies reviewed show that this is more likely for men.

There is good evidence that in electrified households, women's access to information has been increased through TV and other media, and there are cases where this can be said to have led to empowerment. There is a little evidence for increased reading by women with electrification. It would be useful to know more about this and also the potential for TV and media to promote family bonding and gender cooperation, as hinted by some studies.

3 Encourages saving and improve standards of living

Energy as a key variable in eradicating extreme poverty and hunger, to produce energy for sale, such as the multi-purpose platform, can be successfully owned and operated by women. But mostly, women's energy enterprises have operated at small scale and their sustainability under market conditions is not known. Savings in energy costs and energy efficiency could effectively increase household income and food consumption. There is good evidence for reduction in household expenditures on energy with more efficient and lower cost cook stoves

and lighting fuels. But it is not clear whether these savings are used to increase food consumption or are rather offset by increased energy use.

According to another respondent:

'*Mukana wekuwana maeneji anofambidzana nenguva akabatsira isu zvikurusa vechisikana munzvimbo ino yeZhombe. Vasikana taisivhara chikoro tichinotsvaka huni, asi kuuya kwesolar energy kwaita kuti zviveneshanduko. Nguva yekuverenga yavapo.Asi kusiyana kwazvo pakati peedu nevakomana handina ruzivo hangu nazvo.*'

When translated this meant: (*Access to modern energy could free up time for girls in Zhombe to go to school or to spend time on homework. Most studies found focused on electrification. Increased school attendance by girls is associated with electrification, and there is some evidence too of better school performance by girls. Hours of study are also possibly increased, but the latter data is not available for boys and girls separately).*

Women's time is a key constraint to agricultural production, income-earning and family nutritional status of the poor. There is good evidence in the studies reviewed for time and effort savings of 1 to 4 hours daily in cooking, fuel collection and food processing, when energy is made available for these tasks; but there is insufficient evidence on how these time savings are used. There is a positive correlation between the availability of electricity and time spent on fuel collection and cooking – but we don't understand exactly why.

According to another respondent:

Magetsii anobuda pama solar anobatsira zvikurusa isu vanhukadzi mukutsvaga mari nekuita mushandirapamwe kukngava mukuita mapurojekiti akaita sekubika chikafu chokutengesa .Asi atizive hedu kuti zvinounza mari yakadii mukubatsirawo.MaDonor ndivo vanoziva mamiriro azvo nekuti ndivo vanotibatsira uye nekutungamirira hurongwa hwemapurojekiti akaita sekubika munzvimbo ino yeZhombe'.

When translated this meant: (*Better energy access could directly help Zhombe inhabitants in income-earning activities. We know from anecdotal evidence that women use biomass energy in their micro-enterprises, especially food processing, and use electricity to extend the working day for home industries and agriculture. Donor-supported projects have illustrated how "energy enterprises" that manufacture or sell energy equipment, for cooking in Zhombe).*

4.4 The contribution of the government and other funding partners in implementing rural energy technology in the reduction of poverty in Zhombe Communal Area.

The government of Zimbabwe has made a mandate to electrify all its rural areas as part and parcel of its National Development Strategy(NDS) and to compliment the implementation of sustainable development goals. As part of its tireless efforts to provide easy accessible and affordable electricity, the development of an energy policy which encourages the use of natural sources such as water, sunlight and wind can generate green energy which is environment friendly cheap and suitable for both urban and rural areas. Furthermore, Plan Inernational as developmental partner of the central government of Zimbabwe mainly focuses on providing funds and technical expertise that is much needed to meet the needs of vulnerable livelihoods of Zhombe Community

4.5 To proffer recommendations in improving rural technologies in the reduction of rural poverty

1 Donor funding and project implementation

Since donor funds served as the major pillar for laying the project's foundation, the study also concluded that donor funding is crucial to project implementation. According to the research's findings, donor financing is crucial and has a significant impact on how successfully projects are implemented to reduce poverty. Plan International is totally dependent on funding from its implementation partner, such as the USAID, to carry out the Zhombe rural electrification initiative. The study concludes that the most important component in obtaining funding and, as a result, realizing effective project implementation was expenditure accountability. The results of the interviews demonstrate that donor assistance has been essential in putting into action workable projects designed to empower the poor people of Zhombe.

2 Strategic planning

Research findings reflect that strategic planning is part and parcel of all successful developmental and community empowerment projects as it allows spearheading these initiatives to have long term comprehensive plans of meeting their objectives. In order to implement successful and meaningful projects it is key to source more partners as they increase capital reserves and technical assistance.

4.7 Discussion of the findings

The findings of this study showed the evidence that there is a strong relationship between energy and economic growth, and some evidence that energy can be a driver of economic development for developing countries, especially at the industrial stage. There is a strong correlation between per capita energy consumption and human development indicators such as life expectancy, literacy and school enrolment used in the UN’s Human Development Index (HDI), though whether this is causal or simply linked by rising incomes, has not been demonstrated.

Global studies shows a relationship between energy and various socio-economic indicators of importance to women (Matimbe, 2020). A significant positive relationship was found by one study between traditional biomass fuel use and infant and child mortality, life expectancy (with a larger effect for females), fertility rates and crude birth rates, independent of both income per capita and income equality in a country. Indoor air pollution exposures have been related with child and adult morbidity and mortality on a global basis; though the global figures do not disaggregate effects on girls and boys, most impact on adults is assumed to be on women cooks.

An eight-country study found that the fuel transition to hydrocarbon cooking fuels is strongly correlated in these countries with access to other infrastructure represented by variables for education, urbanization, and electrification. Access to clean water especially important for reducing women's work burden – has been plotted against electrification, but the curve shows considerable diversity; other factors may be significant. SDGs shows that the relationship is close, and even modest increases in energy and electricity consumption could be associated with much larger improvements in gender-related development defined as equality in life expectancy, literacy and school enrolment. This is consistent with what is known about the effects of energy access on women's "practical" needs to reduce work burden and access services.

However, the relationship between energy consumption and the UN's Gender Empowerment Index (GEM), which measures gender inequality in economic and political spheres of activity, is much less clear (Worlin ,2019). Gender empowerment likely depends more strongly on other factors, such as legal, social and policy frameworks. Other conditions in addition to energy access are necessary to meet women's "strategic" needs including the transformation of gender roles and relations.

There is good evidence for a number of linkages between energy, gender and the rural poverty alleviation, ranging from time savings and reduced household expenditures, to increased school attendance by girls, empowerment through having more choice in organizing work and through access to TV and media, to acute respiratory illness, maternal health and reduced infant mortality (Magesa,2019).There are many areas though where evidence is suggestive but needs to be more convincing for policy and planning, including on HIV/AIDS, energy's role in women's income generation, maternal and child health outcomes, and voice and participation by women.

Furthermore, there has been much emphasis in energy projects on incorporating gender concerns and reporting on the impacts of energy interventions on SDG indicators. Even worse, data has seldom been disaggregated to show the differential impacts on women and men (Benuse ,2017). For every study found that showed the impacts of an energy project on women and men, perhaps ten others were reviewed that either did not provide quantitative information on impacts at all, or mentioned only "people", "households" or "children", and did not give the impacts on women and men or boys and girls separately. In many "studies", generalizations about benefits for women were made without data or empirical support.

In conclusion, from a gender perspective, what emerges most strongly from the evidence, in fact, is that while energy may have important effects on women in relation to the SDGs, this varies greatly according to the social and economic environment, which necessitates a different strategy for rural inhabitants involvement in the energy intervention (Makavire,2019). It is critical therefore to delve more deeply into the dynamics of under what conditions energy "makes a difference" in the linkages between gender and energy, through case studies and in operational project implementation.

4.8 Chapter summary

This chapter presented and analysed the research findings. The final chapter will look at the summary of the findings and recommendations of the study. It can be concluded from the chapter that energy is a key component of any sustainable development strategy. Without modern energy services, the poor will go on being poor and the sick will continue to be sick. Without electricity, schools and homes will remain without adequate lighting, businesses will find it harder to develop and the streets will remain dark at night.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, RECOMMENDATIONS AND AREAS FOR FURTHER RESEARCH

5.1 Introduction

This chapter presented the results of the whole research on contribution of rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area. Conclusions of the research findings are going to be presented in this chapter. Recommendations that can be implemented by the government and other relevant stakeholders are also going to be presented in this chapter.

5.2 Summary of findings

The core objective of the study was to unveil the contribution of solar and rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area.

5.3 Conclusions

The study concluded that for people living in rural areas of the country without access to electricity, renewable energy technologies. Solar and electricity applications not only provide energy for cooking and heating to rural households leading to improved social conditions, but can also benefit environment locally and regionally.

The study concluded that although tremendous progress has been achieved in the provision of rural energy supply, there is still a number of people in Zhombe without access to energy technologies and the population is still growing. These people, compared to those who have access to electricity, are most likely to be living in more remote areas in harsh climates. As a

result, rural electrification in terms of the technical solutions and cost is becoming more challenging. Furthermore, rural people long for more reliable and better quality energy services to meet their increasing requirements for living, education and production. This can only be supplied on a sustainable basis by renewable energy sources.

The study also concluded that international development institutions, finance institutions, national governments, NGOs and the private sector energy developers, equipment suppliers and service providers has a role to play in poverty alleviation in rural areas. The development organisations and the national governments have to provide leadership of ideas, targets and timetables for achieving them, applying renewable energy sources to their own facilities, facilitating the basis for leveraging private sector finance and enabling the private sector providers to operate in transparent, competitive markets. There is a new consensus emerging on the actions that are needed to deliver improved and energy technologies to poor people:

5.4 Recommendations

5.4.1 More focus on the sustainability issues of rural energy systems.

Access to electrical power does improve living standards in rural communities. However, provision of improved energy, including electric power supply, must be on a sustainable basis, economically, socially and environmentally, if it is to ultimately improve living standards and lift people out of poverty.

5.4.2 Business approach on rural energy supply.

Experiences tell us that adopting business approaches and encouraging the private sector to provide rural energy services are essential to ensure the sustainability of the systems in long term. But any form of energy supplies has always needed some form of subsidy. Underpinning all the actions above, there must be a firm commitment to engaging with poor people

themselves. People living in poverty, in particular women who bear the overwhelming burden for providing for the health and welfare of their communities, must have their say in the prioritisation of energy options if energy policy and services are to meet their needs and provide long term solutions. In energy sector planning, as elsewhere, the poor themselves are too frequently the invisible stakeholders.

5.4.3 The government's principle objectives with regards to renewable energy

Government should make major advances in the exploitation of renewable sources, especially in providing energy to regions where the energy supply is normally restricted and to the national borders. It should also minimise differences concerning the electricity coverage and to extend its supply to rural areas and the national border.

Government should meet the basic calorific energy requirements for the majority of the population and to reduce the dependence upon biomass. As the end-users of the technology, their involvement at early stages of planning will generate ownership that helps achieve long term success. Projects characterised by high levels of community engagement will typically generate a greater sense of community empowerment, ensure that improvements are tailored to a community's specific needs, and create a much higher chance that the improvements will be well maintained by the community after installation.

5.5 Areas of further study

The study focused on investigating the contribution of rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area. There is need to conduct further studies in order to find out the contribution of rural energy technologies such as gas and

solar in the reduction of rural poverty in Zhombe Communal Area. The study can be of benefit to rural people.

More research should be done on investigating the contribution of rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area and very few researches have been done to understand the subject particularly in Zimbabwe.

5.6 Chapter summary

This chapter presented the summary, conclusions and recommendations reached in the study which sought to investigate the contribution of rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area. This chapter also proffered recommendations that will support contribution of rural energy technologies such as gas and solar in the reduction of rural poverty in Zhombe Communal Area. The chapter further outlined the suggested areas for further study. The chapter also addressed findings linked with other objectives of the study. It also addressed how the framework which guided the study was put to use. The chapter lastly listed some recommendations towards addressing the subject of the study. Hence proposals levelled in this study may serve as frames of reference to the occupations and professionals dealing with rural energy technologies.

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APPENDICES

APPENDIX A

SCHEDULED INTERVIEW GUIDE

My name is Simbi Ceasar Simbarashe (RB1852025).I am a student at Bindura University of Science Education (BUSE) who is studying towards attaining a BSc Honors Degree in Peace and Governance. I am carrying out study on **'The contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area'.**I would like you to assist me by providing answers to question that I have. Your participation is greatly valued. The participation is on voluntary basis and I would like to assure that the information you supply shall be treated with great deal of confidentiality. There is no need for you to provide your name and contact details. In addition participation in this research is not compulsory therefore,

you can choose to withdraw your participation at any stage or time. You can choose not to answer a question if you feel so. Submission of this survey will act as consent to participate in the survey and attest that you are over 18 years of age. If there are any questions you may need to ask concerning the research, please contact the researcher.

INTERVIEW GUIDE FOR WOMEN IN ZHOMBE COMMUNAL AREA

1. Identify your gender

2. Identify your position in Zhombe Communal Area?

3. What do you understand about rural technologies?

4. Can you identify rural technologies in the reduction of rural poverty in Zhombe Communal Area?

5. Why do you use these rural technologies?

6. What are the benefits of the rural technologies in the reduction of rural poverty in Zhombe Communal Area?

7. What is the impact of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

8. What are the contributions of the government in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

9. What are the contributions of other funding partners in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

10. Which are the funding partners that contributes on rural technologies in the reduction of rural poverty in Zhombe Communal Area?

11. What are the ways that can be put in place in improving rural technologies in the reduction of rural poverty?

APPENDIX B

Focused Group Discussions Guide

This research is part of a Honors Degree in in Peace and Governance. I am carrying out study on **'The contribution of rural technologies in the reduction of rural poverty in Zhombe Communal** and researcher/interviewer (Simbi Ceasar Simbarashe (RB1852025) at the Bindura University of Science Education (BUSE) .The key informants of the study are the Zibagwe Rural District Council ,Chief ,MP and Directors of NGOs from Zhombe Communal Area.

The research seeks to make an assessment on contribution of rural technologies in the reduction of rural poverty. It is my promise that your information would be confidential, anonymous and only be used for academic reasons.

- Please do not write your name or identification on this form

- If you feel the need to withdraw kindly let me know.

Questions to be discussed

1. What do you understand about rural technologies?

2. Can you identify rural technologies in the reduction of rural poverty in Zhombe Communal Area?

3. Why do you use these rural technologies?

4. What are the benefits of the rural technologies in the reduction of rural poverty in Zhombe Communal Area?

5. What is the impact of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

6. What are the contributions of the government in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

7. What are the contributions of other funding partners in contribution of rural technologies in the reduction of rural poverty in Zhombe Communal Area?

8. Which are the funding partners that contributes on rural technologies in the reduction of rural poverty in Zhombe Communal Area?

9. What are the ways that can be put in place in improving rural technologies in the reduction of rural poverty?

THANK YOU FOR YOUR CO-OPERATION!