International Journal of Economics, Commerce and Management
United Kingdom Vol. III, Issue 10, October 2015
http://ijecm.co.uk/ ISSN 2348 0386

THE EFFECT OF SOLAR ENERGY PROJECT ON SOCIO ECONOMIC GROWTH OF RURAL AREA IN RWANDA

A CASE OF RESULT BASED FINANCING PROJECT OF GIZ IMPLEMENTED BY URWEGO OPPORTUNITY BANK

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Abstract

The study set out to investigate the effect of solar energy project on socio-economic growth of rural area in Rwanda a case study of result based financing Project of GIZ implemented by Urwego Opportunity Bank. The general objective of this project is to promote the investment in renewable energy in Rwanda rural areas for development .Currently in the rural areas there is a lack of electricity and due to this problem there is no development in those areas. Both quantitative and qualitative methodology was used. Primary data was collected from a field survey. Secondary data was collected from different related reports and other official document. To achieve the set objectives a total of 100 people involved in renewable energy projects was sampled using purposive and simple random sampling methods. Questionnaires and observation methods was used in the process of gathering information from the field. Data collected by use of questionnaire instruments and observation was computed and analyzed SPSS (version 22). As conclusion, depending on the role of solar energy and its relationship to

the growth of Gatsibo district, it is concluded that there is a significant effect of Solar Energy Project on the Growth of Rural Area in Rwanda especially in Gatsibo District in spite of few challenges like storing power, costs of the solar panel and theft of the panels.

Keywords: Solar Energy, Socio-Economic Growth, Rural Area, Energy Project

INTRODUCTION

Renewable energy is generally defined as energy that comes from resources which are naturally replenished on a human timescale such as sunlight, wind, rain, tides, waves and geothermal heat. (Omar Ellabban, Haitham Abu-Rub, Frede Blaabjerg, 2014).Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services (Global report 2010).

During the last two decades, Rwanda has experienced an energy crisis mostly due to lack of investment in the energy sector. With the growing of the population and increasing industrialization in urban areas, energy provided by existing hydro and thermal power plants has been increasingly becoming scarce with high energy costs, and energy instability. Furthermore, as wood fuel is the most important source of energy in Rwanda, the enduring dependence on it and fossil fuel consumption as well, will continue to impact on the process of environmental degradation (Larence, 2010).

Until 2004, Rwanda depended on a single energy source – hydropower – whose limited capacity relied on a dilapidated network with technical and commercial losses of around 30%, much of which is attributed to the lack of investment in the sector for the last 25 years. In recent years (2004-2006), Rwanda has suffered from acute electricity supply shortage and severe load shedding. Its installed generation capacity (mostly hydropower), has been severely constrained by regional drought leading to a rapid draw down of the reservoirs. In late 2004, the Government was forced to make a difficult choice: better expensive energy than none (GTZ report 2007).

Diesel generators were rented from private companies at a high cost and this in addition to high fuel costs increased tariffs by over 100% to about US$ 0.22/kWh. Average retail tariffs in the rest of the region are around US$ 0.10-0.12/kWh. In order to realize its ambition of becoming a middle-income country, Rwanda will require strong, sustained economic growth with an average of 8-9% annual GDP growth (GTZ report 2007).

To succeed in this move, the Government of Rwanda together with the private sector would endeavour to scale up the energy production and distribution so as to make the energy

sector competitive in the sub-region. The Government of Rwanda is exploring mechanisms to improve modern energy services in rural areas, by implementing the Second Generation Poverty Reduction Strategy Program (EDPRS). The program focuses on promising options for rural energy supply, such as solar energy, wind energy and extension of the grid to rural areas (GTZ report 2007).

Rwanda currently has about 97 MW installed generating capacity (57 MW hydro and 40 MW diesel out of which, however, only 87 MW are available). A number of new sources are supposed to come on line within the coming years adding a capacity of 232 MW by 2013. Energy is needed for basic human needs: for cooking, heating, lighting, boiling water and for other household-based activities. Energy is also required to sustain and expand economic processes like agriculture, electricity production, industries, services and transport.

Fossil energy resources are limited and fossil energy use is associated with a number of negative environmental effects, therefore energy has become a major geo-political and socio-economic issue (GTZ report 2007).

Energy is also needed to provide adequate health care and education (e.g. clinic and school electrification), and to facilitate adequate water supply and sanitation to populations where only the minority have access to these services.

These are central to the MDGs. Energy also has a role in supporting agricultural productivity (e.g. irrigation pumping or mechanization), as well as powering the transport that enables people to participate in the economy more fully (GTZ report 2007)

From the end of 2004, worldwide renewable energy capacity grew at rates of 10–60% annually for many technologies. For wind power and many other renewable technologies, growth accelerated in 2009 relative to the previous four years (Renewable global status report, 2010). More wind power capacity was added during 2009 than any other renewable technology. However, grid-connected PV increased the fastest of all renewables technologies, with a 60% annual average growth rate. In 2010, renewable power constituted about a third of the newly built power generation capacities (Bloomberg, 2011). Projections vary, but scientists have advanced a plan to power 100% of the world's energy with wind, hydroelectric, and solar power by the year 2030 (Jacob; Mark Z; Deluchi , 2009).

According to a 2011 projection by the International Energy Agency, solar power generators may produce most of the world's electricity within 50 years, reducing the emissions of greenhouse gases that harm the environment. Cedric Philibert, senior analyst in the renewable energy division at the IEA said: "Photovoltaic and solar-thermal plants may meet most of the world's demand for electricity by 2060 – and half of all energy needs – with wind,

hydropower and biomass plants supplying much of the remaining generation". "Photovoltaic and concentrated solar power together can become the major source of electricity", Philibert said.

The developing nations of Africa are popular locations for the application of renewable energy technology. Currently, many nations already have small-scale solar, wind, and geothermal devices in operation providing energy to urban and rural populations. These types of energy production are especially useful in remote locations because of the excessive cost of transporting electricity from large-scale power plants. The application of renewable energy technology has the potential to alleviate many of the problems that face Africans every day, especially if done so in a sustainable manner that prioritizes human rights. Access to energy is essential for the reduction of poverty and promotion of economic growth. Communication technologies, education, industrialization, agricultural improvement and expansion of municipal water systems all require abundant, reliable, and cost-effective energy access (Human Development report 2001).

The Results-Based Financing (RBF) programme promotes private investment in the energy sector for off-grid electrification in rural areas. The RBF fund supports the sale of small solar systems (pico PV) and village grids connected to renewable energy sources. The RBF Programme in Rwanda is financed by DfID and implemented by Urwego Opportunity Bank on behalf of GIZ/Energising Development.

Urwego Opportunity Bank was created in 2007 to provide loans, savings, training, micro-insurance and other financial services to individuals living and working at the base of Rwanda's economic pyramid. In Kinyarwanda "Urwego" means "a ladder". It is a symbolic name given with a meaning that the local poor may start from the lower level of financial scarcity to a higher hierarchy of satisfying human needs. Urwego Opportunity Bnak is a regulated commercial bank owned by four Christian non-profit organizations that are the shareholders, namely Opportunity International Inc., World Relief, Hope International and World Relief Canada. Their main intention is to assist the poor by offering assistance in an effort to free them from poverty.

Statement of the Problem

Electricity shortage has necessitated regular load shedding. Load shedding is when power distribution companies switch off electricity supply to some clients. Frequent power shortage has resulted in individuals, manufacturing entities and firms purchasing their own generators. This has led to an increase in production costs of industry, a subsequent increase in consumer goods and increased emissions to the environment. Power shortages have also led to a 250 per cent increase in power prices – from 48 to 120 Rwf per unit of power (UNDP 2007). At the times of this energy crisis, there was also a shortage of charcoal. Most of the shortage is caused by

deforestation due to exploitation of forests for biomass energy. Rwanda has considerable opportunities for energy development comprising from hydro sources, methane gas, solar and peat deposits. Untapped resources for power generation amount to about 1,200 MW. Most of these energy sources have not been fully exploited. As such, wood is still the major source of energy for 94 per cent of the population and imported petroleum products consume more than 40 per cent of foreign exchange (MININFRA 2009a). Energy is a key component of the economy. It is thus recognized that the current inadequate and expensive energy supply constitutes a limiting factor to sustainable development. Rwanda's Vision 2020 emphasizes the need for economic growth, private investment and economic transformation supported by a reliable and affordable energy supply as a key factor for the development process (MININFRA 2009a). To achieve this transformation, the country will need to increase energy production and diversify into alternative energy sources. In order to promote the Rwanda's Vision 2020, the government of Rwanda has partnered with regional and neighboring countries, nongovernmental organization and other partners in order to provide electricity to the rural population in Rwanda. In spite of the above effort made by the government to provide electricity to the rural people, the level of economic growth still remains low in the country especially in the rural areas hindering their economic growth.

Therefore, the researcher would like to investigate the effect of solar energy project on the growth of rural area in Gatsibo District, Rwanda.

RESEARCH METHODOLOGY

General Objective

To examine the effects of solar energy project on socio-economic growth of rural area in Rwanda.

Specific Objectives

1. To identify the role of Solar energy project on soci-economic growth of communities in Gatsibo District
2. To asses community standard of living before solar energy project in Gatsibo District
3. To examine the effects of Solar Energy project on socio-economic growth of communities in Gatsibo District
4. To examine the challenges of using solar renewable energy in Gatsibo District

Research Questions

1. Why was solar energy project introduced in Gatsibo District?

2. How was your family standard of living before solar energy project in Gatsibo District
3. What was the effects of solar energy project in socio-economic growth of communities in Gatsibo District
4. What are the challenges of using renewable energy in Gatsibo District?

Research Design

Both qualitative and quantitative methodologies of research design were used whereby the quantitative was applicable to quantify the number of people accessing solar energy in Kiramuruzi and Murambi sectors of Gatsibo District offered by renewable energy project while qualitative approach was used to assess their attitude and perception towards these services. The use of both methodologies also ensured that the data was effectively interpreted using the numbers, figures as well as the narrative.

The study also used a case study research design specifically the case of the people living in rural areas and has been able to access the renewable energy. In the case study, the researcher took time to understand better the problem or area of study in preliminary way and relate the variables of the study. This approach often relies on direct research of a limited number of respondents of what is to be studied. The study will be important in that it is useful in describing the characteristics of a large population.

Target Population

The target population of this study was a total number of 100 people who have access to solar energy financed by UOB in partnership with GTZ. Those people have been benefitting from renewable energy for one year and live in Kiramuruzi and Murambi sectors of Gatsibo District. They were selected because they were well informed and know pretty much about those activities so that they can respond better to the researcher's questionnaires.

Sampling Design

The Snowball sampling was also used by the researcher as a tool of purposive sampling. According to Lewis (2000), the "Snowball sampling" technique was used because this technique was actually helpful when the researcher does not have a place where he/she can easily recruit people or when working with respondents who are hard to find in the field. And the main advantage of this technique is that a researcher can get referrals to potential participants that he/she would otherwise not be able to find. Therefore, the sample size of 100 respondents was used.

Data Collection

The researcher used questionnaire and interview methods to collect the primary data. Kothari (2008) defines a questionnaire as that consisting of a number of questions printed or typed in a definite order on a form or set of forms. Closed ended and open ended questionnaires were administered to the study respondents.

The researcher used questionnaires because of its low cost since the population was big. The questionnaire was also free from biasness and the respondents have adequate time to give well thought out answers, large samples can be made use of, the results can be made more dependable and reliable (Kothari, 2008).

A questionnaire is commonly used to obtain data about population, since each item is developed to address a specific objective of the study. Interview is a method of collecting data that involves presentation of oral verbal stimuli and reply in terms of oral verbal responses (Kothari, 2008).

Secondary data was also obtained using internal and external sources such as reports, documentation, books, magazines, Internet, journals on renewable energy project. Data collection procedures include the activity of gathering facts or information about a subject under the research study (Kothari, 2008). After formulating research instruments and sampling the respondents, the researcher informed respondents about the research and its intentions.

Data Analysis Approach

After data collection in the field, the researcher evaluated the worth of the data through processing, analysis and presentation in a more organized and systematic way. The triangulation of the findings on qualitative and quantitative data was applied to arrive at logical conclusions about the results. Quantitative data was entered into appropriate analysis program, preferably Statistical Package for Social Sciences (SPSS) from which further analysis was done using proportions (percentages), rates and descriptive statistics. Descriptive statistics was used to estimate the mean and standard deviations/confidence level of certain variables to ascertain how close or wider the sample statistics are spread from the mean. Cross tabulation was done to ascertain the correlation between the dependent and independent variables. Quantitative data was presented in tables, charts, graphs or narratives.

Qualitative data was entered into a compilation sheet from which themes was identified. Each theme was transferred into a master sheet from which the analysis was done in relation to objectives of this study. Qualitative data was presented in form of narratives with verbatim reporting so that some strong views of respondents could be reported as they are.

EMPIRICAL FINDINGS AND DISCUSSION

Roles of Solar Energy on socio-economic Growth of Gatsibo district

Assessing the Role of Solar Energy on socio-economic Growth of Gatsibo district

Table 1 shows the responses of the respondents on the role of Solar Energy on socio-economic Growth of Gatsibo.

Table 1: Role of Solar Energy on socio-economic Growth of Gatsibo

Role of Solar Energy in Growth of Gatsibo	Mean	Std. Deviation	Comments
To promote business by providing cheap lighting system	4.8500	.35887	Very strong homogeneity
To promote education by providing lighting system for studies	4.8700	.33800	Very strong homogeneity
To promote health by reducing on pollution	4.7600	.62150	Very strong heterogeneity
To promote environment by stopping a deforestation	4.8300	.37753	Very strong homogeneity
To promote agriculture by providing energy for processing the product	4.7800	.52378	Very strong heterogeneity
To promote security by providing lighting system	4.8000	.40202	Very strong homogeneity
Valid N (list wise)	100		

Table 1 shows role of Solar Energy in Growth of Gatsibo District the following findings were generated-

To promote business by providing cheap lighting system: The respondents view was reflected by a very strong mean of 4.8500 and homogeneity standard deviation of .35887. This implies that solar energy was introduced to promote business by providing cheap lighting system in the district.

To promote education by providing lighting system for studies: The respondents view was reflected by a very strong mean of 4.8700 and homogeneity standard deviation of .33800. This implies that solar energy was introduced to promote education by providing lighting system for studies.

To promote health by reducing on pollution: The respondents view was reflected by a very strong mean of 4.7600 and heterogeneity standard deviation of .62150. This implies that to a large extent solar energy was introduced to promote health by reducing on pollution in the district.

To protect the environment by stopping deforestation: The respondents view was reflected by a very strong mean of 4.8300 and homogeneity standard deviation of .37753. This

implies that to a large extent solar energy introduced to protect the environment against deforestation in the district which was due to increased firewood usage.

To promote agriculture by providing energy for processing the product: The respondents view was reflected by a very strong mean of 4.7800 and heterogeneity standard deviation of .52378 agreed that solar energy promotes agriculture. This implies that in solar energy was introduced to promote agriculture sector in processing the products for example milk processing and preservation of other perishables food stuffs.

Lastly to promote security by providing lighting system: The respondents view was reflected by a very strong mean of 4.8000 and homogeneity standard deviation of .40202 agreed that solar energy promotes security. This implies that solar energy was introduced to promote security in order to overcome some security issues at night. We can therefore conclude that solar energy plays a great role to the growth and development of Gatsibo district as the findings above analyzes in details.

Growth Levels in Gatsibo District before Solar Energy

Performance of Students at School Before Solar Energy

Table 2 indicates respondent's views on performance of students in school before introduction of Solar Energy.

Table 2: Performance of Students at School Before Solar Energy

Performance of Kids at school before solar energy	Frequency	Percent	Valid Percent	Cumulative Percent
Very Good	4	4.0	4.0	4.0
Good	14	14.0	14.0	18.0
Fair	59	59.0	59.0	77.0
Poor	23	23.0	23.0	100.0
Total	100	100.0	100.0	

The result shows that, 59% of the respondents agreed that the performance of students was fair, 23% bad; 18% good and 4% very good. This implies that to a large extent performance of students before solar energy in rural areas in Rwanda especially in Gatsibo was bad as agreed by the majority response.

Electricity Cost before Solar Energy

Table 3 shows respondent's views on cost of electricity in the district before solar energy was introduced in the district and the findings are presented in table 3

Table 3: Electricity Cost before Solar Energy

Electricity cost before solar energy	Frequency	Percent	Valid Percent	Cumulative Percent
Very high	18	18.0	18.0	18.0
High	65	65.0	65.0	83.0
Fair	14	14.0	14.0	97.0
Low	3	3.0	3.0	100.0
Total	100	100.0	100.0	

Table 3 shows that, 83% of the respondents said the cost of electricity before solar energy was high, 14% fair and 3% low. This implies that the cost of electricity before solar energy was high in the district as agreed by the majority of the respondents above.

Types of Energy used before Solar Energy

Table 4 shows various forms of energy used before solar energy was introduced.

Table 4: Types of Energy used before Solar Energy Introduction

Energy used before solar energy	Frequency	Percent	Valid Percent	Cumulative Percent
Hydro	10	10.0	10.0	10.0
Firewood	57	57.0	57.0	67.0
Wind energy	14	14.0	14.0	81.0
Geothermal	10	10.0	10.0	91.0
Biogas	9	9.0	9.0	100.0
Total	100	100.0	100.0	

Table 4 shows that, 57% of the respondents were using firewood, 14% wind energy, 10% hydro, 10% geothermal and 9% were using biogas. This implies that before solar energy they were using various types of energy with firewood being used by the majority.

Firewood usage before Solar Energy

Table 5 shows firewood usage before solar energy.

Table 5: Firewood usage before Solar Energy

Firewood usage before solar energy	Frequency	Percent	Valid Percent	Cumulative Percent
Very high	86	86.0	86.0	86.0
High	14	14.0	14.0	100.0
Total	100	100.0	100.0	

Table 5 shows that all the respondents agreed that firewood usage before solar energy were high. This implies that firewood usage in the district was high which had a great impact to the environment inform of deforestation and air pollution.

Riskiness of Firewood usage to People's Health

Table 6 shows riskiness of firewood usage to the health of the people in the district.

Table 6: Riskiness of Firewood usage to People's Health

Risky of firewood to health	Frequency	Percent	Valid Percent	Cumulative Percent
Very risky	66	66.0	66.0	66.0
Risky	28	28.0	28.0	94.0
Not risk	6	6.0	6.0	100.0
Total	100	100.0	100.0	

Table 6 shows that, 94% of the respondents said firewood was risky to their health and 6% disagreed. This implies that firewood usage was very risky to their health in various ways before introduction of solar energy in the district.

Lighting System in the House before Solar Energy

Table 7 shows respondents views on the lighting system in their houses before solar energy

Table 7: Lighting System in the House before Solar Energy

Lighting System	Frequency	Percent	Valid Percent	Cumulative Percent
Very good	3	3.0	3.0	3.0
Good	3	3.0	3.0	6.0
Bad	26	26.0	26.0	32.0
Very bad	68	68.0	68.0	100.0
Total	100	100.0	100.0	

Table 7 shows the Lighting system in the house before solar energy and the findings shows that 94% of the respondents said lighting system was bad and 6% said good. This implies that to a large extent the lighting system in their houses or for security purpose was bad.

Relationship between Solar Energy and Socio-Economic Growth of Gatsibo

Table 8 indicates the Relationship between Solar Energy and Growth of Gatsibo District

Table 8: Relationship between Solar Energy and Socio-Economic Growth of Gatsibo

Relationship between solar energy and growth of GATSIBO	Mean	Std. Deviation	Comments
Solar energy has improved education in Gatsibo district by improving lighting system for reading	4.7300	.46829	Very strong heterogeneity
Solar energy has improved health in Gatsibo district by reducing on air pollution	4.7100	.51825	Very strong heterogeneity
Solar energy has improved business in Gatsibo district by reducing on cost of energy	4.6900	.48607	Very strong homogeneity
Solar energy has improved on environment by reducing on air pollution and deforestation	4.7400	.44084	Very strong homogeneity
Solar energy has improved on agriculture productivity by making of agricultural products easier	4.6500	.51981	Very strong heterogeneity
Solar energy has improved on communication system by making charging of phones easier and cheaper	4.6500	.64157	Very strong heterogeneity
Solar energy has improved on security by improving lighting system	4.7300	.44620	Very strong homogeneity
Valid N (list wise)	100		

Table 8 indicates the Relationship between solar energy and the growth of GATSIBO District and the following findings were generated-

Solar energy has improved education in Gatsibo by improving lighting system for reading: The respondents view was reflected by a very strong mean of 4.7300 and heterogeneity standard deviation of .46829. This implies that in Gatsibo district solar energy has improved on education by providing lighting system for reading, where by student's studies at night without any interference of power fluctuations.

Solar energy has improved health in Gatsibo district by reducing on air pollution: The respondents view was reflected by a very strong mean of 4.7100 and heterogeneity standard deviation of .51825. This implies that solar energy has improved health in Gatsibo district by reducing on air pollution. This can be supported by the fact that wood energy produce smoke which can be harmful to one's life.

Solar energy has improved business in Gatsibo district by reducing on cost of energy: The respondents view was reflected by a very strong mean of 4.6900 and homogeneity standard deviation of .48607. This implies that solar energy improves on people's business in Gatsibo district by reducing on cost of energy which means that solar energy has an impact on the growth of Gatsibo District.

Solar energy has improved on environment by reducing on air pollution and deforestation: The respondents view was reflected by a very strong mean of 4.7400 and homogeneity standard deviation of .44084. This implies that to a large extent solar energy protects the environment by stopping deforestation, since the introduction of solar energy

reduced on firewood usage as some people would use solar energy for cooking other than wood.

Solar energy has improved on agriculture productivity by making processing and preservations of agricultural products easier: The respondents view was reflected by a very strong mean of 4.6500 and heterogeneity standard deviation of .51981. This implies that solar energy promotes agriculture sector in processing the products for example milk processing and preservation of other agricultural products from getting perished very fast.

Solar energy has improved on domestic work by making cooking easier: The respondents view was reflected by a very strong mean of 4.6500 and heterogeneity standard deviation of .64157. This implies that solar energy improves on domestic work by making cooking easier than starting to spilt fire wood with an axe and making fire to start cooking.

Solar energy has improved on communication system by making charging of phones easier and cheaper: The respondents view was reflected by a very strong mean of 4.7100 and heterogeneity standard deviation of .51825. This implies that the use of solar energy in Gatsibo District has improved the communication system by making charging of phones easier and cheaper. This was justified that charging phone was difficult especially to people living in the village where there is no hydro power

Solar energy has improved on security by improving lighting system: The respondents view was reflected by a very strong mean of 4.7300 and homogeneity standard deviation of .44620. This implies that the use of solar energy in Gatsibo district has improved on the security by providing lighting system. In conclusion therefore, we can say solar energy in Gatsibo district has contributed positively to the development of the district as the findings above suggested.

Relationship between Solar Energy and Socio-Economic Growth

The table 9 below is indicating the Relationship between Pay Policy System and Motivation of the employees in higher institute of learning

Table 9: Relationship between Solar Energy and Socio-Economic Growth

		Solar Energy	Growth of Rural Areas
Solar Energy	Pearson Correlation	1	.983**
	Sig. (2-tailed)		.000
	N	44	44
Growth of Rural Areas	Pearson Correlation	.983**	1
	Sig. (2-tailed)	.000	
	N	44	44

****. Correlation is significant at the 0.01 level (2-tailed)**

The table 9 is giving the relationship between Solar Energy and Growth of Rural Areas whereby the respondents N is 100 and the significant level is 0.01, the results indicate that Solar Energy has positive high relationship to Growth of Rural Areas equal to .983**and the p-value is .000 which is less than 0.01and when p-value is less than significant level, therefore researcher conclude that variables are correlated. This means that there is a significant relationship between Solar Energy and Growth of Rural Areas in Rwanda. As conclusion Pay Solar Energy has positive effects on Growth of Rural Areas in Rwanda.

Solar Energy Challenges Facing People of Gatsibo District

Assessing Solar Energy Challenges Facing People of Gatsibo District

The table 10 below indicates the challenges faced by people of Gatsibo district as a result of using solar energy.

Table 10: Solar Energy Challenges Facing People of Gatsibo District

Challenges	Frequency	Percent	Valid Percent	Cumulative Percent
Storing Energy	25	25.0	25.0	25.0
Cost (expensive)	41	41.0	37.0	62.0
Theft	34	34.0	38.0	100.0
Total	100	100.0	100.0	

Table 10 determines the challenges facing people of Gatsibo district in using solar energy system, 25% of the respondents said they find it difficult in storing energy especially during rainy season, 41% said its costly (expensive) and 34% said theft. This implies that solar energy is faced with number of challenges which needs to be addressed if it is to operate effectively.

Solutions to the above Mentioned Challenges

The table 11 below shows the proposed solutions to the challenges facing people of Gatsibo district in using solar energy

Table 11: Solutions to The Challenges of Using Solar Energy

Solutions to the challenges	Frequency	Percent	Valid Percent	Cumulative Percent
Innovation and development of storing energy	26	26.0	26.0	26.0
Competitive costs	40	40.0	40.0	66.0
Government Support	34	34.0	34.0	100.0
Total	100	100.0	100.0	

From table 11, 26% of the respondents proposed that innovation and development of storing energy should be taken into consideration in order to promote the efficiently store energy generated during the day for use in homes at night, 40% proposed competitive costs meaning that the companies should offer the competitive prices for their products and services and 34% proposed that the government should give support in terms of encouragement and assistance financial services to the project.

CONCLUSION

The research has revealed that solar energy plays a great role in promoting the growth of rural areas among other electricity projects because it supports business by providing cheap lighting system, promoting education system by providing cheap lighting system for studies, promote health by reducing on pollution from firewood smoke, promote environment policy by stopping a deforestation since firewood usage is reduced, promote agriculture by providing energy for processing the product and promoting security by providing lighting system. This research indicated that solar energy has improved education, health, business, environment, agriculture productivity and many other benefits to the community. As conclusion, depending on the role of solar energy and its relationship to the growth of Gatsibo district- Ghana, it is concluded that there is a significant effect of Solar Energy Project on the Growth of Rural Area in Rwanda especially in Gatsibo District, as witnessed in table 4.14 is giving the relationship between Solar Energy and Growth of Rural Areas whereby the respondents N is 100 and the significant level is 0.01, the results indicate that Solar Energy has positive high relationship to Growth of Rural Areas equal to .983**and the p-value is .000 which is less than 0.01and when p-value is less than significant level, therefore researcher conclude that variables are correlated.

RECOMMENDATIONS

The research has indicated that Solar Energy Project has a significant effect on the growth of Rural Area in Rwanda especially in Gatsibo District, Ghana. However some weaknesses were found and the recommendations were given to Gatsibo District.

The research has indicated that respondents are challenged with storing energy. As recommendation, innovation and development of store energy should be taken into consideration in order to promote the efficiently power storage generated during the day for use in homes at night because the solar energy are produced within the day.

The research has indicated that buying and installing solar energy equipment is costly (expensive). Consequently, companies should offer the competitive prices for their products and services in order to facilitate the solar energy in Gatsibo district.

Security of solar panels should be improved on. This can be done by registering all the panels in order to avoid its movement in case of theft and government should improve citizen security in general.

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