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**TITLE: The Key factors Influencing Access to Finance for Scaling up clean Modern
Energy in Rural Areas of Rwanda: A case study of Ngarama Sector**

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DECLARATION

I, **Kelvin RUGIRA**, hereby declare that this thesis represents my personal work, realized to the best of my knowledge. I also declare that all information, material and results from other works presented here, have been fully cited and referenced in accordance with the academic rules and ethics.

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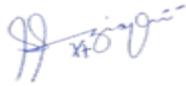
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DEDICATION

I dedicate this study to my family. I am truly grateful for their love, care and moral support they have portrayed during my schooling time, which has contributed much to my success. God bless you all

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Undertaking this Master's degree has been a truly life-changing experience for me and it would not have been possible to do without the support and guidance that I received from many people

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ABSTRACT

This study sought to Identify Key factors Influencing Access to Finance for Scaling up Clean Modern Energy in Rural Areas of Rwanda. The study specifically focused on rural population participation in financial institutions; financial literacy of the rural populations; available lending schemes in financial institutions to support the scaling up of clean modern energy and relationship between financial inclusions and local social enterprises. The study anchored on two theories namely the Endogenous Growth theory, the theory of causes of wealth of nations. The study adopted a descriptive research design. This study was conducted in Ngarama sector where the majority of the populations lack access to clean modern energy due to inability to purchase a standalone solar system. In Ngarama sector, approximately 81% lives in rural areas where electricity national grid does not reach, therefore leaving Ngarama resident with only one choice of accessing electricity through off grid technology. The study used random sampling to select 267 households. The respondents were selected from the target population of 30345 residents of Ngarama sector. The study used primary data, which was collected using questionnaires, through simple random sampling to come up with the final sample. In this study, descriptive statistics, which involves frequencies and percentages, was used in analysis. The result obtained in this study was presented using tables and charts. The study findings revealed that membership in financial institutions is the first step in right direction towards a sustainable solution for the rural populations who are financially excluded and hence attain means to purchase clean modern energy. The study findings also revealed that financial literacy is at low level in many rural areas and this prevents the customers from seizing the available opportunities in different financial institution, the potential for this sector in providing means to address different issue including clean modern energy among others in rural areas are never properly utilized or exploited so, harnessing this in proper manner will stimulate scaling up of clean modern energy and support rural community population start making informed decision. The study findings recommended that flexible credit facilities for clean modern energy in remote areas be structured and embedded in the financial institution product with the intention of supporting the underprivileged population access the funds to purchase the solar home system of her choice for which they shall embrace the sense of ownership to the system purchased and be able to take care of upkeep cost that may arise during servicing period. On addition the study shades light on disconnect between financial institutions and social local

enterprises in rural areas with less capacity to prove their guarantee or repayment strategy to the bank so that they can demand credit to strengthen their operations, hence recommending the empowerment of social local enterprises involved in clean modern energy to play their role in linking the wholesaler to customer and provide reliable after sale services to guarantee the sustainability of the program

RÉSUMÉ

Cette étude visait à identifier les facteurs clés influençant l'accès aux financements pour le développement de l'énergie moderne et propre dans les zones rurales du Rwanda. L'étude s'est concentrée spécifiquement sur la participation de la population rurale dans les institutions financières; la littératie financière des populations rurales; les systèmes de prêts disponibles dans les institutions financières pour soutenir la mise à l'échelle de l'énergie moderne propre et la relation entre les inclusions financières et les entreprises sociales locales. L'étude s'est appuyée sur deux théories, à savoir la théorie de la croissance endogène, la théorie des causes de la richesse des nations. L'étude a adopté un plan de recherche descriptif. Cette étude a été menée dans le secteur de Ngarama où la majorité des populations n'ont pas accès à une énergie moderne et propre en raison de l'incapacité d'acheter un système solaire autonome. Dans le secteur de Ngarama, environ 81% vit dans des zones rurales où le réseau électrique national n'atteint pas, laissant ainsi les résidents de Ngarama avec un seul choix d'accès à l'électricité grâce à la technologie hors réseau. L'étude a utilisé un échantillonnage aléatoire pour sélectionner 267 ménages. Les répondants ont été sélectionnés parmi la population cible de 30345 résidents du secteur de Ngarama. L'étude a utilisé des données primaires, qui ont été recueillies à l'aide de questionnaires, au moyen d'un échantillonnage aléatoire simple pour arriver à l'échantillon final. Dans cette étude, les statistiques descriptives, qui impliquent des fréquences et des pourcentages, ont été utilisées dans l'analyse. Le résultat obtenu dans cette étude a été présenté en utilisant des tableaux et des graphiques. Les résultats de l'étude ont révélé que l'adhésion à des institutions financières est le premier pas vers une solution durable pour les populations rurales qui sont exclues financièrement et donc d'obtenir des moyens d'acheter de l'énergie propre et moderne. Les résultats de l'étude ont également révélé que la littératie financière est faible dans de nombreuses zones rurales, ce qui empêche les clients de saisir les opportunités disponibles dans différentes institutions financières, ce qui permet à ce secteur de résoudre différents problèmes, y compris l'énergie moderne et propre. Les zones rurales ne sont jamais utilisées ou exploitées comme il se doit, ce qui permettra de stimuler l'expansion de l'énergie propre et moderne et d'aider les populations rurales à prendre des décisions éclairées. Les conclusions de l'étude recommandent que les facilités de crédit flexibles pour l'énergie propre et moderne dans les zones reculées soient structurées et incorporées dans le produit de l'institution financière avec l'intention de soutenir la population défavorisée

d'accéder aux fonds pour acheter le système de maison solaire de son choix. sentiment d'appartenance au système acheté et être en mesure de prendre soin du coût d'entretien qui peut survenir pendant la période d'entretien. En outre, l'étude éclaire la déconnexion entre les institutions financières et les entreprises sociales locales dans les zones rurales avec moins de capacité à prouver leur stratégie de garantie ou de remboursement à la banque afin qu'elles puissent demander du crédit pour renforcer leurs opérations. impliqué dans l'énergie propre et moderne pour jouer son rôle en reliant le grossiste au client et fournir des services après-vente fiables pour garantir la durabilité du programme

Table of Contents

DECLARATION	ii
DEDICATION	iii
AKNOWLEDGEMENT	iv
ABSTRACT	v
RÉSUMÉ	vii
LIST OF ABBREVIATIONS AND ACRONYMS	xii
LIST OF TABLES	xiii
LIST OF FIGURES	xiv
DEFINITION OF OPERATIONAL CONCEPTS	xv
CHAPTER ONE: GENERAL INTRODUCTION	17
1 Introduction	17
1.1 Background	17
1.1.1 Rwanda’s Financial Landscape	18
1.1.2 Structure of Microfinance Institution in Rwanda	19
1.2 Problem Statement	19
1.3 General Objectives	20
1.3.1 Specific Objectives	20
1.4 Research Questions	20
1.5 Scope of the study	20
1.6 Significance of the study	21
CHAPTER TWO: LITERATURE REVIEW	22
2 Introduction	22
2.1 Theoretical Review	22
2.1.1 Endogenous Growth Theory	22
2.1.2 The theory of causes of wealth of nations	24
2.2 Conceptual Framework	25
2.3 Key Factors Influencing Access to Finance for sustainable clean modern energy in rural areas of Rwanda	26
2.3.1 Membership in Microfinance	26
2.3.2 Rural Financial Literacy	28
2.3.3 Lending Schemes	29

2.3.4	Access to Finance for local social enterprises involved in clean modern energy solutions in rural areas	33
2.4	Critique of the Literature	34
2.5	Research Gaps	34
CHAPTER THREE: RESEARCH METHODOLOGY		35
3	Introduction	35
3.1	Research design	35
3.2	Research site and Rationale	35
3.3	Study Population	36
3.4	Sampling Technique	36
3.5	Sample Size	36
3.6	Data Collection Methods	37
3.7	Data Collection Instruments	37
3.8	Validity of Research Instruments	38
3.8.1	Questionnaires	38
3.8.2	Interviews	38
3.9	Data Analysis and Presentation	39
3.10	Ethical Considerations	39
CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS		40
4	Introduction	40
4.1	Response Rate	40
4.2	Demographic Results	40
4.2.1	Gender	41
4.2.2	Respondent's Age group	41
4.2.3	Level of Education	42
4.2.4	Economic Main Activities	45
4.2.5	Rural Populations Priority	49
4.3	Microfinance Membership in Rural Areas	51
4.3.1	Bank account in financial institutions.	52
4.3.2	Mindset on microfinance membership	53
4.3.3	Opening an account	54
4.4	Financial Literacy in Rural Areas	54
4.4.1	Knowledge about the operation of Microfinance	55

4.4.2	Trainings on financial services	56
4.4.3	Rationale for Saving	57
4.5	Available Lending Schemes	61
4.5.1	Knowledge about procedures for earning credit	62
4.5.2	Requirement to secure credit	63
4.5.3	Why do people shy away from demanding credit?	66
4.5.4	Flexibility of the available credit	67
4.5.5	Variety credit that covers all social categories of people	67
4.6	Relationship between rural financial inclusions and local social enterprises	68
CHAPTER FIVE: SUMMARY, CONCLUSIONS & RECOMMENDATIONS		70
5	Introduction	70
5.1	Summary of Findings	70
5.1.1	Microfinance Membership	70
5.1.2	Rural Financial Literacy	71
5.1.3	Available Lending schemes	72
5.1.4	Relationship between rural financial inclusions and local enterprises	72
5.2	Conclusions	73
5.3	Recommendations	74
5.4	Areas of further Research	75
REFERENCES		76
APPENDICES		78
Appendix 1: Household ‘s Questionnaire.		78
Appendix 2: Questionnaire for Social Enterprises.....		87
Appendix 4: Interview Guide for Mininfra.....		90
Appendix 5: Interview Guide for BBoxx.....		91
Appendix 6: Interview Guide for SACCO.....		92
Appendix 7: Work Plan & Timeline.....		93
Research Grant Financial Statement Report		94

LIST OF ABBREVIATIONS AND ACRONYMES

BBox:	British Off Grid Solar Company	83
EDCL:	Energy Development Corporation Limited	81
FRW:	Rwandan Francs	11
Km:	Kilo-meter	29
LPG:	Liquidified Petroleum Gas	10
MFIs:	Microfinance Institutuins	10
Mininfra:	Ministry of Infrastructure	82
NGOs:	Non- Government Organizations.....	23
PAUWES:	Pan African University, Institute of Water and Energy Sciences.....	4
ROSCA:	Rotating Savings and Credit associations.....	26
SACCO:	Savings and Credit Cooperatives Organizations	11
SDGs:	Sustainable Development Goals.....	18
SHS:	Solar Home System	18
SME:	Small and Medium Enterprises.....	11
SPSS:	Statistical Package for Social Sciences.....	33
UN:	United Nations	24

LIST OF TABLES

Table 1:1: The Structure of Rwanda Financial Landscape	19
Table 4:1: Gender of respondents	41
Table 4:2: Respondent's Age group	42
Table 4:3: level of education across different age group of the Ngarama respondents	43
Table 4:4: Ngarama Resident's occupation.....	46
Table 4:5: Respondent's level of monthly income across all the available occupation in Ngarama.....	47
Table 4:6: Ngarama Sector Resident's priority	50
Table 4:7: Account Ownership findings from the respondents	52
Table 4:8: Respondents perception on the most likely to become a customer	54
Table 4:9: Respondent's perception on Cost of opening an account in financial institution ...	54
Table 4:10: Finding's Knowledge on financial institutions amongst the respondents	55
Table 4:11: Respondent's Findings on Training about bank Services	56
Table 4:12: Respondent's Findings on Rationale for saving in Financial Institution	58
Table 4:13: Respondent's Findings on Rationale for not saving with in financial institution .	59
Table 4:14: Findings on Respondent's Understanding about procedures to earn credit in Financial Institutions.....	63
Table 4:15: Respondent's Perception on Primary requirement to get credit from Financial Institutions.....	64
Table 4:16: Respondent's Obstacles on Refraining from Demanding credit in Financial Institutions.....	66

Table 4:17: Respondent’s Perception on Flexibility of the credit from Financial Institutions.67

Table 4:18: Respondent’s Perception on Availability of Variety of Lending schemes.....68

LIST OF FIGURES

Figure 2-1: Rwanda’s financial Access	26
Figure 3-1: Ngarama sector landscape.....	36
Figure 4-1: Ngarama Respondent’s gender	41
Figure 4-2: Respondent’s Age Group	42
Figure 4-3: Teenager’s Level of education amongst the respondents group	44
Figure 4-4: Youth’s level of education amongst the respondents group	44
Figure 4-5: Level of education amongst the old respondents	45
Figure 4-6: Occupation of Ngarama sector respondents.....	46
Figure 4-7: Estimated Respondent's Monthly Income by government servants	48
Figure 4-8: Estimated Respondent’s Monthly Income by Agriculturist.....	48
Figure 4-9: Estimated Respondent’s Monthly Income by Small Enterprises.....	49
Figure 4-10: Ngarama Sector resident's priority.....	51
Figure 4-11: Male Rationale for Saving in Financial Institution	58
Figure 4-12: Female Rationale for Saving in Financial Institution	59
Figure 4-13: Male Rationale for not Saving in Financial Institution.....	60
Figure 4-14: Female Rationale for not Saving in Financial Institution	61
Figure 4-15: Perception of Male respondents on requirement for earning credit in financial institution	65
Figure 4-16: Perception of Female respondents on requirement for earning credit in financial institution	65

DEFINITION OF OPERATIONAL CONCEPTS

Factors Influencing Access to Finance: This refers to the important areas that needs to be strengthened in order to make it easy for rural population to access means and fund to purchase modern energy services.

1. Membership in Microfinance Institution

Supporting rural underprivileged population access finance for scaling up modern energy in way that will not jeopardize the off-grid market is through microfinance or financial institutions, given the availability of rural populations who remained unbanked possess threats to the programs

2. Financial Literacy

Providing financial services educations to the already existed customers and enlighten them about the existing opportunities and help them makes informed decision is paramount in uplifting their understanding and help them shift from traditional mind-set and commit themselves in banking with financial institutions other than keeping their money in their homes.

3. Flexible Lending Schemes

Financial Institutions should design and introduce new energy packages that meets the needs of rural populations and suits their financial capacity to make sure that they shall be able to pay back the credit. This modern energy product must be of good quality and self-refunding either by saving expenses incurred before or generating some revenues.

4. Local social Enterprises financial inclusiveness

Empowering local social enterprises involved in modern energy to serve as the last retailer and ensure the sustainability of the process by proving maintenance services, replacing the malfunctioning equipment as fast as possible to boost trust among the customers.

Clean Modern Energy

The concepts in this study stands for reliable, accessible and sustainable electricity for lighting and powering electricity appliances.

Indicators of Clean Modern Energy

- Increased population with access to clean lighting system
- Access to improved Cooking Stoves & LPG
- Increased social entrepreneurs in clean energy solution
- Increased investment in energy efficiency
- Economic empowerment of rural community
- Improved school performance for the children
- Prevents the family from being exposed to toxic hazardous fumes from kerosene
- Improves productivity in family by extending working hours

CHAPTER ONE: GENERAL INTRODUCTION

1 Introduction

Energy access is key to development and no country has managed poverty alleviation without increasing energy access. Rwanda has set target to reach 100% electrification rate by 2024 in its blue print (Mininfra, 2015). Synergies the influence of Microfinance, local financial institutions and energy suppliers to extend access to clean modern energy to the rural areas can be an ideal solution to ever challenging problems ranging from lack of economic power for upfront fees, failure to afford the tariffs for the services and investment funds to the energy developers (IEA, 2017)

One of the great hindrances of access to clean modern energy in rural areas is the low economic capacity of the customers, hence the investors hesitate to put their money in building such power production facilities unless they are signed power purchase agreement to guarantee their return on investments. With flexibility Microfinance institutions, clean modern decentralized facilities can be sustainable (Germidis, 2010) in the isolated community where grid infrastructure do not cover.

Under Rwanda Energy sector strategic plan of 2015, it was made clear that due to the high cost of transmission infrastructure, low level of electricity consumptions and the form of scattered settlement schemes in rural communities, off grid solutions should be prioritize in such situation. With availability of good policy framework and ease of doing business climate in Rwanda many foreign off grid companies have offloaded in Rwandan market in the energy sector. The bottleneck challenge for both customers and investors remains as affordability issue due to less purchasing power of the rural populations.

1.1 Background

There is no question that rural financial inclusion can expand access to quality modern energy services for underprivileged people. Access to the finance can help to counterbalance the high upfront cost associated with cleaner technologies, such as biogas, micro hydropower, solar, or liquefied petroleum gas (LPG). To date, an overwhelming majority of financial support for rural energy applications has been publicly funded. Although these programs are beneficial, the rate of diffusion of clean modern energy is very slow in rural areas hence affecting the private sector and

investment climate for rural energy services and influence the outreach and impact. A deeper understanding of the business opportunities for small-scale lending for energy services, as well as the most effective way microfinance institutions (MFIs) & Other financial institutions can respond to these opportunities will facilitate access to appropriate financial services and smooths operations.

Based on the evidence from many energy access interventions around the world, that too narrow a focus on expanding energy delivery without adequate attention to productive uses for income generation yields little by way of socio-economic development (Brew-Hammond, 2010), Microfinance institutions & other financial institutions in the rural areas should be structured to the way that they can include energy project supports in the special way, starting by employing well trained skilled personnel who understand the field very well. Since it should be a two-way system the funds from Microfinance help diffuse the access to clean energy as well as the clean energy generates or stimulates more benefits which improves social economic development.

Electricity plays a significant role but yields the best outcomes when accompanied with additional infrastructural development like roads and telecommunications, health care centers, Educations facilities and services like SME and consumer finance that spur business and market development. The role of increasing revenues in stimulating the alteration to cleaner energy fuels for cooking is well established. It would therefore seem vital for energy planners and project developers to design systems such that they either include or go hand in hand with productive use of energy and energy for income generation deeds (Brew-Hammond, 2010), this will provide stability and a long-term solution to equip poor families with the capacity to maintain, repair and replace the system.

1.1.1 Rwanda's Financial Landscape

Rwanda's financial sector is composed of a wide and growing array of institutions and is becoming increasingly diversified. The banking system continues to hold the largest combined share of financial sector assets at 66.3 percent. Overtime, this ratio has declined, showing increased diversification in recent years. For example, in 2011, the banks' combined share was 70.8 percent and has gradually declined to 66.5 percent in June 2016. The main contribution to diversification came from increased share of pension, MFIs and SACCOs — the MFIs and SACCOs combined share of financial sector assets increased to 6.7 percent, up from 5.1 percent in 2011, while the

share of assets for the pension sector increased from 13.8 percent to 17.1 percentage (BNR, June, 2016).

Table 1:1: The Structure of Rwanda Financial Landscape

	2011			Jun- 15			Jun- 16		
	Number	Assets (billion Frw)	% of total assets of FS*	Number	Assets (billion Frw)	% of total assets of FS*	Number	Assets (billion Frw)	% of total assets of FS*
Banks	15	1,084	70.8%	17	2,000	66.4%	17	2,278	66.5%
Insurance	8	158	10.3%	14	295	9.8%	15	329	9.6%
Pension	1	212	13.8%	1	530	17.6%	1	585	17.1%
Microfinance	11	77	5.1%	493	188	6.2%	493	230	6.7%
TOTAL	35	1,531	100%	525	3,013	100%	526	3,422	100%
*FS: Financial Sector									

(BNR, June, 2016)

1.1.2 Structure of Microfinance Institution in Rwanda

Microfinance institutions are widely spread across Rwanda and have increased significantly in number over the last 5 years and continue to play a significant role in accelerating financial inclusion. As at June 2016, the Rwandan microfinance system comprised of 15 microfinance institutions (under the legal status of limited company); 479 savings and credits cooperatives (SACCOs): These include 416 Umurenge-SACCOs and 63 non Umurenge-SACCOs. All these institutions are regulated and supervised by National Bank of Rwanda

1.2 Problem Statement

The role of electricity in development of any community is essential, yet electricity remains as the scarce commodity in developing countries, with more than 90% of electrified population in Rwanda living in cities, leaving the majority of rural areas without access to clean modern energy. The main challenges which strongly affects rural underserved communities from acquiring modern energy is inability to raise the needed finance to be able to purchase the modern energy system in sustainable manner.

The majority of rural community continue to live without access to affordable, reliable and clean modern energy which results in a number of consequences to the functioning of the society and imposes direct threats to the lives in families, ranging from health issues because of toxic exhaust

fumes from kerosene and poor performance of the children in education because of poor or lack of quality lights for doing homework and women spends a considerable long time in search of firewood hence affecting their productivity.

1.3 General Objectives

To identify key factors influencing access to finance for scaling up clean modern energy in rural areas of Rwanda.

1.3.1 Specific Objectives

1. To assess the influence of microfinance membership in scaling up access to sustainable clean modern energy in rural areas of Rwanda
2. To examine the influence of financial literacy to the access of finance for clean modern energy in rural areas of Rwanda.
3. To analyze the available lending schemes to support access to finance for scaling up sustainable clean modern energy in rural areas of Rwanda.
4. Evaluate the relationship between rural financial inclusions and local social enterprises working in modern energy sector.

1.4 Research Questions

1. How can membership in microfinance support poor people in acquiring finance tor access to the sustainable clean modern energy in rural areas of Rwanda?
2. How does improving rural financial literacy support scaling up of sustainable clean modern energy in rural areas of Rwanda?
3. What are the convenient energy lending schemes that can be employed to scale up the access to finance for sustainable clean modern energy in rural areas of Rwanda.
4. How can we harness the synergies between financial institutions and local social enterprises involved in modern energy sector to support the diffusion of sustainable clean modern energies in rural areas of Rwanda?

1.5 Scope of the study

This study was conducted in the Eastern part of Rwanda, in the District of Gatsibo in Ngarama sector, and during the period of 6 months starting from period of proposal to the final, a

comprehensive understanding of the situation on the ground on the key factors influencing access to finance for scaling up clean modern energy in rural areas.

In this study clean modern energy was considered as the access to electricity from clean sources of technology, the study did not focus on the clean cooking system.

The study will focus on key factors influencing the access to finance from formal financial institutions excluding the informal financial services that are not legally controlled by any government institutions because of limited time.

Literature has been reviewed on the national and international level on the relatively the same studies carried out elsewhere. Different expert in financial and energy sector has been engaged to provide their insights on the study, as well as keeping the role of beneficiaries, the end users to react and contributes to this study.

1.6 Significance of the study

This study will serve as a guiding tool for the government, non-government players in energy sector in their quest to achieve a universal access to clean modern energy for all 100% electrification by 2024. It will provide a valuable insight on different on-going program that is focusing on addressing rural electrification, as well as policy makers will draw some insight on the best way to tackle this ever-challenging issue of affordability of clean modern energy in rural areas of Rwanda.

CHAPTER TWO: LITERATURE REVIEW

2 Introduction

This chapter contains literature on goal setting theory, its relevancy and criticisms and factors affecting access to finance for scaling up sustainable clean modern energy in rural areas.

2.1 Theoretical Review

This section discussed the some of the selected theories that may be applied in the study that brings out the theoretical foundations that guide the study. The endogenous growth theory, The theory of causes of wealth of nations

2.1.1 Endogenous Growth Theory

Philippe Aghion and Peter Howitt of 1999 in their theory of endogenous growth which tackles on changes and innovation as the tremendous increase in material well-being that has taken place in advanced economies since industrial revolution has been characterized by the change and innovation. More than anything else, it is change and innovation that have created the affluence of modern times. Beyond creating wealth, it has transformed the way people live their lives (Aghion & Peter , 1998).

Thus, economic growth involves a two-way interaction between technology and economic life: technological progress transforms the very economic systems that creates it, so the purpose of endogenous growth theory is to seek some understanding of this correlation between technology and various structural characteristics of the economics and society

In many rural areas, poor people still depend on wood and other biomass fuels for most of their household and income-generating activities according to (Kaygusuz, 2010). In remote areas children and women are the mostly affected by lack of clean modern energy the most especially spending countless hours in search of fire wood, and spending some hours doing their homework on kerosene powered lamp with bad smokes which are so disastrous to the respiratory organs.

Considering the challenges of connecting isolated communities to the national grid, decentralized renewable energy plants help to address the energy access challenges in rural areas, while meeting the goal of environmental sustainability (Chijioke, 2016). A robust system needs to be established to make it possible for more decentralized renewable technologies to effectively serve rural community. With a number of challenges associated with off grid electrification in rural areas,

financial inclusions to the poor people can unlock these opportunities and create viable environment for the investments to flow in and greatly contributes to the sustainable development goal 7. It is true the government has established a clear and robust policy framework that provides great potential and opportunities for the private sector to chip in and bridge the gap of energy poverty in remote areas.

An effective way for the governments of developing countries to prioritize decentralized renewable energy into their energy mix, as well as offset the cost of renewable energy distribution is channeling it through microfinance initiatives. Microfinance is the system of providing small loans at favorable interest rates in order to initiate specific types of economic activities (Snow, 2005). Providing modern energy to the underprivileged people in our rural communities needs multi approach, with Rwanda's geographical land scape that is more mountainous as it is referred as the country of a thousand hills, so electrifying its community by connecting them on the national grid is nearly impossible for short term as it can require significant big funds. The country in its energy policy (2015) has already highlighted the significance of off grid technology as on the other hands relieves the utility the burden as it is sophisticated technology that can easily be managed hence contributes much in saving energy lost during transmission. Either by employing decentralized system with mini grid which will distribute electricity to the end users or standalone system.

This is a very powerful concept as rural electrification is considered as one of the highest priority on agendas, the definition of affordable, reliable, sustainable and modern energy as stated in sustainable development goal number seven needs to be clearly understood. In most cases short cuts are being employed by following easy route and disseminate small solar home system to the poor families which does not address the core issue. These families get minimum services from this un reliable electricity as they can only support minimum number of lights with no productive use. This is not sustainable in the sense that access to modern energy should play the central role in poverty elimination and generates some revenues to the families which can be used to raise their standards of living, and in case there is malfunction or faults the owners can be able to replace or fix it. The correlation between modern energy and financial inclusions to the underprivileged communities should be on the center of discussions as one strongly affects another

There is a need for policy interventions which clearly calls for a radical shift in funding priorities (Bhattacharyya, 2013), empowering the poor people by providing them with means to address their social needs and advance standards of living will build better atmosphere for business and hence energy poverty issue will be tackled. People understands their needs better than anyone else empowering them financially will provide them with the option to choose the best and sustainable system. Stimulation of local social enterprises and get them involved in modern energy solution locally will impose significant impact in diffusion of modern energy for the long run basis.

2.1.2 The theory of causes of wealth of nations

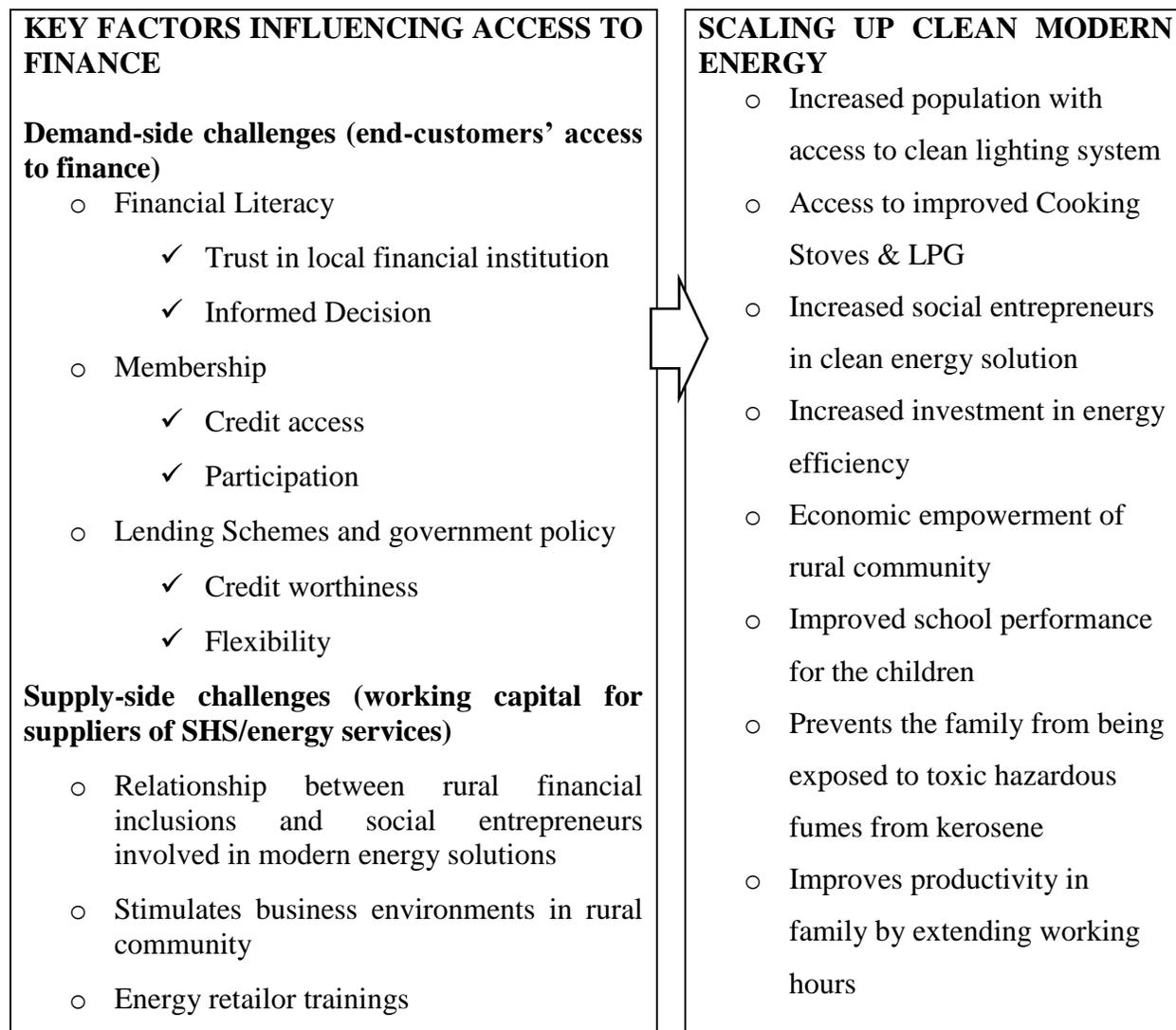
Adam Smith (1723) defined economics as follows: “Economics is the science of wealth”. He was the author of the famous book “Wealth of Nations” (1776). Adam smith was of the view that economics was concerned with the problems arising from wealth-getting and wealth-using activities of people. He was interested mainly in studying the ways by which the wealth of all nations could be increased. Economic theories try to explain economic phenomena, to interpret why and how the economy behaves and what is the best to solution - how to influence or to solve the economic phenomena. They are comprehensive system of assumptions, hypotheses, definitions and instructions what should be done in a certain economic situation. In principle, the approach to economic theory is divided into positive and normative.

The relevance of Adams smith writings was in advocating for large investments of capital and use of large scale machinery in a bid to produce wealth on a large scale. This theory is relevant to this study as it shows how wealth could be increased financial inclusion. It is through the collected effort for all the sustainable development is attained. Helping rural community access finance for clean modern energy that will open a new chapter in their lives by using empowering the usage of advanced technology in doing work easily and faster.

According to the report in world energy outlook 1.1 billion people still lacks access to electricity (IAE, 2017) and about half of these people live in sub-Saharan Africa where natural resources are almost distributed everywhere in abundance with enough workforce to exploit it, when human resources are equipped with the skills, knowledge with the dynamic institutional in place energy poverty can no longer be a threat to the human race. Linking this to the best approach to tackle this sustainable development goal number seven(SDG7) different tactics needs to be employed, here in normal circumstances grid extension would be the first thought that clicks in mind and after

realizing its cost and complexity people will think of off grid system which is the best solution in theories, and now the real question will be how do we extend this sustainable development goal number seven(SDGs) to the rural communities who lacks many basic needs in their daily lives starting from the struggle to get something to put on their table for their families, access to education for the children, health care insurance coverage, and so on and so far. Unless the government subsidizes 100% of the services which is not practically doable this underserved communities will not enjoy this service for long.

2.2 Conceptual Framework



2.3 Key Factors Influencing Access to Finance for sustainable clean modern energy in rural areas of Rwanda.

2.3.1 Membership in Microfinance

Increasing the membership and participation of rural populace in bank services can be the catalyzer in actively involve them serves in different entrepreneurial activities that can generate income and create an enabling environment for the investments to flow in and address electricity and clean cooking means.

Enrolling underserved population into formal, or semi-formal financial institutions is paramount towards building sustainable life for them as it opens their eyes and new doors of opportunity and helps the government or non-government organizations with their different respective program (Babasaheb, 2016). It is a very good starting point in disseminating modern energy in remote areas, facilitating rural financial capabilities to subscribe, repair and replace the system when their life span is over or dung the period of defaults.

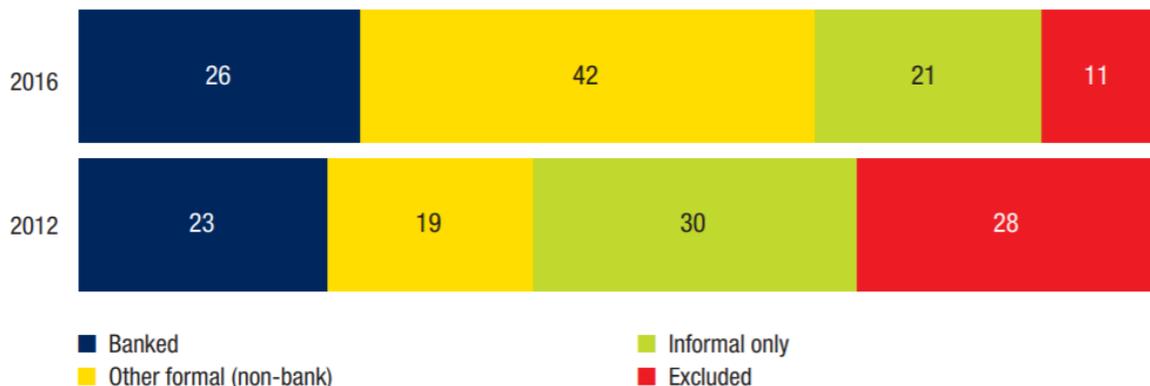


Figure 2-1: Rwanda's financial Access

From the above diagram it is clear that 68% have access to formal financial services in Rwanda according to the Fin Scope report (Murenzi, 2016) with a significance big level of difference in financial inclusion between urban and rural areas mainly because of limited infrastructure.

Only 11% Rwandan adults are excluded from any form of financial services either formal or Informal financial products.

Financial service in rural areas that rural populations can benefit from only if financial literacy is enlightened and enrolled into financial institutions

Rural financial inclusion is about extending financial services to the underserved populations in remote areas and basically the range of services are securing credits, savings, money transfer and insurance. All these different services are crucial in the day to day lives of people as they support their wellbeing in all aspects (Schlaufer, 2008).

- Savings and Insurance Schemes: This supports rural population in reducing vulnerability to risks, planning more reliably for the future and saving for upcoming investments, as well as smoothing out irregular income flows and covering unexpected expenses. The final is particularly important in rural areas where income depends on agricultural cycles. Energy commodity in less developed community is put to productive uses to generate incomes in rare cases but can fully supplement other source of income and saves poor family from getting exposed to exhausted toxic fumes from kerosene lamps, and curb the expenses incurred on the inefficient cooking stoves (traditionally 3 stone)
- Loans for investments and working capital are crucial elements that enable rural entrepreneurs to make investments, seize economic opportunities, and purchase agricultural inputs and working capital. If the loans are only tied for only energy systems then it should make a real difference either helps the beneficiary make significant save on the energy costs or generates substantial benefits. Soft loans with flexible terms to access and repay them can contribute tremendously to the social and economic transformation of lives but trainings, and proper usage of the credits needs to be well monitored.
- Money transfer services make it possible for people who leave remote places to work in cities or overseas to send home their remittances securely and at practical costs. In addition to encouraging rural development, rural finance is increasingly used as an incentive to promote sustainable use of natural resources, use of alternative energies, and environmentally sound behavior. In recent years, several banks and microfinance institutions have attempted to achieve not only financial and social, but also environmental sustainability. Despite the significant demand for financial services in rural areas, institutions offering financial services: such as banks, credit unions, microfinance

institutions (MFI) or insurance companies are typically reluctant to serve rural areas. As a result, the majority of the developing world's rural population does not have access to the formal financial system (Babasaheb, 2016).

2.3.2 Rural Financial Literacy.

Financial Inclusion is the provision of financial services in rural areas that support a wide range of economic activities and households of various income levels. While they need it the most, rural communities remain the largest unserved market for financial services. Ensuring their financial inclusion can unlock the considerable economic potential of rural areas.

People living in rural areas may need access to financial services to purchase agriculture inputs; modern energy services; maintain infrastructure; contract labor for planting/harvesting; transport goods to markets; make/receive payments; manage peak season incomes to cover expenses in low seasons; invest in education, shelter, health; or deal with emergencies and all these services are connected and places a strong need for raising awareness or mobilization of appropriate means for financial literacy.

The level of financial literacy is still very low in rural areas and this blocks them from having comprehensive understanding of why they should pay the premium without a payout in certain timeline. More than 80% of all adults needs more information and knowledge about money management according to the Fin Scope report 2016

Legal systems that do not ensure marketable property rights and contribute to weak collateral and contract enforcement mechanisms, limit access to finance further (Meyer, 2006). As a consequence, products such as long-term financing hardly reach rural areas. For example, leasing that increases the asset base of rural entrepreneurs and has potential to increase productivity and employment, is rarely offered in rural communities.

So, with proper mass mobilization of rural populace on finance tools and supports them make informed finance decisions can unlock the immense opportunities in all aspects of rural livelihood as the stepping stone in addressing the issue of scaling up modern energy in remote areas of developing country, whether in agriculture, education, infrastructure and health (Meyer, 2006). This can be done by providing financial trainings to the population, and conduct

finance awareness campaigns, social media and this can only be done to build trust and instill sense of consciousness to the population.

The most significant difference between rural and urban levels of financial inclusion is the uptake of bank products/services. Higher density of (formal) financial service providers in urban areas and usually better infrastructure also result in shorter travelling time to e.g. the nearest bank branch. There is a gender gap in terms of financial inclusion in Rwanda, which is smaller in comparison to the urban/rural divide. In general, there are slightly higher levels of financial inclusion among males compared to females due to a number of reasons (e.g. economic, social, legal, and cultural). Age is an important determinant of financial inclusion. This study shows that Rwanda has a relatively young population. There is often a direct relationship between education levels as well as financial behavior and literacy. Further, there is a relationship between education levels, income sources, and levels of income. Hence the levels of financial inclusion are lower among people with low levels of education (primary education or less) (Murenzi, 2016)

2.3.3 Lending Schemes

Many potential customers without access to electricity have trouble mobilizing sufficient capital to buy solar products or improved cooking stove. Microfinance loans for modern energy can increase sales, stimulates demands and allow modern energy enterprises to reach clients with low or irregular incomes (Winiacki, 2010). Creating innovative solution in modern energy diffusion in rural areas has been facing different stumbling block among them include lack of the right policy framework and access to finance. Currently a lot has been done in terms of policy and regulations framework to supply rural communities with modern energy specifically electricity and clean cooking means but most of these people survives on subsistence farming and they are basically found on the bottom of the pyramids. With most of the systems requiring relatively high upfront cost to purchase the equipment and installations on addition to daily operation fee that may arise along the way.

Most of the people without modern energy access also lack access to financing that would enable them to purchase cleaner energy services. People on low incomes in developing countries typically spend a large proportion of their income on energy.

Lack of affordable, appropriately designed loans and other financing options is a key barrier limiting wider access to clean energy products and services. Without end-user finance options available for their customers, it can be difficult for most solar energy enterprises to achieve significant scale as their potential customers lies at the bottom of the social pyramids, soft loans which are much more flexible for repayment depending on the seasonal, or the rural context can build this momentum (Schlaufer, 2008)

Microfinance institutions have demonstrated that providing credit to micro entrepreneurs and households can be efficient, responsive, and profitable to both the borrower and institution. If appropriately designed, loans offered by MFIs can provide clients with access to high-quality modern energy services by closely matching loan payments to existing energy expenditures or income flows (Winiecki, 2010)

According to the Global Development Research Center, a number of credit lending model that are being used by microfinance worldwide has been compiled in their Microfinance credit lending models documents (Srinivas, 2018). They include, associations, bank guarantees, community banking, cooperatives, credit unions, Grameen, group, individual, intermediaries, NGOs, peer pressure, ROSCAs, small business, and village banking models.

Many of these models are "formalized" versions of informal financial systems. Informal systems have historical patterns that predate modern banking systems. They are still in existence today used mostly by low-income households who do not have access to formal banks

In reality, models are related with each other, and most sustainable microfinance institutions have features of two or more models in their activities.

- Associations.

This is where the targeted community forms an 'association' through which various microfinance activities are started. Such activities may comprise of savings and credits. Associations can be composed of youth, women; can form around political/religious/cultural issues; can create support structures for microenterprises and other work-based issues.

In some countries, an association can be a legal body that has certain advantages from government policies or non-government organization programs.

- Bank Guarantees

As the name suggests, a bank guarantee is used to obtain a loan from any banking institutions. Loans obtained may be given directly to an individual, or they may be given to a self-formed group. Bank Guarantee is a form of capital guarantee scheme, guaranteed funds may be used for various purposes, including loan recovery. Several international and UN organizations have been forming international guarantee funds that banks and NGOs can subscribe to.

- Community Banking models

Community Banking model essentially treats the whole community as one unit and creates semi-formal or formal institutions through which microfinance is bestowed. Such institutions are usually formed by extensive help from NGOs and other developmental organizations, who also train the community members in various financial activities of the community bank.

These institutions may have savings components and other income-generating projects included in their structure.

- Cooperative Model

A co-operative is an autonomous association of people united willingly to meet their shared economic, social, and cultural benefits and objectives through a jointly-owned and democratically-controlled enterprise. Some cooperatives include member-financing and savings activities in their mandate.

- Credit Union Model

A credit union is a unique member-driven, self-help financial institution. It is organized by and comprised of members of a particular group or organization, who agree to save their money together and to make loans to each other at reasonable rates of interest.

The members are people of some common bond: working for the same employer; belonging to the same church, labor union, social fraternity. Each is owned and governed by its members, with members having a vote in the election of directors and committee representatives.

- Group Model

The Group Model's basic philosophy lies in the fact that shortcomings and weaknesses at the individual level are addressed by the collective responsibility and security afforded by the formation of a group of such individuals. The collective coming together of individual members is used for a number of purposes: educating and awareness building, collective bargaining power, peer pressure etc.

One example of the Group Model is "Joint Liability". When a group takes out a loan, they are jointly liable to repay the loan when one of the group's members defaults on the repayments

- Individual Model

This is a straight forward credit lending model where micro loans are given directly to the borrower. It does not include the formation of groups or generating peer pressures to ensure repayment.

The individual model is, in many cases, a part of a larger credit plus program, where other socio-economic services such as skill development, education, and other outreach services are provided.

- Intermediaries Model

Intermediary model of credit lending positions a 'go-between' two parties involved between the lenders and borrowers. The intermediary plays a critical role of generating credit awareness and education among the borrowers. These activities are geared towards raising the 'credit worthiness' of the borrowers to a level sufficient enough to make them attractive to the lenders.

The links developed by the intermediaries could cover funding, program links, training and education, and research. Such activities can take place at various levels from international and national to regional, local and individual levels.

Intermediaries could be individual lenders, NGOs, microenterprise/microcredit programs, and commercial banks.

- Peer pressure Model

Peer pressure uses moral and other connections between borrowers and project participants to ensure participation and repayment in microcredit programs. Peers could be other members in a borrowers group (where, unless the initial borrowers in a group repay, the other members do not

receive loans. Hence pressure is put on the initial members to repay); community leaders (usually identified, nurtured and trained by external NGOs);

The pressure applied can be in the form of frequent visits to the defaulter, community meetings where they are identified and requested to comply.

- ROSCA Model

Rotating Savings and Credit Associations are essentially a group of individuals who come together and make regular cyclical contributions to a common fund. After having received the lump sum amount when it is his turn, he then pays back the amount in regular monthly contributions. Deciding who receives the lump sum is done by consensus, by lottery, by bidding or other agreed methods.

2.3.4 Access to Finance for local social enterprises involved in clean modern energy solutions in rural areas

The major challenges of extending modern energy to underserved communities whose majority are rural dwellers, according to the arc finance (ArcFinance, 2017)

1. lack of access to finance by the end users
2. Difficulties in distribution channels and after sale services

Lack of access to finances hampers microenterprises operating in the areas of clean modern energy in rural communities. People needs electricity to light their homes so that they can extend their working hours and children benefits from getting good light at night to do their homework, charge their phones, at the same time clean cooking means are of paramount to the families as in most cases this strongly affects children, and women. Long distance in search of firewood by women and children in rural areas is perceived as their social responsibility and on the other hand they are the primary victims of toxic smokes from this inefficient cooking stoves.

Th clean energy enterprises remains small and fail to integrate their services within their customers for long term because they don't find viable environment to execute their business. Entrepreneurship is the key to the sustainable development, it helps establish a continuous flow of wealth (Fan & Ruohan, 2017). Entrepreneurial activities generally involve a certain amount of irretrievable start-up costs for obtaining essential skill training, operating innovations, building

production facilities, and building distribution links. If entrepreneurs personal treasure or internal resources are not sufficient to support their investments, they have to resort to external finance, especially through financial markets that are established to reduce transaction costs that limit direct pooling and guide the allocation of funds via processing all available information about investments. A well-functioning financial system can provide worthwhile investment opportunities to as many participants as possible and channel funds to their most productive uses. Therefore, financial development is crucial to the formation of entrepreneurs and their entrepreneurial activities (Fan & Ruohan, 2017).

2.4 Critique of the Literature

From the literature, as far as rural electrification and diffusion of modern energy is concerned, the emphasis on the significant role that financial institutions can play in supporting rural underserved community access sustainable modern energy services has been highlighted. Limited number financial institutions in rural areas, limited financial literacy and so many challenges that impedes the dissemination of modern energy in rural areas.

From the literature read, due to affordability constraints demand for modern energy services has slowed down. Most of the potential client who lives in rural areas far away from national grid do not have constant revenue streams that can facilitate them from acquiring stand-alone solar system. So, a robust mechanism needs to be established to make it easy for everyone to achieve the universal access to reliable, affordable and sustainable modern energy. This research will demonstrate the key factors that needs to be taken care of towards addressing the issue of financial constraints in rural areas of Rwanda.

2.5 Research Gaps

Regarding the information read during the literature review, there was other authors that wrote on the same field about different means that can be employed to speed up the diffusion of modern energy in rural areas however there was still a gap that needed specific separate survey on key factors that can influence the access to finance for scaling up modern energy in rural areas of Rwanda. The next chapters will cover this missing part in details.

CHAPTER THREE: RESEARCH METHODOLOGY

3 Introduction

This section provides the description of how the study were conducted. It brings out the research design, study population, sample design and size, data collection instruments, data analysis and interpretation tools. It also includes data analysis and measurement of variables.

3.1 Research design

The study employed a combination of the qualitative and quantitative data collection, especially primary data which was collected through questionnaires and interviews by meeting household's leaders, interviewing microfinance staffs, energy suppliers, energy stakeholders and observation of the situation. At data collection stage, qualitative approach was involved in administering open ended interview to the respondents, whilst the quantitative approach was involved in administering closed ended interview and questionnaires to respondents on both Microfinance staffs and Energy Suppliers experts. Again, some secondary data were used to complement the research

3.2 Research site and Rationale

This study was conducted in Eastern province Gatsibo District in Ngarama Sector, the rationale behind this selection is because of new settlements that are being developed where by the houses are scattered making this place an ideal place for decentralized system or standalone system. This place being with the highest solar irradiation in country has attracted the most of off Grid Company. This district being among the district with the lowest electrification rate of around 20% makes it the ideal place to carry out this research.

Ngarama sector is found on the surface area of 58.5km² with a population density of 519.3/km². according to the 2012 national census the Ngarama sector had 30,354 inhabitants with 81.9% of land being rural areas and 18.1% urban.

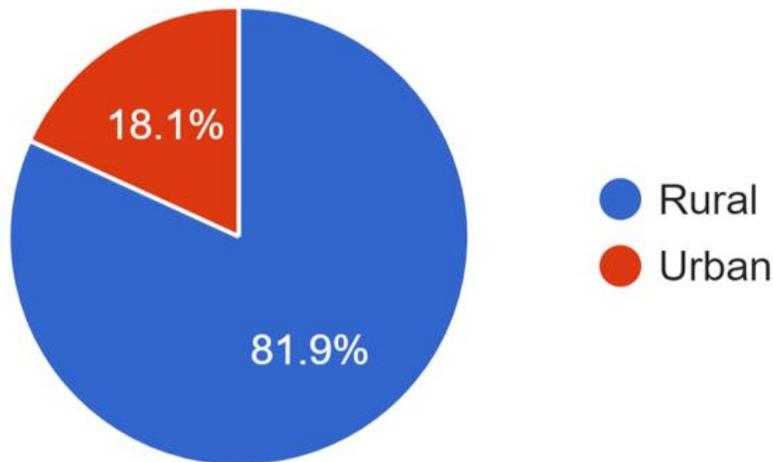


Figure 3-1: Ngarama sector landscape

3.3 Study Population

Nachiamis and Nachamis (2012) define population as the entire set of relevant units of analysis or data while Ott et al (2015) argue that a target population consists of a list of elements or individual members of the overall population from which a sample is drawn. The target population of the study are Ngarama Sector residents and small local enterprises. The target population of the study included 30,354 population of Ngarama sector (Nachiamis & Nachamis , 2012) . The unit of analysis was the household owners and local small enterprises.

3.4 Sampling Technique

A sample design is the architecture or the strategy used to select study participants or respondents. A sampling frame is a list of population from which a sample is drawn (Singh & Masuku, 2014). Sampling refers to the systematic selection of a limited number of elements out of a theoretically specified population of elements. The rationale is to draw conclusions about the entire population. The study used random sampling technique to come up with the final sample because of its accurate representation of the larger population

3.5 Sample Size

Fostgate (2012) recommends that a formula should be used for calculating the sample size. In this study, the Fisher (1998) formula was used to determine sample size. Other studies that have used

this formula include Fostgate (2005), Georgiadis, Johnson and Gardner, (2005) who carried out studies in different fields.

The formula used is:

$$n = Z^2 pq / e^2$$

Where:

n represents the expected sample size

Z represents the abscissa of a normal curve that cuts the area α at the tails that is $1 - \alpha$ which is equal to the desired level of confidence level which is 95% in this case

P represents an estimated proportion of a population attribute

q is obtained by calculating $1 - p$

e represents the desired precision level/ margin error

Therefore, a sample size of 267 was obtained as follows:

$$\begin{aligned} n &= \{(1.96)^2 * (0.5) (0.5)\} / (0.06)^2 \\ &= 267 \end{aligned}$$

Hence, the sample size for this study was 267 households. The study used proportionate sampling to make sure that all household had fair representation. Random sampling was used to select the households where the questionnaires were filled. The head of the family (husband or wife) were the respondents in this survey.

3.6 Data Collection Methods

The researcher is expected to rely on both primary and secondary data. Primary data were obtained through questionnaires and interviews while secondary data were obtained through already published journals, magazines, books and newspapers about the variables under study.

3.7 Data Collection Instruments

The Researcher used two instruments to collect primary data from the field. These included questionnaires and interview guide questions.

3.8 Validity of Research Instruments

Validity is the degree by which the sample of test items represents the content the test is designed to measure (Borg & Gall, 1989). To ensure content validity, the questionnaire was subjected to thorough examination by selected experts in energy sector. They were asked to evaluate the statements in the questionnaire for relevance and whether they are meaningful, clear. On the basis of the evaluation, the instrument was adjusted appropriately before subjecting it to the final data collection exercise. Their reviewed comments were used to ensure that content validity is enhanced.

3.8.1 Questionnaires

The researcher presented respondents with several questions on the topic under investigation. The respondents were given freedom to answer the questions. This is intended to get in-depth views of the respondents. The researcher facilitated to enlighten respondents on the topic under investigation.

3.8.1.1 *Questionnaire Field Test*

The researcher first visited the officials in energy sector major player regarding the intended activity and received suggestions on the developed questionnaires to be used in the process of primary data collection. Revisions were done accordingly for better setup of data collection and questionnaire design.

3.8.2 Interviews

Interview is the most commonly used method in collecting data. It entails conducting individual conversations between a researcher and the individual. To keep the researcher focused, it is imperative for the researcher to have guidelines of questions to extract the needed information from the respondent. The questions used in the research were structured, un-structured and semi structured to give the respondent to provide in- depth data.

3.8.2.1 *Interview Process*

Due to different working schedules of the respondents, appointments were made, and the interviewees were made knowledgeable about the purpose, process, confidentiality and ethical issues of the study. The researcher took notes in the process.

3.9 Data Analysis and Presentation

Once data has been collected, the completed and returned questionnaires were edited for completeness, coded and entries made into Statistical Package for Social Sciences (SPSS version 20). Coding consists of technical procedures where symbols which are normally numerals are given to the raw data in order to transform it into an easily tabulated and counted format, (Churchill & Iacobucci, 2002). It assists in reducing the replies to a few categories containing information required for analysis. Thus, codes were given to each individual response. In this study, descriptive analysis involved frequencies in their absolute and relative forms. The results were mapped from charts in accordance to the respondent's answers and then interviews from experts in the field have complimented the study.

The conclusions have been drawn from combination of both responses from household's questionnaires and interviews from experts.

3.10 Ethical Considerations

The researcher obtained an informal consent from every respondents and authorization from the University. The researcher obtained an informal consent from every respondent and all the relevant authorities were consulted. The informal consent sought by asking the respondents of their willingness to participate in the filling of the questionnaire. Only those willing were allowed to participate in filling the questionnaires. The researcher informed the respondents that participation in this study was purely voluntary and withdrawing from participation is acceptable. No one was to be victimized for refusing to participate in the research. The researcher gave respondents assurance that confidentiality was observed. This was done by assuring the respondents that information they provided was to be used for academic purpose only and that there was no disclosure of the information to anyone whatsoever. The researcher assured the respondents of their anonymity and their response was not disclosed to anyone. The researcher was also ensured that the respondents' name was not included in the questionnaire. The researcher assured the respondents of their privacy.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS

4 Introduction

This chapter contains analysis of data collected for the study. It also contains results presentation for this study; the results were presented in forms of figures and tables. Figures and Tables were used to present results on percentages and frequency. The analysed data was arranged under themes that reflect the research objectives.

4.1 Response Rate

The study administered 267 questionnaires to different households in Ngarama sector Gatsibo District, out of which all questionnaires were fully filled and returned. which represented a response rate of 100%. Mugenda and Mugenda (2003) argue that a return rate of 50% is acceptable. A response rate of 100% was hence excellent for the study. The high response rate was achieved because of the methodology adopted by Researcher in filling the questionnaires, helping the respondent in fully understanding the intention of the research and explain one by one question as well as recording the answers has facilitated in reaching to all estimated sample size of the study. Persistence by the researcher also played a role in achieving the high response rate

4.2 Demographic Results

The study sought to establish the demographic characteristics of the respondents ranging from Gender, respondent's age group, the level of education, the economic activities of the people of Ngarama sector and their priorities just like any other village In Rwanda. All demographic characteristics are very important in bringing in very useful insights of how rural communities can be supported to gain access to sustainable clean modern energy in rural areas of Rwanda.

Level of education, age group and economic activities are all directly connected to the wellbeing of society so, a lot can be predicted and linked to the purchase power to buy modern energy or knowledge about the services offered by any financial institution. However according to the report from lighting Africa report (Alstone, Carmen , Brendon , & Adriana , October, 2011), Financing opportunities and frameworks are often different for women than for men with opportunities for women often relying more on informal networks and lending groups where limited resources are found and it reduces the chance of leveraging the opportunity. This is why many times gender factor was used to analyze the situation among different variables more than other factors like age group, level of education and economic activities.

4.2.1 Gender

From the table below and its pie chart representation to give the sense of credibility of the responses gotten from respondents, around 73% of the respondents were males whereas only 27% were female. Under the African culture it is believed that male are the head of the family though in making decisions for the family both agrees on issues but the male has always the upper hand on the final say.

Table 4:1: Gender of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	195	73.0	73.0	73.0
Female	72	27.0	27.0	100.0
Total	267	100.0	100.0	

Primary data 2018

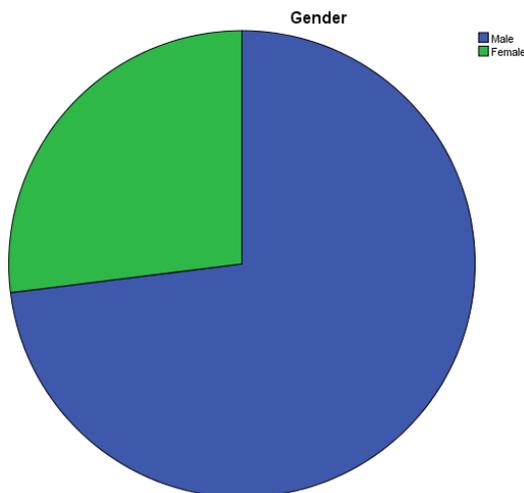


Figure 4-1: Ngarama Respondent's gender

4.2.2 Respondent's Age group.

During the surveys, it was very important to highlight the age group of the respondents and this clearly shows the level in which different categories possess different financial capabilities and level of understanding of how financial institutions works. The link between age group and the impact to the entire study is paramount and key factors in assessing how diffusion of modern energy can strongly depend on it.

The majority of the respondents were old registering 62.2% and this group is defined from 36years and above, whereas 27.7% of the respondents being youths ranging from 20 years to 35 years old,

the least percentage from the respondents were described as the teenagers and they were defined as the group less than 20 years old.

Table 4:2: Respondent’s Age group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Teenager	27	10.1	10.1	10.1
	Youths	74	27.7	27.7	37.8
	Old	166	62.2	62.2	100.0
	Total	267	100.0	100.0	

Primary data 2018

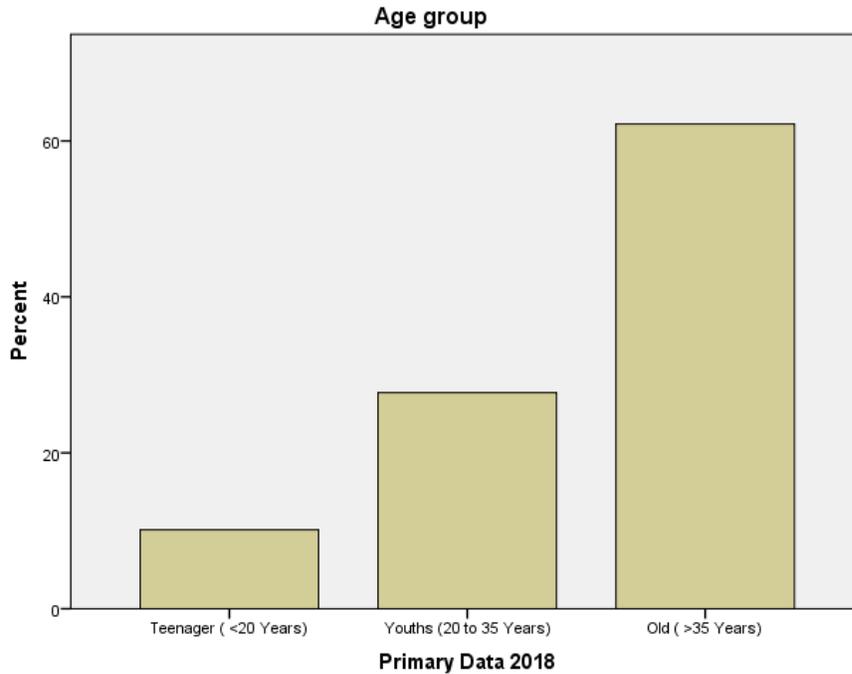


Figure 4-2: Respondent’s Age Group

4.2.3 Level of Education

The findings on the level of education showed that the majority of respondents across three categories demonstrated in table 4:3 below have attained primary level of education with 77.8%, 64.9% and 72.9% Teenager, Youths and Old respectively. The level of illiterate ranges from 22.2% for Teenager, 31.1% for Youths and 23.5% for old. From the figure we can observe the gap of low level of education across the residents of Ngarama sector.

These findings indicate that majority of the household leaders have no enough education background which would be connected to how ease or hard it can be for rural population in Rwanda to participates in financial institutions and also shows the literacy level.

Table 4:3: level of education across different age group of the Ngarama respondents

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
Teenager (<20 Years)	Valid No education	6	22.2	22.2
	Primary Education	21	77.8	100.0
	Total	27	100.0	100.0
Youths (20 to 35 Years)	Valid No education	23	31.1	31.1
	Primary Education	48	64.9	95.9
	High School	3	4.1	100.0
	Total	74	100.0	100.0
Old (>35 Years)	Valid No education	39	23.5	23.5
	Primary Education	121	72.9	96.4
	High School	3	1.8	98.2
	University	3	1.8	100.0
	Total	166	100.0	100.0

Primary Data 2018

There is less level of education in all categories of respondents and it's common to all rural populations in Rwanda. this presents itself as direct shortcoming to working with financial institutions which has some sophisticated services at time.

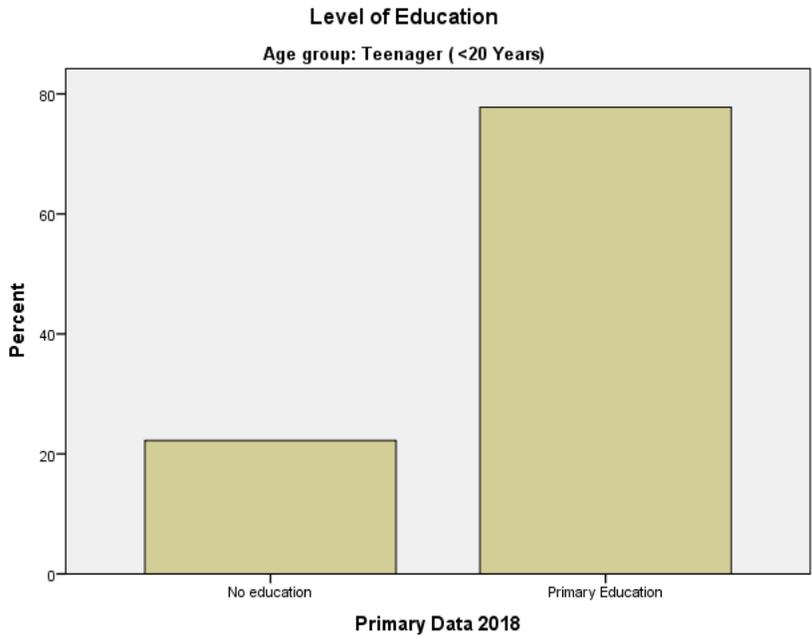


Figure 4-3: Teenager’s Level of education amongst the respondents group

From the above graph, the majority teenager has dropped from schools before attaining 9 years basic education, so this limited knowledge needs much effort to understand the services offered by financial institution and how they operate. A special program needs to be introduced with primary target to the unserved people who are isolated.

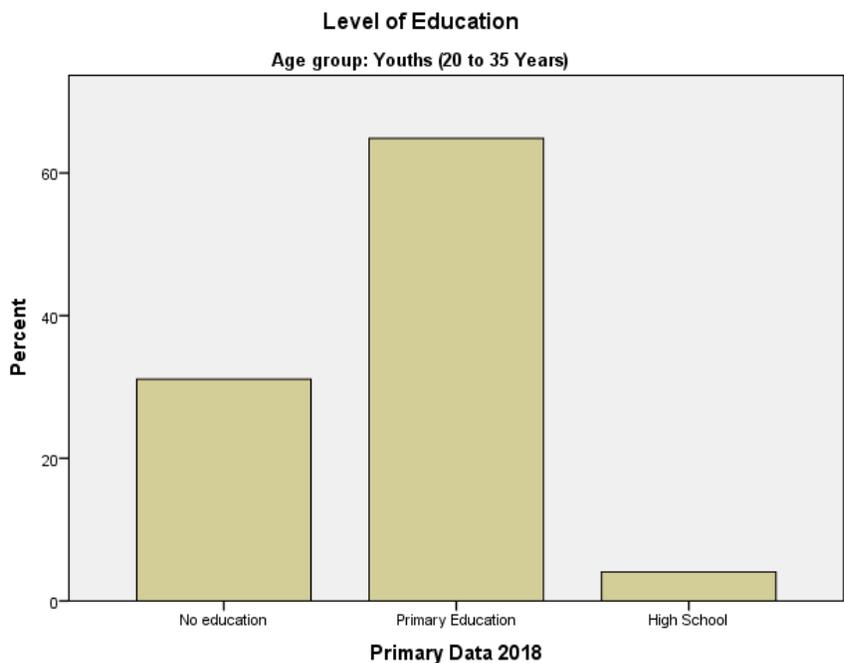


Figure 4-4: Youth’s level of education amongst the respondents group

It is very important for financial institution to collaborate with local government in making sure that there is financial inclusiveness across the entire population.

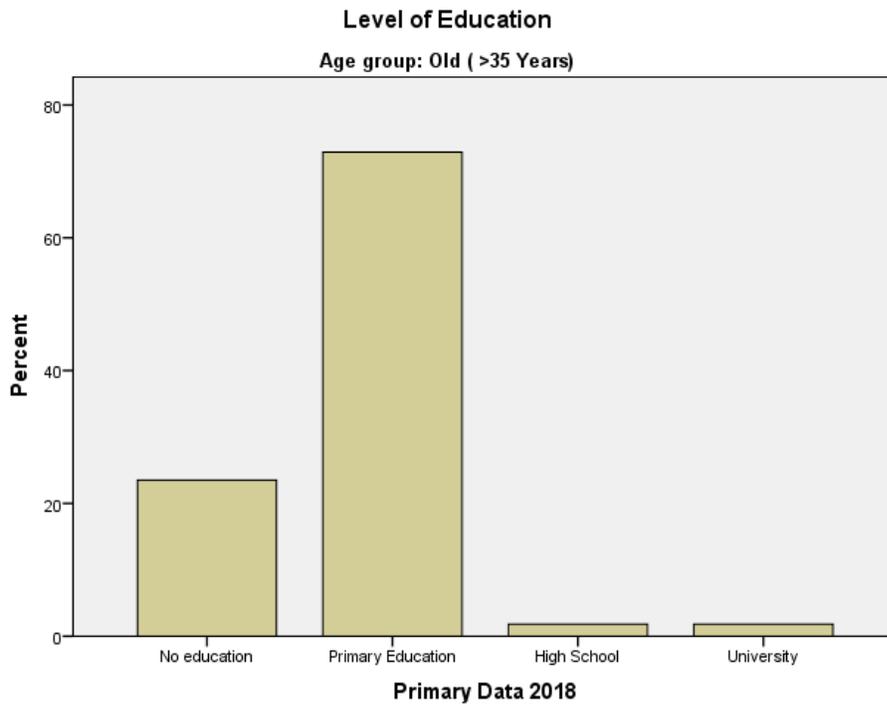


Figure 4-5: Level of education amongst the old respondents

The findings indicate how the level of education in rural areas are extremely low and its implication across many development sectors. Many educated people in rural areas migrate to more developed places where white color jobs can be found.

4.2.4 Economic Main Activities

The findings on the economic main activities of Ngarama sector residents indicate that the majority of Ngarama residents are agriculturalist with around 83.1% in this sector, 13.1% of the respondents had small business, only 2.6 of the respondents are government servants and 1.1% own cattle on top of doing agriculture.

These findings illustrate the sources of the livelihood for the people of Ngarama who strongly relies on agriculture with low level of salaried workers and higher dependency on irregular income from farming hence their earnings or revenues are irregular

Table 4:4: Ngarama Resident's occupation

	Frequency	Percent	Valid Percent	Cumulative Percent
Government Servant	7	2.6	2.6	2.6
Agriculture	222	83.1	83.1	85.8
Cattle Keepers	3	1.1	1.1	86.9
Small Enterprises	35	13.1	13.1	100.0
Total	267	100.0	100.0	

Primary Data 2018

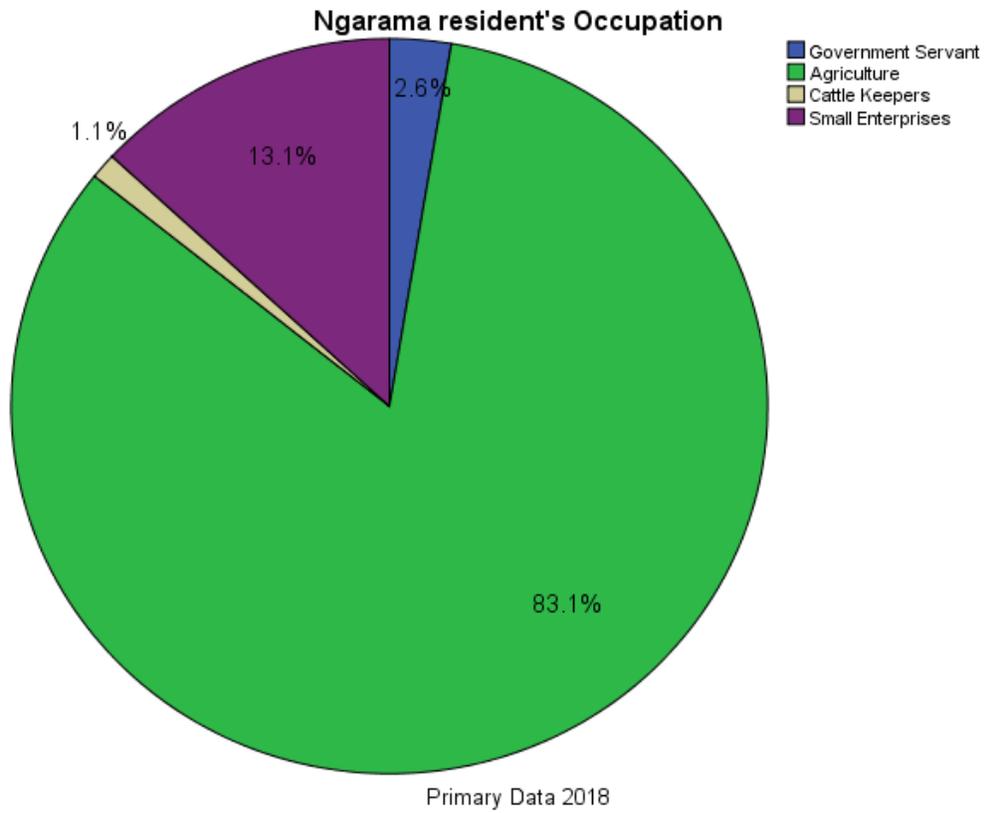


Figure 4-6: Occupation of Ngarama sector respondents

The main economic activities of most of Ngarama residents being agriculturist, small businesses owners and few working with in local public institutions with big gap in their earnings which strictly brings in different approach to engage them with financial institutions. So, below is the estimated monthly income according to the responders economic activities and their perceived earnings.

Table 4:5: Respondent’s level of monthly income across all the available occupation in Ngarama

Occupation	Frequency	Percent	Valid Percent	Cumulative Percent
Government Servant Valid	<20,000 Rwf	2	28.6	28.6
	20,000 to 40,000 Rwf	3	42.9	71.4
	40,000 to 100,000Rwf	2	28.6	100.0
	Total	7	100.0	100.0
Agriculture Valid	<20,000 Rwf	160	72.1	72.1
	20,000 to 40,000 Rwf	42	18.9	91.0
	40,000 to 100,000Rwf	17	7.7	98.6
	100,000 to 200,000	3	1.4	100.0
	Total	222	100.0	100.0
Cattle Keepers Valid	20,000 to 40,000 Rwf	2	66.7	66.7
	40,000 to 100,000Rwf	1	33.3	100.0
	Total	3	100.0	100.0
Small Enterprises Valid	<20,000 Rwf	8	22.9	22.9
	20,000 to 40,000 Rwf	13	37.1	60.0
	40,000 to 100,000Rwf	11	31.4	91.4
	100,000 to 200,000	3	8.6	100.0
	Total	35	100.0	100.0

Primary data 2018

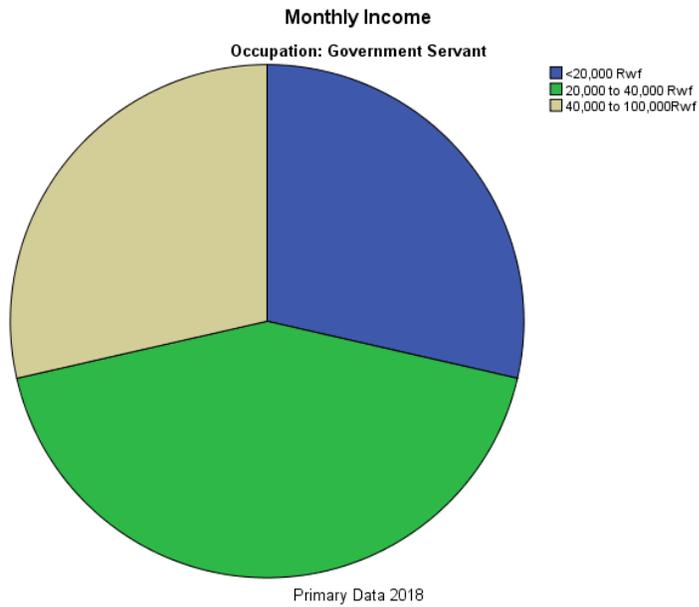


Figure 4-7: Estimated Respondent's Monthly Income by government servants

The pie-chart above represents 2.6% of the entire sample size responded to our study and this is the only portion of population who gets regular monthly salary. Working with any financial institution is compulsory.

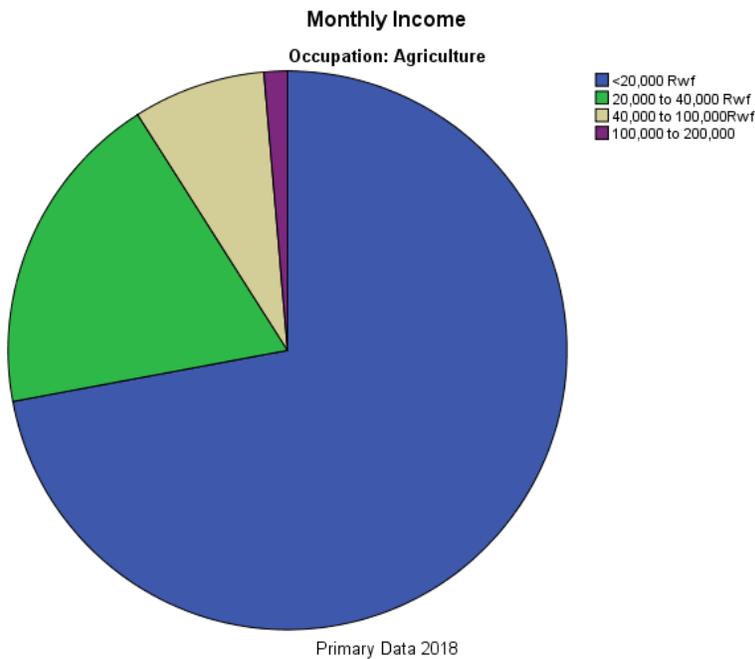


Figure 4-8: Estimated Respondent's Monthly Income by Agriculturist

The average seasonal income of the population who falls in category of Agriculturist depends on the weather, with two seasons per year. On good season high harvest can be witnessed on contrary to low season where the family can struggle to get the food on the table.

Designing credit facility for such group of people needs thorough observation to make sure that the financial institutions knows exactly what kind of season the customer have experienced in that point in time so that there may be mutual understanding.

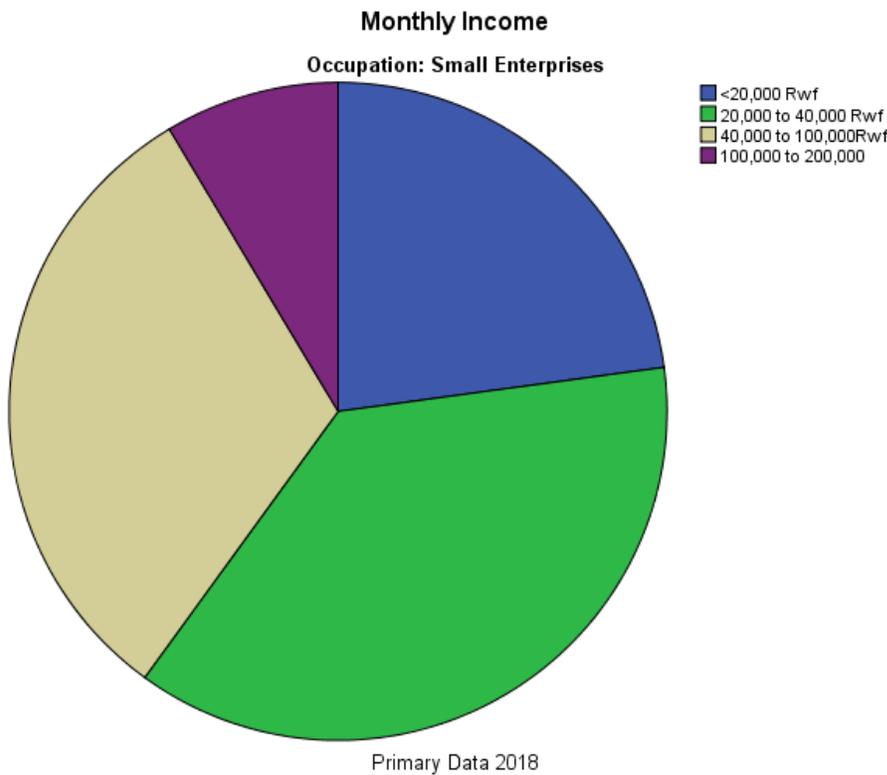


Figure 4-9: Estimated Respondent’s Monthly Income by Small Enterprises

The small enterprises represent 13.1% of the sample size respondent and this group can easily chip in the already designed credit facilities with in the financial institutions because they are able to generate some income on daily basis. But the common recurring difficulty for them is securing collateral especially the case of startups.

4.2.5 Rural Populations Priority

The intention of this survey question was to find out the most pressing issues that residents of Ngarama sector feels need to be treated with urgent. It is not practical to compare modern energy

with food, education and health care services but this survey question intends to understand the priority that will gain more attention to the residents of Ngarama once they access the fund. From the table below 81.6% of the respondents felt more concerned with sustaining food issue than anything else and the remaining respondents cited in almost equal share the education, health care services and modern energy.

Table 4:6: Ngarama Sector Resident's priority

	Frequency	Percent	Valid Percent	Cumulative Percent
Energy	15	5.6	5.6	5.6
Food	218	81.6	81.6	87.3
Health Care	16	6.0	6.0	93.3
education	18	6.7	6.7	100.0
Total	267	100.0	100.0	

Primary Data 2018

The need for clean modern energy for all, be it rural or urban is very crucial and there will be no doubts about that. It plays central role in alleviating poverty, but on other hand many rural population lacks a lot many basic needs that constitute their daily life. So, in trying to weighs in clean modern energy in comparison to other pressing issues the position on priority list wasn't that much good though. With different programs in place to address other issues for instance the successful Mituelle de santé health insurance that covers around 95% of the entire population and introduction of free basic education for all until secondary school. This justify the need for creation of means through which clean modern energy should be given special programs to assess and support dissemination of this service in rural communities who remained unserved and isolated from access to energy facilities.

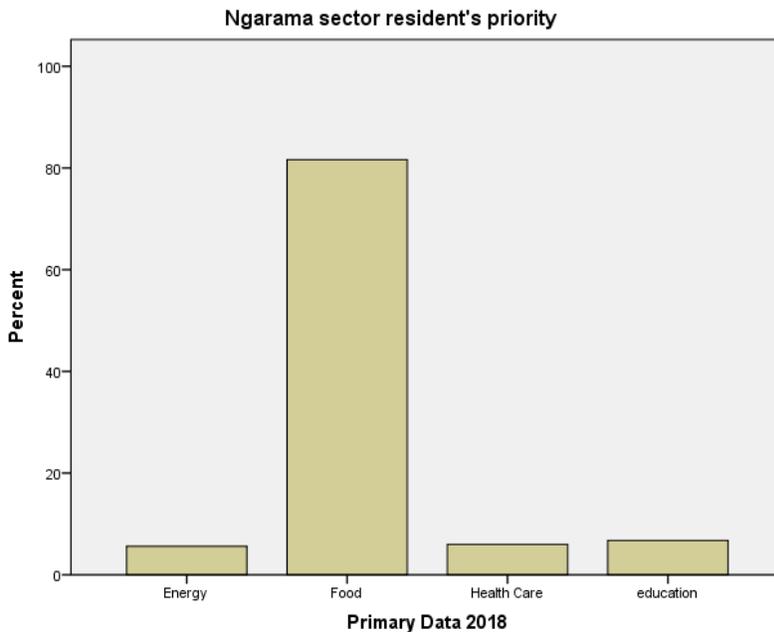


Figure 4-10: Ngarama Sector resident's priority

The findings of the study stress the need for creation of modern energy services products in financial institutions that strictly allows the owner to purchase modern energy services. Given the rural population economic stand unless it is a special product created for the sake of addressing energy issue, it is not practical or wise to spend on modern energy issue before sustaining the most pressing priorities like food and others.

4.3 Microfinance Membership in Rural Areas

The study sought to understand the level of participation for which the residents of Ngarama sector have attained because there is no any other means the government or any other player in the energy sector can reach the less privileged people in the rural areas. So, this is the main fundamental and basic factor that need to be assessed with great attention. With 2030 sustainable development goal number seven which stipulates that all countries should attain sustainable energy for all with reliable, affordable modern energy, and the great ambition for the Rwandan government to reach 100% electrification rate by the year 2024, there are many programs and projects in the pipeline to address the issue of rural access to energy but other than financial institutions stepping up and play their role actively to realize it, there will be no long-term solution to provide sustainable service. One of the failed strategy employed by government was to provide free basic solar home

system to the identified poorest families across the country which has received many critics by donors and other major players in the energy sector, there was no sense of ownership for the free services, no guarantee for repair once there is default and this could jeopardize the off-grid market as everybody could wait to receive free system from government hence the market could be destabilized. so, the only effective process is channeling the cheap fund through financial institution from which the local population could be able to access flexible credit facility specifically for modern energy and purchase the solar home system with the full responsibility of the products and pay back the money with very small or no interest. However, although not all households have businesses that need working capital, all households need energy access. Findings from the Energy Links Project attracted to a credit scheme that is self-repaying as a result of automatically generated energy savings. With energy savings programs, potential clients may start by opening a savings account, buy the energy product, and eventually enjoy other benefits of being “banked” such as the ability to take working capital loans for small businesses (Levai, Paul , & Elisabeth, September, 2011)

4.3.1 Bank account in financial institutions.

The findings as seen from the table below indicate that among the government servants respondents 100% have account in financial institution where as among the small business owners 85.7% of the respondents have account in financial institutions with only 14.3% without the account in any financial institution, on the other hand the agriculturist respondents has indicated low level of financial inclusiveness compared to other categories where by 54.1% against 45.9% with account in financial institutions.

This clearly illustrate the gap that needs to be filled and categories that needs much more attention if the concerned part are to support scaling up of clean modern energy for all.

Table 4:7: Account Ownership findings from the respondents

Occupation			Frequency	Percent	Valid Percent	Cumulative Percent
Government Servant	Valid	Have Account	7	100.0	100.0	100.0
Agriculture	Valid	Have Account	120	54.1	54.1	54.1
		No Account	102	45.9	45.9	100.0
		Total	222	100.0	100.0	
Cattle Keepers	Valid	Have Account	3	100.0	100.0	100.0
Small Enterprises	Valid	Have Account	30	85.7	85.7	85.7
		No Account	5	14.3	14.3	100.0
		Total	35	100.0	100.0	

Primary Data 2018

4.3.2 Mindset on microfinance membership

This question was intended to find out from the residents of Ngarama sector on what they think about working with microfinance, who they think is much more likely to successfully work with financial institutions. And the findings indicate that among the male respondents only 46.7% believe it's for everyone; where as 45.1% think the microfinance is only for rich people; 8.2% of male respondents of Ngarama sectors think that microfinance is for poor people.

The findings also show that only 30.6% female respondents think that microfinance institutions belong to everyone; with all of 51.4% of the respondents indicated microfinance as the financial institution for only rich people with considerable capacity; 18.1% female respondents believe microfinance institutions are the institutions for only poor people.

From this disparity in the responses the conclusion can clearly be drawn about the mindset of rural community, with regard to what they think about financial institutions and lack of deep sensitization through different platform that can reach everyone. Many rural population have restrained themselves from working with any financial institutions basically due to less information and little awareness.

Table 4:8: Respondents perception on the most likely to become a customer

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Everyone	91	46.7	46.7	46.7
		The rich people	88	45.1	45.1	91.8
		The poor People	16	8.2	8.2	100.0
		Total	195	100.0	100.0	
Female	Valid	Everyone	22	30.6	30.6	30.6
		The rich people	37	51.4	51.4	81.9
		The poor People	13	18.1	18.1	100.0
		Total	72	100.0	100.0	

Primary Data 2018

4.3.3 Opening an account.

The findings indicated how different male and female of Ngarama sector residents think about the opening of an account in financial institution. From table below, we can learn that in both male and female there is considerable portion of people who have no idea about the cost of membership and account opening which simply translates that they possess low knowledge on financial institutions; while others believe that it is expensive to own an account in financial institutions basically because of lack of information.

Table 4:9: Respondent's perception on Cost of opening an account in financial institution

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Expensive	71	36.4	36.4	36.4
		Cheap	108	55.4	55.4	91.8
		No Idea	16	8.2	8.2	100.0
		Total	195	100.0	100.0	
Female	Valid	Expensive	32	44.4	44.4	44.4
		Cheap	37	51.4	51.4	95.8
		No Idea	3	4.2	4.2	100.0
		Total	72	100.0	100.0	

Primary Data 2018

4.4 Financial Literacy in Rural Areas.

The study sought to analyse the respondent's point of view when it comes to their own relations and knowledge about the microfinance and formal financial institutions in general. The researcher

prepared a couple of questions to test and get insights from the residents of Ngarama Sector. Gathering the information to test the understanding of the microfinance for the rural community; as well as finding out if there has been training or sensitization they have received to enlighten them on financial services; lastly checking the perception for the rationale of the residents of Ngarama sector when it comes to saving with financial institutions. Reports on Microfinance Energy Poverty highlighted that many MFIs recognize the need for their communities to improve access to energy and the consequences of fossil fuels or lack of lighting on their customers' health, environment, and economic opportunities. However, as financially sustainable enterprises, MFIs need a strong business case before they begin to lend for clean energy, and clean energy must align with their strategic direction. Energy products can be a good strategic fit for MFIs seeking to grow in both urban and rural areas. In urban areas, MFIs face increasing competition. Clients may be attracted to MFIs that offer distinctive and relevant products and educational programs such as energy loans or energy retailer trainings (Levai, Paul , & Elisabeth, September, 2011)

Below are the statistical results attained during the questionnaire filling and the researcher believe that there is connection between the level of financial literacy and long-term solutions to the rural populations being able to access the finance for scaling up modern energy.

4.4.1 Knowledge about the operation of Microfinance.

The findings from surveys indicates that there is considerable big number of people who basically lacks the basic knowledge on the financial services and this hampers their involvement and benefiting from variety of services offered by these institutions. In all three group as demonstrated from table 4.8 below, there are significant big percentage of people who lacks understandings of the services offered by financial institutions. 29.6%, 36.5 &26.5% of teenager, Youths and old respectively.

The level of financial illiterate is evenly distributed among all age group as shown in the table 4:10 below and this affirms how it is common concern across the entire populations and this strongly calls for synergies among different players to address the problem.

Table 4:10: Finding's Knowledge on financial institutions amongst the respondents

Age group			Frequency	Percent	Valid Percent	Cumulative Percent
Teenager (<20 Years)	Valid	Knowledgeable	19	70.4	70.4	70.4
		Don't understand	8	29.6	29.6	100.0
		Total	27	100.0	100.0	
Youths (20 to 35 Years)	Valid	Knowledgeable	47	63.5	63.5	63.5
		Don't understand	27	36.5	36.5	100.0
		Total	74	100.0	100.0	
Old (>35 Years)	Valid	Knowledgeable	122	73.5	73.5	73.5
		Don't understand	44	26.5	26.5	100.0
		Total	166	100.0	100.0	

Primary Data 2018

4.4.2 Trainings on financial services

The findings from the study indicates the big gap when it comes to the efforts by all concerned parties be it financial institution, local authorities in charge of conducting awareness campaigns with intention of improving customer's knowledge and help them make informed decision. From the findings which is in the table below 48.1% teenager have never been trained before to understand the importance of working with financial institution and hence this factor excludes them from benefiting from any financial services. Whereas 50% of the youths who responded to the study have not also received any training on the operations and how beneficial it can be. The worst case is found in the third category of old people which indicates 56.0% of people without a comprehensive training to get a sense of what financial institution is and can provide for him.

Table 4:11: Respondent's Findings on Training about bank Services

Age group			Frequency	Percent	Valid Percent	Cumulative Percent
Teenager (<20 Years)	Valid	Have received training	14	51.9	51.9	51.9
		Not trained	13	48.1	48.1	100.0
		Total	27	100.0	100.0	
Youths (20 to 35 Years)	Valid	Have received training	37	50.0	50.0	50.0
		Not trained	37	50.0	50.0	100.0
		Total	74	100.0	100.0	
Old (>35 Years)	Valid	Have received training	73	44.0	44.0	44.0
		Not trained	93	56.0	56.0	100.0
		Total	166	100.0	100.0	

Primary Data 2018

4.4.3 Rationale for Saving

The findings from the survey has indicated that for both male and female the rationale for saving in financial institution is to increase living standard with 69.7% & 59.7% male and female respectively, at the same time we can notice the difference in understanding between male and female with big number of 25% on female side responding to have no idea which clearly indicated how their level is slightly low compared to their counterpart male respondents with only 11.3% of their population falling in this group.

17% of male and only 11.1% female saves with financial institution because of unexpected expenses which indicates the level of responsibility difference between male and female.

Lastly there is low passion from both sides for love to save more than spending with both side scoring 3%.

Table 4:12: Respondent's Findings on Rationale for saving in Financial Institution

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid Unexpected expenses	34	17.4	17.4	17.4
	To increase living standard	136	69.7	69.7	87.2
	like to save more than spending	3	1.5	1.5	88.7
	Have no idea	22	11.3	11.3	100.0
	Total	195	100.0	100.0	
Female	Valid Unexpected expenses	8	11.1	11.1	11.1
	To increase living standard	43	59.7	59.7	70.8
	like to save more than spending	3	4.2	4.2	75.0
	Have no idea	18	25.0	25.0	100.0
	Total	72	100.0	100.0	

Primary Data 2018

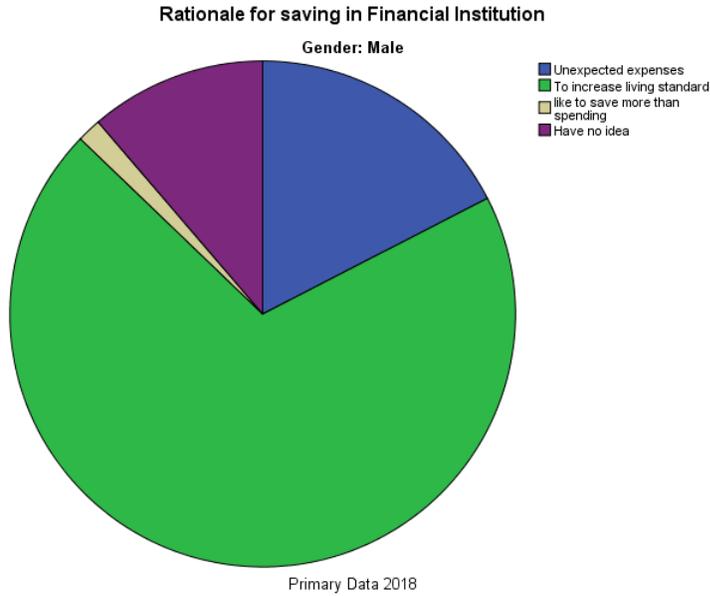


Figure 4-11: Male Rationale for Saving in Financial Institution

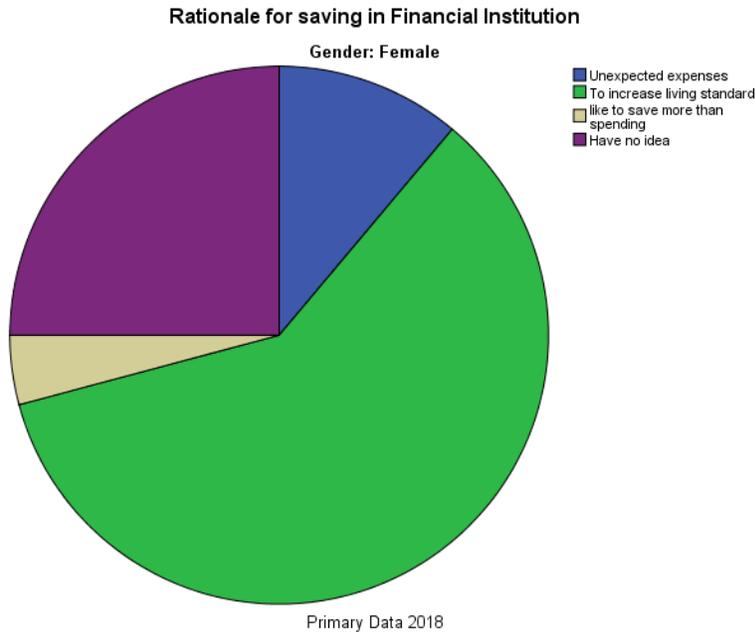


Figure 4-12: Female Rationale for Saving in Financial Institution

On Contrary the study wanted to find out the rationale or the reason for some people who don't like to save their money within any financial institution. The findings come from the perception of the respondents.

The study indicates that the primary reason that halts rural populations from engaging financial institutions are Ignorance and low income. 40% & 38.9% male and female respondents respectively have highlighted low income as the main reason why people in rural communities hesitate and refrain from joining financial institutions. On the other hand, the majority of respondents have stated ignorance as the main blocks that have kept the big number of potential clients in isolation, because of lacking the basic knowledge and sticking to the traditional way of doing things.

Table 4:13: Respondent's Findings on Rationale for not saving with in financial institution

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Low income	78	40.0	40.0	40.0
		Ignorance	81	41.5	41.5	81.5
		No Idea	36	18.5	18.5	100.0
		Total	195	100.0	100.0	
Female	Valid	Low income	28	38.9	38.9	38.9
		Ignorance	32	44.4	44.4	83.3
		No Idea	12	16.7	16.7	100.0
		Total	72	100.0	100.0	

Primary Data 2018

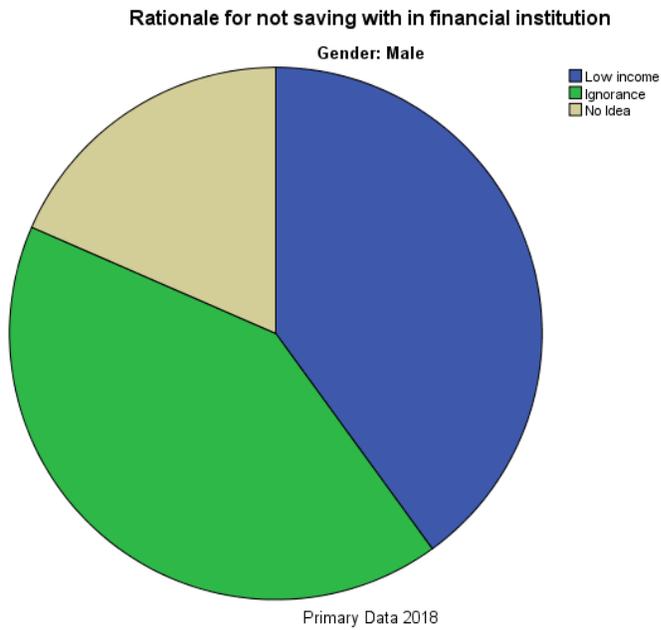


Figure 4-13: Male Rationale for not Saving in Financial Institution

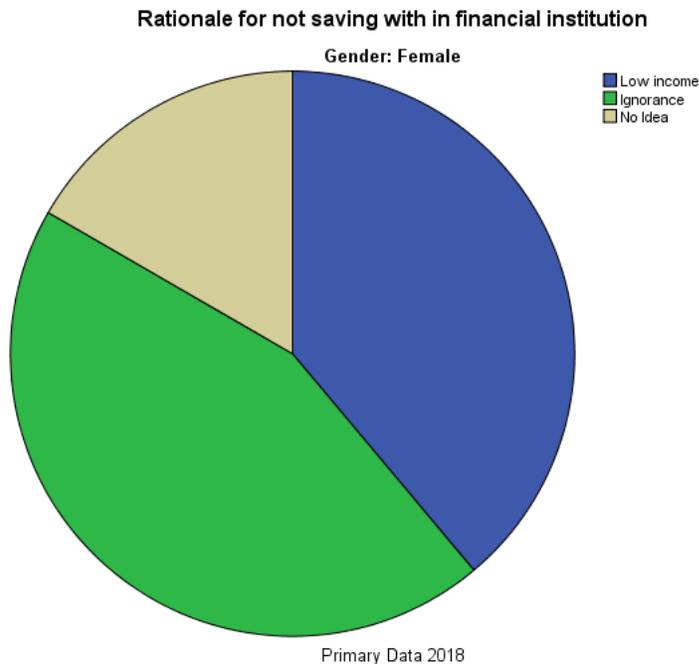


Figure 4-14: Female Rationale for not Saving in Financial Institution

4.5 Available Lending Schemes

The study sought to analyze the available lending schemes for which the rural communities can benefit from as well as assessing the knowledge; requirement to secure a loan; why do people afraid of credit; flexibility of the credit and the variety of option that covers all. Access to modern energy requires finance which many of rural community cannot afford but with good credit at terms and conditions they can repay the fund over period of time.

According to the report on Microfinance and Energy poverty (Levai, Paul , & Elisabeth, September, 2011) for microfinance and other financial institutions, a reduced energy bill creates an opportunity for client savings in an account. MFIs or savings group can promote that market an energy product in conjunction with a savings program can incentivize savings. Since MFI clients typically start to save money within a few weeks or months of taking an energy loan, quite a bit of capital can be unlocked through savings. when developing the business model for energy loans financial institutions can decide to couple the loans with a dedicated savings account to sensitize the population and promote the deposit of the expenditures saved. The acquisition cost of solar technology is high relative to kerosene, although the total cost of the ownership is lower over period of time. Even affordable solar lanterns require an up-front payment that families cannot

always afford. Therefore, buyers need to accumulate lump sums for their purchase. Savings groups allow members to save and borrow the small amounts needed for modern energy acquisition, while MFIs & financial institutions can assist with flexible and cheap loans.

The sustainability of this new energy products will depend on safe guarding the interest of all parties ranging from providing good quality products that well suits the needs of the customers and help them curb their expenses and generates some revenue.

1. Microenterprise energy loan: A dedicated loan product enabling new customers to purchase clean energy devices that allow them to expand their businesses or reduce costs (Levaï, Paul , & Elisabeth, September, 2011).
2. Home improvement energy loan: An add-on loan product for existing clients who decide to improve their home by purchasing energy products. Savings from the replacement of kerosene provides a source of repayment capacity. The loan term and interest are tailored to the actual savings generated from switching to modern energy solutions (Levaï, Paul , & Elisabeth, September, 2011).
3. Energy-linked savings account: A product that incentivizes savings by illustrating how much clients can save by switching from traditional lighting. This product can serve both existing clients of Financial Institutions and new client households, giving them a bank account for the first time (Levaï, Paul , & Elisabeth, September, 2011).
4. Energy retailer loan: A loan enabling micro-entrepreneurs to begin retailing energy products to their communities and become the last-mile distributors for clean energy products. Sometimes, these small retailers already have stores, and simply buy inventory to expand into basic solar home systems. MFIs offering these loans could help link the best micro retailers with the larger energy product distributors. Often these distributors are challenged to find and evaluate trustworthy, high-potential retailers in rural areas. MFIs can support and accompany these retailers through making this deal (Levaï, Paul , & Elisabeth, September, 2011).

4.5.1 Knowledge about procedures for earning credit

The findings of this study indicate that the women are less knowledgeable in comparison to their counterpart men when it comes on the understanding of the procedure for accessing the credit in

financial institution. 47.2% of the interviewed women were of no knowledge about the procedures to secure loan, whereas on the other hand only 29.2% of the interviewed men has highlighted to be less informed about the procedures.

Financial institutions from rural areas offered limited services to their customers and the majority of them are uneducated and old who cannot easily be converted from using conventional way of doing things hence missing out on great opportunities that lies with financial services.

Table 4:14: Findings on Respondent’s Understanding about procedures to earn credit in Financial Institutions

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Clear and Understandable	138	70.8	70.8	70.8
		Not clear	57	29.2	29.2	100.0
		Total	195	100.0	100.0	
Female	Valid	Clear and Understandable	38	52.8	52.8	52.8
		Not clear	34	47.2	47.2	100.0
		Total	72	100.0	100.0	

4.5.2 Requirement to secure credit

This survey sought to examine the perception of how rural areas populations think about the regular approach to acquire the loan from financial institutions. From the table below, we can draw a lot of very important lesson concerning what it takes to secure credit from financial institutions. First and foremost, on both side male and female presenting good collateral holds a very critical factors towards being given or denied credit in financial institutions, the findings show that 60% & 51.4% from male and female respectively have sited good collateral as the determining factors when looking for the loan hence making the entire process much complicated for younger people who do not possess good collateral. Rural communities do not own many personal properties for which they can present to the bank other than their houses and land which are very sensitive property that will cause many families to abstain from taking such high-risk decision.

On the other hand, from the findings 13.3% and 16.7% male, female respectively responded in the survey have ranked viable project as the second most vital criteria for earning credits from financial institutions. So, with limited level of education rural communities find it difficult to be able to prepare and present viable project to the financial institution which can convince the bank to give them the money.

Lastly being an active member with a good history plays also important role in securing credit and yet portion of the rural communities do not possess account hence this will limit the chances of accessing the fund for scaling up modern energy. As already seen from the previous results there is a considerable number of people in the rural areas who are not affiliated with any financial services and this is a very big threat to the country struggling in building financial inclusive economy, with 9.7% of the male respondents in completely dark about the requirement for earning credit; where as 23.6% female respondents had no idea, this disparity gender is very huge and it indicates the real gap between male and female engaging in financial institutions. Corruption and another unfair behavior has scored poorly and this indicates how seriously and organized the financial institutions are in Rwanda. governed by clear law with strict and fit management.

Table 4:15: Respondent's Perception on Primary requirement to get credit from Financial Institutions

Gender			Frequency	Percent	Valid Percent	Cumulative Percent
Male	Valid	Only to have an account	1	.5	.5	.5
		To be an active member	21	10.8	10.8	11.3
		Good Collateral	117	60.0	60.0	71.3
		Viable project	27	13.8	13.8	85.1
		To have connection with Manager	10	5.1	5.1	90.3
		Have no Idea	19	9.7	9.7	100.0
		Total	195	100.0	100.0	
Female	Valid	To be an active member	3	4.2	4.2	4.2
		Good Collateral	37	51.4	51.4	55.6
		Viable project	12	16.7	16.7	72.2
		To have connection with Manager	3	4.2	4.2	76.4
		Have no Idea	17	23.6	23.6	100.0
		Total	72	100.0	100.0	

Primary Data 2018

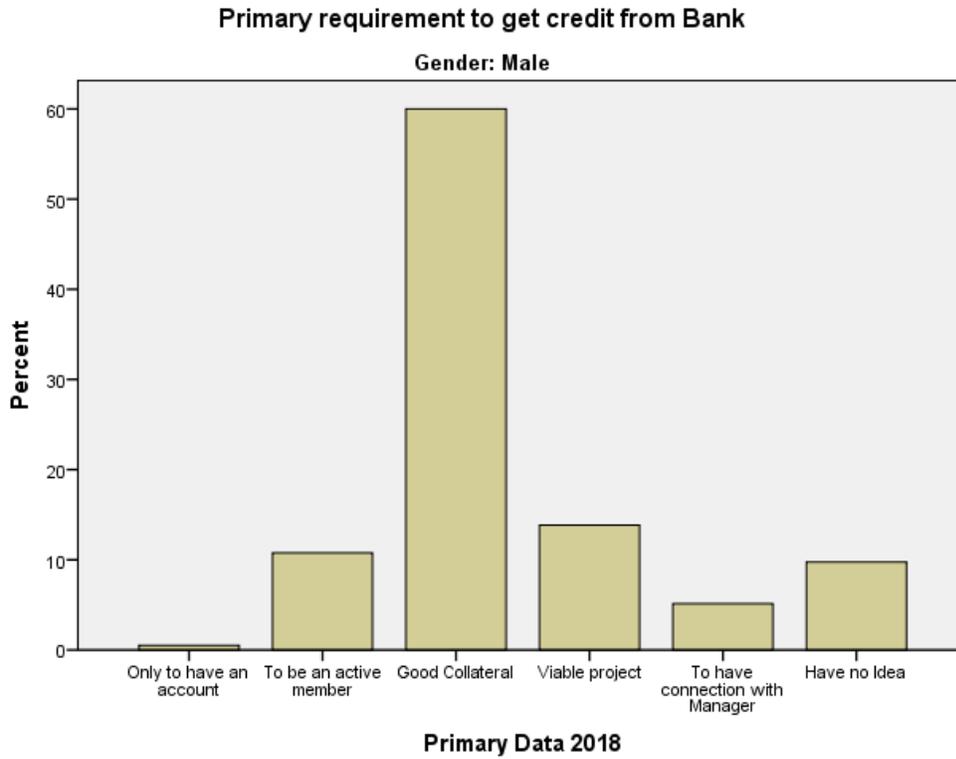


Figure 4-15: Perception of Male respondents on requirement for earning credit in financial institution

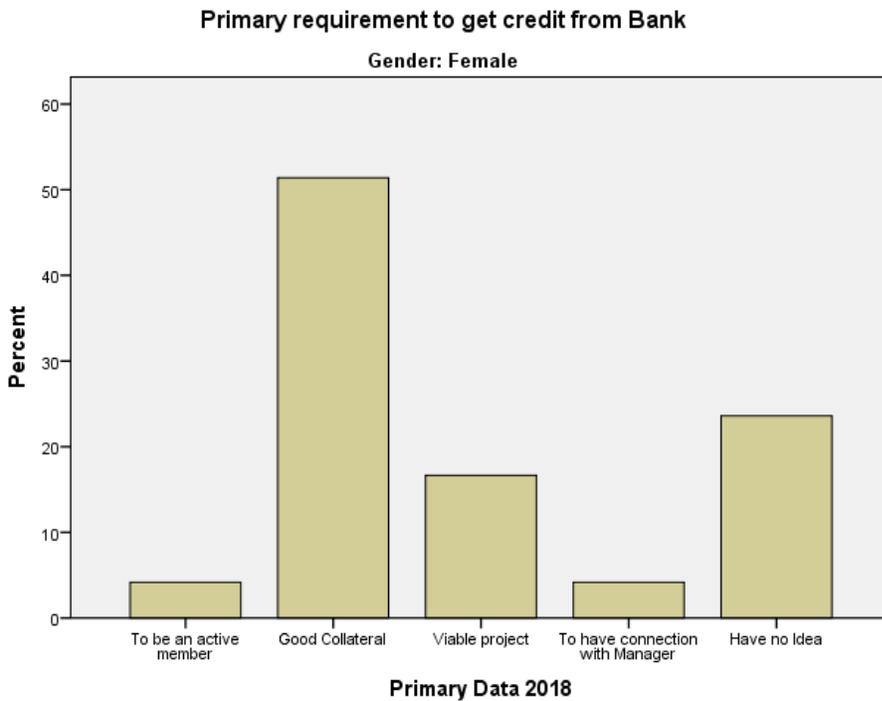


Figure 4-16: Perception of Female respondents on requirement for earning credit in financial institution

4.5.3 Why do people shy away from demanding credit?

The findings indicate that many people refrain from asking the loan for different purposes but the rate at which different age group of people restrain clearly illustrate that different approach needs to be considered.

From the results of the survey Teenagers restrain from asking for a loan in financial institution mainly because of lack of collateral, the study shows that 44.4% of the teenagers responded have argued that they cannot access finance from the bank because they fall short of collateral to be trusted by the bank and yet they don't own any valuable asset, again 40.7% of the teenagers respondent have cited the fear of failure to pay back the fund as other factors holding them back from asking for credit.

On the other hand, 63.5% youth's respondents and 81.3% old respondents view the fear of failure to pay back the fund as the major blocks that restrict them from going for credit in financial institutions, taking risk for their valuable properties like land and house.

From the table below, it is very clear how the percentage of respondents who cited collateral as the main challenges gradually increases directly proportionally as the ages group goes up, this signifies how young people struggles from securing credit.

Table 4:16: Respondent's Obstacles on Refraining from Demanding credit in Financial Institutions

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
Teenager (<20 Years)	Valid No collateral	12	44.4	44.4
	Fear of failure to repay	11	40.7	85.2
	No idea	4	14.8	100.0
	Total	27	100.0	100.0
Youths (20 to 35 Years)	Valid No collateral	19	25.7	25.7
	Fear of failure to repay	47	63.5	89.2
	No idea	8	10.8	100.0
	Total	74	100.0	100.0
Old (>35 Years)	Valid No collateral	15	9.0	9.0
	Fear of failure to repay	135	81.3	90.4
	No idea	16	9.6	100.0
	Total	166	100.0	100.0

Primary Data 2018

4.5.4 Flexibility of the available credit

Flexibility of credit terms and conditions is very important to facilitate low income earners access the funds in terms of loans for which they shall be able pay back. The findings from the study indicates that people with different occupations have reacted in different ways. 57.1%; 49.5% & 60% government servants, Agriculturist and Small enterprises owners respectively feels comfortable with the available conditions of the loans they acquire from microfinance institutions. But the comfort level shrinks down for agriculturists more than those other categories who earns a monthly salary and business man who earns on daily basis. Counting for the seasonal harvest which may be low or high depending on the weather to be able to pay back the loans, this increases the risk of failure to comply.

Table 4:17: Respondent's Perception on Flexibility of the credit from Financial Institutions

Occupation		Frequency	Percent	Valid Percent	Cumulative Percent
Government Servant	Valid Very flexible	4	57.1	57.1	57.1
	Not flexible	3	42.9	42.9	100.0
	Total	7	100.0	100.0	
Agriculture	Valid Very flexible	110	49.5	49.5	49.5
	Not flexible	112	50.5	50.5	100.0
	Total	222	100.0	100.0	
Cattle Keepers	Valid Not flexible	3	100.0	100.0	100.0
Small Enterprises	Valid Very flexible	21	60.0	60.0	60.0
	Not flexible	14	40.0	40.0	100.0
	Total	35	100.0	100.0	

Primary Data 2018

4.5.5 Variety credit that covers all social categories of people

Ngarama sector have a population majority of them earning their living through subsistence farming which counts to 83.1% of the surveyed population, small portion of community elite working in government institutions with around to 2.6% of the sample population and 13.1% owns small enterprises in Ngarama center.

Having these different categories, one will wonder if there are available designed credit windows to address each of these group's need. The findings from the surveyed population have indicated that 100% government servants that responded have endorsed the available variety lending

schemes, but on contrary 27.9% agriculturist respondents have expressed dissatisfaction about the loans schemes in place, and only 22.9% of small enterprises respondents has shown disapproval about the available variety of credit.

There are many discomforts across the majority of rural population on the available credit structure in line with their occupation to facilitate easy payment of the credit. Only 6.5% of the Isunge Ngarama Sacco's customers have managed to access the credit from microfinance according to the Manager. This calls for re structure of the credit to accommodate the entire population targeting mainly loans for small farmers who are the majority microfinance customers.

Table 4:18: Respondent's Perception on Availability of Variety of Lending schemes

Occupation	Frequency	Percent	Valid Percent	Cumulative Percent
Government Servant Valid Positive	7	100.0	100.0	100.0
Agriculture Valid	Positive	137	61.7	61.7
	Negative	62	27.9	27.9
	No Idea	23	10.4	10.4
	Total	222	100.0	100.0
Cattle Keepers Valid Positive	3	100.0	100.0	100.0
Small Enterprises Valid	Positive	25	71.4	71.4
	Negative	8	22.9	22.9
	No Idea	2	5.7	5.7
	Total	35	100.0	100.0

Primary Data 2018

4.6 Relationship between rural financial inclusions and local social enterprises

This study sought to understand the linkage between rural financial inclusion and local enterprises in Ngarama sector, in this small town of Ngarama center, there is considerable number of small business going on ranging from grinding, welding, barber shops, shoe repair, stationery shops and so on and so far, this is mainly fueled by national grid that is only found in the center of the sector which is home for many public institutions.

Ngarama sector has got electricity from national grid which covers the small part of the center, and this is an ideal place to clearly see how electricity can spread social economic development in comparison with unelectrified places.

During field visit in Ngarama sector some important issues were raised and attributed to the less diffusion of small business and enterprises that could drive this sector to another level.

- Collateral is the common threat across the board but especially when it comes to youths, it takes another dimension because. Lack of assurance to guarantee the microfinance the return of the credit.
- Bureaucracy makes the available program much complicated to the extent that many people with viable idea gave up on chasing the fund to implement because long time
- There are no clear directives to the beneficiaries on different development programs

Empowering local enterprises to sustain the diffusion of clean modern energy in rural areas for the long run is impeccable, this is field dominated by foreign companies operating in younger market whose customers with less educated, low purchase power and different mindset about modern technology, this has only allowed them to win the hanging fruits of customers. So, bringing in local companies who have a deep understanding of local cultures, values and their history can help unlock the market. In future there will be a need of spare parts, technicians to repair and replace the old batteries, inverters and solar panels, a great need locally empowered enterprises can cease the opportunity and bridge the gap between foreign companies and local populations.

CHAPTER FIVE: SUMMARY, CONCLUSIONS & RECOMMENDATIONS

5 Introduction

This chapter contained a summary of the findings, recommendations, conclusions and areas for further studies that the study identified. The summary of the findings was done in line with the study objectives. The conclusions were also presented per objective.

5.1 Summary of Findings

This study sought to establish the key factors influencing access to finance for scaling up clean modern Energy in Rural areas of Rwanda. The study specifically focused on the effects of microfinance membership in rural areas; Rural Financial literacy; Available Lending schemes; Relationship between local small enterprises and rural financial inclusions. The study was anchored on theory of Endogenous growth theory and the theory of growth of economy of a nation. The study adopted a descriptive research design. This study was conducted in Ngarama sector where majority of inhabitants live without access to clean modern energy In Ngarama sector, with approximately 30,354 population on surface areas of 58.5km². Therefore, the target population of the study included 30,354 populations in Ngarama sector. The study used random sampling to select 267 households who were the respondents selected from the target population of 30,354 populations. The study used primary data which was collected using questionnaires, through simple random sampling to come up with the final sample and interviewing key personnel in both energy and financial sector. secondary data was also used in this study on the available literatures on related study done before.

In this study descriptive statistics which involves frequencies and percentages was used in analyzing the information basically on comparison between different variables in questionnaires and insights from experienced personnel in the field.

5.1.1 Microfinance Membership.

On average, descriptive results revealed that the respondents agreed on statements concerning less level of participation or membership in microfinance. With little membership in any form of formal financial institution it completely shuts down the small window of addressing the issue of access to finance for scaling up modern energy.

The findings have shown 40.1% of the respondents were without financial institution account, living in isolated life. There is a limited knowledge about the microfinance and bank in in general as 46.8% of respondents thinks that the financial institutions are only reserved for rich people who have enough money. The noticeable disparity for account ownership across the economic activities in rural areas is the true reflection of how the majority agriculturist are not much participating in financial institutions.

A cross the entire rural populations in Ngarama sector there is reluctance in having interest to join financial institutions mainly because of little information, traditional mindset and culture. There is strong connection between participation in any formal financial institution and being able to access the finance needed for scaling up clean modern energy in rural areas to address universal access to electricity. With the development of off grid market especially diffusion of standalone solar system across the country there are possibility of synergies between off grid services provider and financial institutions through different development program to support their clients that can only benefit those working with financial institutions.

5.1.2 Rural Financial Literacy.

The results of the study indicate that there was little knowledge and understanding about the services and operations of the available formal financial institutions in Ngarama sector. With the lack of basic education in majority of household leaders and being old, with little curiosity about the new things coming up and slowly in adjusting to the modern society.

The survey has shown 29.6% of respondents without knowledge about services offered by financial institutions and 53.6% of the respondents have never had any training to enlighten them about the benefits they can get from formal financial institutions. In general, the majority of Ngarama residents do not possess the basic financial literacy which can support them maximize the opportunity that offered by financial institutions. With more financial literacy, the rural communities can leverage the opportunities channeled through financial institutions. More financial educative campaigns should be conducted through different platform to change the status quo of owning an account in financial institution as the formalities rather start maximizing the opportunities channeled though financial institutions by government of other government partners. As it has been highlighted in our findings 56% of Old respondents' category have never received

any financial training or workshop to cement and facilitate their involvement to the services provided to them.

Again, considering low level of education across Ngarama sector residents there is a tendency of clients being lead blinded and sometimes reluctant from complete engagement due to fear of unknown terms and conditions for which they must be abided by the law.

5.1.3 Available Lending schemes

The results of the study have shown that significant number of respondents claim to not know the procedures to secure credit in microfinance, with 47.2% being women in relation to 26.2% men so, the gap between male and female is enormous given the paramount importance of woman in development project of the family in rural areas.

Again, collateral makes it difficult for many to earn credit in rural areas. Ngarama residents are agriculturist with their economy basically rooted in their harvest which frequently change depending on season so, there is a possibility of risking their house or land for the sake of credit which they cannot be able to pay back when the weather becomes bad and hence afraid to take the risk. This concern grows bigger when it comes to youths who claim lack of collateral to be major threat to their dream as for their case claim to not have tangible property to present to the financial institutions other than their skills.

Further more people shy away from going for credit because of many reasons among them are ignorance and fear for failure to pay back the credit. This can only be settled by using all available platform and channels to educate the populations.

In financial institutions of Ngarama sector the available credit had conditions that are not flexible and hence becomes harder for the clients to pay back the money especially different categories, in short there is a need to design variety of credit facilities depending on the available social classes of Ngarama sector without leaving behind some. For instance, government servants, small enterprises and agriculturist as referred to in this survey.

5.1.4 Relationship between rural financial inclusions and local enterprises

The study has also emphasized on the linkages between financial inclusions and social local enterprises. For the sustainable development to be attained in rural areas many entrepreneurs need to emerge and establish a continuous loop between producers and consumers. Seed capital has

been on forefront as the main challenges. Promoting social local enterprises involved in modern energy can be great contribution to guarantee sustainability of modern energy. Currently the off-grid market is dominated with foreign company and they provide services to the customers during their contract period but it remains unclear who will take care of after sale service after the contract. So empowering local enterprises to take ownership and bring innovations in this sector is very critical.

Local enterprises need to be equipped with means and knowledge to form stable markets which addresses the needs of people and generates more employment opportunity. This way the future can be safe, when local social enterprises could start harnessing the locally available opportunities to give solution to the neighborhood without incurring the import charges and prices way beyond the actual price.

5.2 Conclusions

The study concluded that membership in microfinance to rural populations is the crucial step towards drawing closer to the fund. participation in financial institution will help the government and its partner to be able to support the underprivileged population with available different program like Renewable Energy fund which have main objective of increasing access to electricity to the rural areas. So, it is the first step to have an active account in financial institution. Many people in rural areas have sidelined themselves in microfinance with poor mindset about its importance and limited information about the opportunity offered by microfinance. So, there is need for shift in mindset and cease the opportunity

The study also concluded that on addition of having an account in microfinance, financial literacy in rural areas needs to be boosted. The knowledge and understanding of services, operations and opportunities that are channeled through financial institutions by government and its partners will help to bridge this huge gap of lack of access to finance for scaling up modern energy. Lack of regular and continuous training to enlighten and entices the customers about different program available that might be of importance to their daily lives has undermined the credibility of what financial institutions can achieve. Training customers and non-customers to help them make informed decisions about their spending, savings and investments can build trust and strong bond. Ignorance is the enemy of everything, abundant opportunities to support rural communities financially in their endeavors are hanging waiting for someone to grab them.

The study also concluded that lending schemes in place today have got so many obstacles that are not favorable to the rural community customers because of their unique life style. With the high level of illiterate to the rural population who cannot easily be adjusted from their conventional way of doing things, majority of Ngarama residents being agriculturist who deeply depends on produces from their garden, and with tough eligibility criteria which knocks out many from credit. Collateral is the primarily the main criteria that screens out majority of people seeking credit as its very tough condition to own property other than house and land with more value than the fund which will qualify them for credit. The conditions are not flexible in accordance to their occupation to enable them pay back the money without difficulties.

Finally, financial inclusions to the local social enterprises has suffered a lot because of rigid system which demands a lot of perseverance and patience to access the financial support from financial institution. Bureaucracy has undermined different programs set by government to boost local entrepreneurs.

5.3 Recommendations

1. There must be a Continuous financial education aimed at changing financial behavior, financial products/services and financial services knowledge (including product functionality and customers' benefits) in rural areas.
2. The financial institution should bring to the market more innovative products that are relevant and affordable to help bring on board the remaining isolated population.
3. The financial sector in partnership with the government should take up the vital role in savings awareness campaigns among rural population
4. The Clean modern energy products should be embedded in the financial institutions products offered to Rwandans; and it should be the responsibility of Private Financial Agents to ensure that these products are relevant and affordable.
5. The government must financially empower the local enterprises to support the off-grid companies in provision of after sale services to the customers to guarantee continuous services
6. The financial institutions must employ permanently skilled personnel in energy sector to deal with energy projects in banks and responds to the challenges faced due to lack of knowledge in the field

7. The credits should be designed in way that is flexible to different occupations; monthly salaried workers, seasonal agriculturists and small business owners.
8. Special program to support women and youths should be of priority to increase their participation in financial institutions as the enrollment rate is still very low, yet they occupy the majority number in society.
9. The financial literacy modules should be imbedded in curriculum of all level, starting from primary education to the high learning institution program to ensure the diffusion of financial literacy.

5.4 Areas of further Research

The study recommends future research studies to look at informal financial services as they are more common in rural areas and extend the scope of the research to the provision of clean cooking technologies to the both urban and rural areas that could replace the majority consumption of biomass as fire wood in rural areas or charcoal in urban and semi-urban areas.

REFERENCES

- Aghion, P., & Peter, H. (1998). *Endogenous Growth*. Cambridge: Cambridge, MA: MIT.
- Alstone, P., Carmen, N., Brendon, M., & Adriana, E. (October, 2011). *Expanding Women's role in Africa's Modern Off-grid lighting market*. Lighting Africa.
- ArcFinance. (2017). *Renewable Energy Microfinance and Microenterprises programs*.
- Babasaheb, G. N. (2016). *The role of banking sector in development of rural area*.
- Bhattacharyya, S. C. (2013). *Financing energy access and Off-grid Electrification*. Leicester: OASYS SOUTH ASIA Research Project.
- BNR. (June, 2016). *Annual Financial Stability Report*. Kigali.
- Borg, & Gall. (1989). *Educational research*.
- Brew-Hammond. (2010). Energy Access in Africa. *Elsevier*, 7.
- Chijioke. (2016). Financing renewable energy projects for sustainable economic. *ELSEVIER*, 114.
- Fan, Z., & Ruohan, Z. (2017). Financial Inclusion, Entry Barriers, and Entrepreneurship. *Sustainability*.
- Germidis. (2010).
- IAE. (2017). *world Access Outlook report*.
- IEA. (2017). *Energy Access outlook*.
- Kaygusuz, K. (2010). Energy services and energy poverty for sustainable rural development. *ELSEVIER*, 1.
- Levaï, D., Paul, R., & Elisabeth, R. (September, 2011). *Microfinance and Energy Poverty*.
- Meyer, (. a. (2006). *Empowering rural communities through financial inclusions*. International Labor Office.
- Mininfra. (2015). *Energy Sector Strategic plan* .
- Murenzi, I. (2016). *Financial Inclusion in Rwanda 2016 by Fin Scope*. Kigali.
- Nachiamis, & Nachamis . (2012).
- Schlauffer, C. (2008). *InfoResource Focus*. Geneve.
- Singh, A. S., & Masuku, M. (2014). SAMPLING TECHNIQUES & DETERMINATION OF SAMPLE SIZE IN APPLIED STATISTICS RESEARCH. *International Journal of Economics, Commerce and Management*, 3.
- Snow, J. (2005). The race to own the world. *Expanding the role of Microfinance in Promoting Renewable Energy Access in Developing Countries*, p. 121.

Srinivas, H. (2018). *Microfinance -Credit Lending Models*. Kobe, Japan: Global development Research center.

Winiecki, J. (2010). Arc Finance.

APPENDICES

Appendix 1: Household 's Questionnaire.

o	Stage	Simplified general household data collection
1.0	Introduction	<p>Dear respondent,</p> <p>I am student carrying out research on “The effect of rural financial inclusions in scaling up clean modern energy in rural areas of Rwanda, A case of Eastern province in Rwanda” for my dissertation. Please kindly provide genuine answers for the following questions. Your answers will be accorded highest confidentiality.</p> <p>Start time <input style="width: 150px; height: 25px;" type="text"/></p> <p>Date <input style="width: 150px; height: 25px;" type="text"/></p>
1.1	Identification	<p>House number identification if applicable <input style="width: 60px; height: 25px;" type="text"/></p> <p>Name (Interviewee)/ Optional</p> <p><input style="width: 450px; height: 30px;" type="text"/></p> <p>Gender</p> <p>Male <input style="width: 30px; height: 20px;" type="checkbox"/></p> <p>Female <input style="width: 30px; height: 20px;" type="checkbox"/></p>

		<p>Address (Province/ District/ Sector/ Cell/ Village)</p> <div style="border: 1px solid black; height: 30px; width: 100%;"></div> <p>In which age group are you in? (Tick)</p> <p>15-19 <input type="checkbox"/> 19-24 <input type="checkbox"/> 25-29 <input type="checkbox"/> 30-34 <input type="checkbox"/></p> <p>35-39 <input type="checkbox"/> 40-44 <input type="checkbox"/> 45-49 <input type="checkbox"/></p>
1.2	Education	<p>What is your highest level of education?</p> <p>None <input type="checkbox"/></p> <p>Primary education <input type="checkbox"/></p> <p>High school <input type="checkbox"/></p> <p>College <input type="checkbox"/></p> <p>Masters <input type="checkbox"/></p> <p>PhD <input type="checkbox"/></p> <p>Others (Specify)</p>

		<div style="border: 1px solid black; width: 400px; height: 25px; margin: 0 auto;"></div>											
1.3	Economic Activity Characterization	<p>What is your family main activities?</p> <p><input type="checkbox"/> Professor, Doctor, priest or Government servants</p> <p><input type="checkbox"/> Agriculture</p> <p><input type="checkbox"/> Cattle rearing</p> <p><input type="checkbox"/> Building, woodcraft, Transport</p> <p><input type="checkbox"/> Small Enterprises/Business</p> <p>Others (Specify)</p> <p style="padding-left: 40px;">Others (Specify)</p> <div style="border: 1px solid black; width: 500px; height: 25px; margin-left: 20px;"></div>											
1.4	Income	<p>What is your mean Average monthly income</p> <p><input type="checkbox"/> Less than 20,000Rwf (\$ 30)</p> <p><input type="checkbox"/> Between 20,000 and 40,000Rwf (\$30 & \$60)</p> <p><input type="checkbox"/> Between 40,000 and 100,000Rwf (\$60 & \$150)/ Months</p> <p><input type="checkbox"/> Between 100,000 and 200,000Rwf/Months</p> <p><input type="checkbox"/> More than 200,000Rwf/ Months</p>											
	Social status	<p>What is your family's priority?</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">Criteria</td> <td style="width: 5%;">5</td> <td style="width: 5%;">4</td> <td style="width: 5%;">3</td> <td style="width: 5%;">2</td> <td style="width: 5%;">1</td> <td style="width: 5%;">2</td> <td style="width: 5%;">3</td> <td style="width: 5%;">4</td> <td style="width: 5%;">5</td> <td style="width: 10%;">Criteria</td> </tr> </table>	Criteria	5	4	3	2	1	2	3	4	5	Criteria
Criteria	5	4	3	2	1	2	3	4	5	Criteria			

		Food											Energy	
		education											Energy	
		Health care											Energy	
		<ol style="list-style-type: none"> 1. Equally Important 2. Moderate important 3. Strong important 4. Very strong important 5. Extreme important 												
2.2	Financial literacy & Participation	<ol style="list-style-type: none"> 1. Do you have a bank account? <table border="1" style="margin-left: 200px;"> <tr><td>Yes</td></tr> <tr><td>No</td></tr> </table> 2. How many microfinance institutions in your sector/ village <p>One <input type="checkbox"/></p> <p>Two <input type="checkbox"/></p> <p>Specify <input type="checkbox"/></p> <p>Have no idea <input type="checkbox"/></p> 3. Do you understand how microfinance/ bank works? 											Yes	No
Yes														
No														

		<p style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p> <p>4. Have you ever benefited from one?</p> <p style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p> <p>5. Does the range/variety of programs offered by the financial institution address your needs?</p> <p style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p> <p>6. Have you ever been trained on the bank operations?</p> <p style="text-align: center;"> <input type="checkbox"/> Yes <input type="checkbox"/> No </p> <p>7. Who are the most convenient customers of the microfinance?</p> <p>a. Everyone <input type="checkbox"/></p> <p>b. The rich people <input type="checkbox"/></p> <p>c. Poor people <input type="checkbox"/></p>
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d. Another category (Specify)

8. Is opening an account in the microfinance expensive?

Yes
No

9. People save or invest for different reasons. What are your (your family's) personal reasons to have made savings or investments?

- a) For unexpected expenses
- b) To increase my living standards in the future
- c) I like saving rather than spending money
- d) I have no answer

10. If you (your family) do/does not make savings, what is the reason?

- a) I don't trust financial institutions
- b) I cannot do this because of a low income
- c) I don't see the point in making savings
- d) I cannot resist the temptation to spend the money on shopping
- e) Ignorance

		<p>f) For another reason</p> <p>g) No answer</p>				
2.3	Available lending schemes	<p>1. Can the credit be of helpful to you?</p> <table border="1" data-bbox="704 485 834 642"> <tr><td>Yes</td></tr> <tr><td>No</td></tr> </table> <p>2. Do you know the procedures to secure a credit?</p> <table border="1" data-bbox="704 791 834 949"> <tr><td>Yes</td></tr> <tr><td>No</td></tr> </table> <p>3. Do you think everyone with a bank account can secure the credit within short period of time?</p> <p>✓ very easy to get <input data-bbox="1019 1226 1084 1276" type="checkbox"/></p> <p>✓ Easy to get <input data-bbox="1019 1281 1084 1331" type="checkbox"/></p> <p>✓ Difficult to get <input data-bbox="1019 1360 1084 1411" type="checkbox"/></p> <p>✓ Very difficult to get <input data-bbox="1019 1440 1084 1491" type="checkbox"/></p> <p>4. What is the primary requirement to earn credit from microfinance?</p> <p>✓ Only to have an account <input data-bbox="1211 1730 1276 1780" type="checkbox"/></p>	Yes	No	Yes	No
Yes						
No						
Yes						
No						

✓ To be an active customer

✓ To present a good collateral

✓ To present a viable project

✓ To have connection with manager

N.B. You can tick more than one option

5. Why do people shy away from demanding the credit from bank?

6.

✓ Big interest rate

✓ No collateral

✓ Ignorance

7. Does the credit from your microfinance offers flexible condition for repayment?

Very flexible	
Flexible	
Not flexible	

8. Is the interest rate affordable to everyone?

			Very affordable to everyone					
			Affordable to everyone					
			Not affordable to everyone					
		<p>9. Does the bank/ Microfinance offer variety of lending schemes to accommodate all customers category?</p> <table border="1"> <tr> <td>Yes</td> <td></td> </tr> <tr> <td>No</td> <td></td> </tr> </table>			Yes		No	
Yes								
No								

Appendix 2: Questionnaire for Social Enterprises

o	Stage	Simplified general social enterprises data collection
1.0	Introduction	<p>Dear respondent,</p> <p>I am student carrying out research on “The effect of rural financial inclusions in scaling up clean modern energy in rural areas of Rwanda, A case of Eastern province in Rwanda” for my dissertation. Please kindly provide genuine answers for the following questions. Your answers will be accorded highest confidentiality.</p> <p>Start time <input data-bbox="695 905 984 982" type="text"/></p> <p>Date <input data-bbox="613 1031 902 1108" type="text"/></p>
1.1	Identification	<p>House number identification if applicable <input data-bbox="1101 1304 1235 1381" type="text"/></p> <p>Name (Interviewee)/ Optional</p> <p><input data-bbox="581 1528 1357 1606" type="text"/></p> <p>Gender</p> <p>Male <input data-bbox="630 1713 690 1770" type="checkbox"/></p>

		<p>Female <input type="checkbox"/></p> <p>Address (Province/ District/ Sector/ Cell/ Village)</p> <p><input type="text"/></p> <p>In which age group are you in? (Tick)</p> <p>15-19 <input type="checkbox"/> 19-24 <input type="checkbox"/> 25-29 <input type="checkbox"/> 30-34 <input type="checkbox"/></p> <p>35-39 <input type="checkbox"/> 40-44 <input type="checkbox"/> 45-49 <input type="checkbox"/></p>
2.4.	Access to finance by social enterprises	<p>1. Do you have many business enterprises in your village involved in modern energy services or products?</p> <p>a) Yes</p> <p>b) No</p> <p>c) I don't know</p> <p>2. If yes is it easy to get a working capital?</p> <p>a) It is easy and faster</p> <p>b) It is easy but it takes time</p> <p>c) It is not easy at all</p> <p>d) I have no idea</p>

		<p>3. If no, what should be done to make it happen?</p> <ul style="list-style-type: none">a) Mobilize the financial institutionb) Government should help on thatc) Train people on how business is doned) We don't need a lot of social entrepreneurs <p>4. Does the environment here favors doing business?</p> <ul style="list-style-type: none">a) Yes, the conditions are favorableb) It is not easy to raise capital?c) I don't know <p>5. Where can someone who wants to do business gets the seed capital?</p> <ul style="list-style-type: none">a) Savings and credits cooperativesb) Commercial bankc) Borrow from family membersd) Borrow from Friendse) Non-government organization
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Appendix 4: Interview Guide for Mininfra

1. What are the most challenging issues that blocks the implementation of rural electrification policy?
2. How do you support local social enterprises working in modern energy services or products?
3. Does standalone solar home system meet the needs of rural communities? Is it the best solution or it is the short-term solution?

Appendix 5: Interview Guide for BBoxx

1. Is rural electrification in Rwanda a bankable project that can attract foreign investments?
2. What are the main challenges that you face in the process of electrifying underserved communities?
3. Have you encountered the issues of customers withdrawing/ defaulting from subscription before the end of contract?
4. On your opinion and experience, what should come first between, provision of energy/ electricity and economic empowerment?
5. Your potential customers are found on the bottom of the pyramid, how easy or hard is it to turn them into permanent and stable clients?
6. Have you received any incentives or financial support from local or national governments?
7. Do you have any need for specific policies to be implemented in order to facilitate the scale up of modern energy?
8. What are the regulatory barriers that you are currently facing that need to be removed or fixed?
9. How do you see the demand for modern and clean energy changing for the last 3 years?

Appendix 6: Interview Guide for SACCO

1. How do you see the potential of financial institutions in providing access to modern energy to underserved people?
2. How do you improve the financial literacy of underserved population who are your potential customers?
3. From your experience and opinions what blocks rural communities from fully participating in financial institutions?
4. What will be the main criteria for the beneficiaries of the energy project services? Will you extend this opportunity to non-member customers?
5. On your opinion what should come first between, provision of energy/ Electricity and economic empowerment to the underprivileged people to sustainably alleviate the poverty?
6. What do you see as the core task that needs to be taken with a maximum attention within the entire process?
7. Do you have flexible loan that can accommodate all your customers to acquire modern energy?
8. Does your customer trust this institution?

Appendix 7: Work Plan & Timeline

YEAR	2017		2018								
Months											
Activities	November	December	January	February	March	April	May	June	July	August	September
Writing Topic proposal, & Literature review											
Submission of proposal for approval											
Internship & Internship Reports,											
Developing questionnaires, Interview formats											
Data Collection & Data entry into the computer											
Data Analysis											
Final Compilation of the results and submission											
Defense											

Research Grant Financial Statement Report

Reference was made from research grant proposal budget made on 26th February, that was later approved and signed on 05th march pledging to honor the agreement. The total amount of 2999.48USD was received that is in line with the submitted budget. Therefore, based on the law no 55/2007 of 30/11/2007, governing the central bank of Rwanda (BNR), assigning BNR, the responsibility of formulating monetary policy, the Rwandan francs (Frw), in addition, following monetary rules and regulations, in Algeria, governing the use of foreign currency inside of the country. The research grant was exchanged into FRW and DZD currencies, on the following exchange rate.

1 USD equivalent to 850frw, on 19th march, (Access bank Rwanda, 2018)

1 USD equivalent to 106 DZD, on 12th March, (Société Generale Algeria, 2018)

USD currency	Exchange Rate	Equivalent Local Currency	Location
1,088.679	106 DZD	115,399.974	Algeria
1,910.801	850 FRW	1,624,180.85	Rwanda

RESEARCH BUDGET						
STATIONERY	ITEM	ITEM DESCRIPTION	QUANTITY	DESCRIPTION	Rwandan Currency(RWF)	USD= RWF/850
	Photocopying Services	Pages	3051		85	259,335
	Pens	Pieces	12		200	2,400
	Pencils	Pieces	12		95	1,140
	Rubbers	Pieces	6		120	720
	Rulers	Pieces	6		200	1,200
	Notebooks	Pieces	12		300	3,600
	Spiral Binding		6		2,000	12,000
	Book Binding		6		10,000	60,000
	Markers	Pieces	12		300	3,600
	Laptop	Pieces	1	Personal Charge		
	Internet & Communication	Router		Personal Charges		
		Monthly Subscription				
		Communication Fees				
	Accommodation	Rent During Internship period	2 Months	Personal Charge		
	Stationery Total					343,995
						404.7
TRAVEL CHARGES	Flight ticket					
	Local transport charges	Tlemcen_ Algiers & vice versa	Private Tax, To and From		20,564 DZD	194
	Airline Ticket to Rwanda	Return ticket	1 Ticket		95026 DZD	894.47
	Local transport charges					
	Renting a car for transport	Data Collection period/ 15 questionnaire per day	18 Days		40,000/ Day	720,000
	Total for Travel Charges					1,935.53
LABOR/ REMUNERATIONS						
	Data Analysis Training Fees	person	1		200,000	200,000
	Data Entry	Entering Data in SPSS	3 Person in 4 Days of entering data into SPSS		30,000 per day	360,000
	Total for Labor / Remunerations		560,000			658.8235294
	GRAND TOTAL					2,999.05

