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The Impact of Renewable Energy Use on Socio-Economic Growth of Local Community in Rwanda: A Case of Rusizi District (2020-2024)

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Abstract

Despite efforts in sustainable development and energy access, 40% of Rusizi's remote residents lack electricity, limiting education, healthcare, and businesses, while non-renewable energy harms health, environment, and growth. The research thesis entitled "Impact of renewable energy use on socio-economic growth of local community in Rwanda with the case of Rusizi district. This research aimed at identifying the types of renewable energy used in Rusizi district, assessing the socio-economic status of the local community in Rusizi district, examining the impact of renewable Energy use on socio-economic growth of communities in Rusizi district and analyzing the challenges of associated with the use of using renewable energy in Rusizi district. The targeted population in this research were 76,514 people from two sectors: Kamembe and Gihundwe, from which a sample of 398 people were selected using the simple random sampling method. In addition, 16 local leaders were selected using the purposive sampling method. The data were collected from sampled local community members by using a questionnaire while a face-to-face interview was administered to the local leaders. The data was completed by data from observation as well as documentation review. The data obtained were analyzed and processed through the use of tables graphs and charts. After using renewable energy, the results have shown that 97% of respondents are insured and these with difficulties of having health insurance are equivalent to 3.0%. The local community members got school fees for their children and themselves after using renewable energy. The result showed that there were changes after getting credits from 3.8% to 8.4% who can afford tertiary education and from19.2% to 25.5% who can pay school fees in secondary schools. The research recommends Rusizi District to enhance access to renewable energy equipment, support investors with easier loan processes, and address poverty, which remains a major challenge hindering the local community from benefiting fully from sustainable energy and development initiatives.

Keywords: *Renewable Energy, Socio-economic Growth, Local Community, Rusizi District, Rwanda.*

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1. Introduction

The energy sector is a major source of greenhouse gases emissions, and electricity is inextricably linked to a country's broader economic activity (Irena, 2020). Energy has a direct impact on the economy via the production of energy goods and services and jobs created for the extraction, transformation, and distribution of energy. Energy also has an indirect impact as an input for most of all other goods and services produced, underpinning economic activity across sectors. Thus, impacts on the energy sector can have ripple effects throughout the economy, making renewable energy development an opportunity to potentially meet energy demands. Diversify energy sources, and spur economic growth while decreasing GHG emissions (Karekezi S & Kithyoma W, 2003)

Given the link between energy and the economy, and trends toward a renewable energy transition, the impact of renewable energy on the economy is of particular interest. Although many countries are relatively early in their energy transition efforts, limiting the extent to which the effects of the renewable energy transition and related policies can be analyzed, the hope is that increased renewable energy production supports the advancement of sustainable economic development goals (SEDS, 2023).

In Africa, only 20 per cent of the total installed electricity generation capacity in Africa in 2019 was based on renewable sources (Irena, 2020b). While hydropower still accounts for the largest share of installed renewable energy capacity in Africa, its relative share has declined from 92 per cent in 2010 to 67 per cent today as other renewable technologies have become more competitive. Without significant, reasonable investments in refurbishing existing hydropower plants, this share decline will only accelerate. An additional 1,980 MW of new renewable energy capacity was added in Africa in 2019, increasing the installed capacity by 3.3 per cent over the previous year (Irena, 2020b).

Many countries across Africa including Morocco, Senegal, Egypt, South Africa and Kenya are demonstrating encouraging trends in terms of adding new renewable energy capacity. Southern Africa is leading the continent in terms of installed renewable capacity, with 19,000 MW(Akinwale, 2022). In relative terms, however, Central Africa has the highest share of renewables installed with 72 per cent, mainly from hydropower. Africa arguably has the largest renewable energy resources of any continent. Sunlight is abundantly available everywhere, while other types of resources are more plentiful in some countries and regions than in others such as geothermal along the Rift Valley in East Africa, or wind power in the Horn of Africa and various coastal areas (Yildirim, 2012).

In Rwanda, the application of renewable energies contributes to global warming prevention and as a matter of fact, photovoltaic systems have been increasingly developed in recent years due to the global benefit of natural resources conservation. It is also evident that fossil fuel-based energy sources will be depleted over time since they are finite and consequently, they have been proven to contribute to global climate change. To protect our environment and increase electricity access in remote areas, green and clean energy alternatives like solar energy, absorbed by photovoltaic systems, can be of great importance.

In Rwanda, there is a serious problem of electricity access especially in rural areas, this is very crucial in affecting the sustainable development of the country. The current situation shows that the grid connected is estimated to be around 23%, whereby rural villages that are connected to the national grid accounts for only 5% and in addition, statistics show that 85% of Rwandan population live in rural areas while only 15% accounts for urban citizens. (Infrastructure., 2020) The most common activity observed in these areas is farming for

food provision and other life basic needs security. For the case of Rwanda with many populations in rural areas, there is a challenge of energy extension and development in other economic sectors. The topology of the electric grid in Rwanda is another important aspect.

There is presently insufficient electrical power to compensate for Review Only electricity demand in Rwanda, most of the power produced from different power plants are distributed to urban areas and business centers. The power supply is done using single lines because the transmission network is very radial in nature (OECD, 2022).Grid extension is affected by economic constraints such as high cost of electricity that is not affordable for rural consumers as well as geographical conditions, and therefore, it's hard for poor people living in far distances from grid lines to get power (Ministry of Infrastructure, 2016). In fact, there is a lack of alternate paths for electricity in transmission network and notably, the power service related to rural areas, and this has a negative impact of pushing village residents to move in cities (Republic of Rwanda, 2015).

1.1 Research Objectives

1.1.1 General objective

The general objective of this study is to analyze the impact of renewable energy on socio-economic growth of the local community in Rusizi.

1.1.2 Specific objectives

The specific objectives of this study are the followings:

(i) To identify the types of renewable energies used in Rusizi district.
(ii) To assess the socio-economic status of the local community in Rusizi district.
(iii) To examine the impact of renewable Energy use on socio-economic growth of communities in Rusizi District secondary city.
(iv) To analyze the challenges associated with the use of renewable energy in Rusizi District

2. Materials and methods

2.1 Profile of Rusizi District

Rusizi District is located in the Western Province of Rwanda, bordering the Democratic Republic of Congo and Burundi, with access to Lake Kivu. It is composed of 18 sectors, 93 cells, and 510 villages, with Kamembe town serving as the main urban center. The district includes sectors such as Bugarama, Butare, Bweyeye, Gikundamvura, Gashonga, Giheke, Gihundwe, Gitambi, Kamembe, Muganza, Mururu, Nkanka, Nkombo, Nkungu, Nyakabuye, Nyakarenzo, Nzahaha, and Rwimbogo.

Recent statistics from Rwanda Energy Group Limited (REG, 2022) show that only 60% of households in Rusizi have access to electricity, with 60% of this supply coming from renewable sources like solar, mini-grids, and hydropower. The district benefits from hydroelectric projects such as Rusizi I and II as its primary energy sources. The intensity of employment in Rusizi stands at 45.9% across both sexes, according to REG. Notably, renewable energy initiatives have created new job opportunities in areas such as solar panel installation, maintenance, energy retail, and community-based energy projects.

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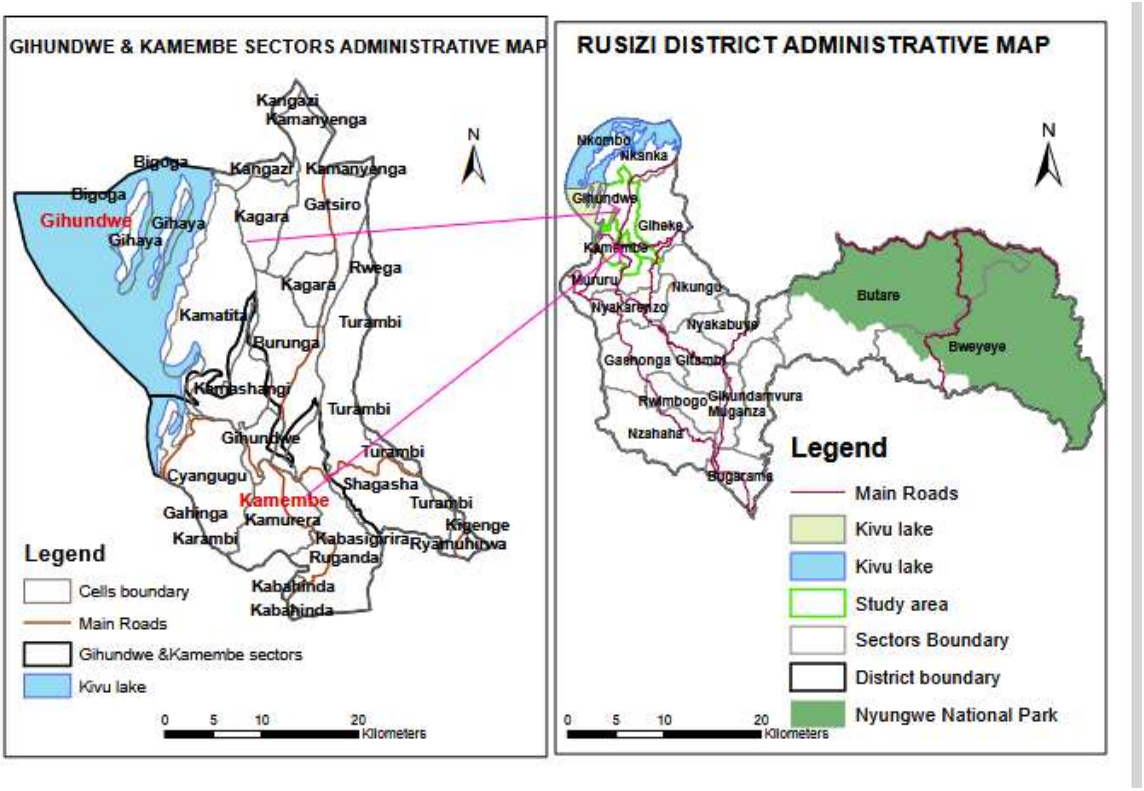
Despite these efforts, poverty remains a significant challenge. The National Institute of Statistics of Rwanda (NISR, 2022) estimates that 38% of the population in Rusizi lives below the poverty line. Agriculture remains the dominant economic activity, employing over 80% of the population. Renewable energy has facilitated innovations in agricultural practices, including solar-powered irrigation and improved post-harvest storage solutions. The current research was conducted in Kamembe and Gihundwe sectors, which form part of Rusizi's secondary city and display urban development trends. These sectors are located at the center of Rusizi District and are crucial to the implementation of the district's master plan.



Source: National Institute of Statistics in Rwanda (NISR), 2020.
Figure 1: Administrative map of Rusizi district.

2.2 Research design and data collection methods

The study adopted a descriptive research design to examine the relationship between renewable energy use and socio-economic development. Descriptive research is useful in understanding and analyzing how different variables relate to each other (Kothari, 2021). This approach allowed the researcher to collect both qualitative and quantitative data using a mixed-method strategy. The primary tool for data collection was the questionnaire, which helped gather large amounts of data quickly and efficiently from a wide range of respondents. Questionnaires are particularly appropriate in social science research due to their structured format and ability to collect both factual and opinion-based information.

Questionnaires were preferred over interviews because they are more cost-effective and convenient. They do not require scheduled venues or extensive arrangements, and since respondents were not required to disclose their names, confidentiality was ensured. This encouraged honest and accurate responses. In addition, questionnaires allowed the researcher to reach a larger population in a shorter time.

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The target population included 76,498 community members from Kamembe and Gihundwe sectors in Rusizi District, along with 16 local leaders comprising executive secretaries of cells and sectors, and land officers. The total target population was 76,514 individuals. From this population, a sample size was determined using Yamane's formula. The researcher selected 398 community members and 16 local leaders, making a total sample size of 414 respondents.

Table 1: Target population by sector

Sector	population	local leaders	Total
Kamembe	34,883	7	34,890
Gihundwe	41,615	9	41,624
Grand total	76,498	16	76,514

Source: Fifth Rwanda population and housing census, 2022 (NIRS)

Simple random sampling was used to select respondents from the community. This method ensured each individual had an equal chance of being selected, which increased the representativeness of the sample. From Gihundwe sector, 217 respondents were selected, while 181 came from Kamembe sector. These individuals included farmers, business people, teachers, and other community members. Questionnaires were administered based on availability, regardless of gender or age.

Table 2: Sample size distribution of Respondents

Category of population	Target population	Sample to select	Sampling technique
Gihundwe sector	N_1=41,615	N_1 $\frac{398 \times 41.615}{76,498} = 216.51$ $= 217$	Simple random sampling
Kamembe sector	N_3=34,883	N2= $\frac{398 \times 34,883}{76,498} =$ $181.48 = 181$	Simple random Sampling
Staff at the cell level	N_3=12	$N_3 = 12$	Purposive sampling
Staff at the sector level	N_4=4	N_4=4	Purposive sampling
Total	76,514	414	

Source: Primary Data, 2025

Purposive sampling was used to select the 16 local leaders, including 12 executive secretaries from the cells and 4 individuals at the sector level. These leaders were selected based on their roles and knowledge related to renewable energy initiatives and development in their areas. Their responses were expected to provide in-depth insights and complement the data collected from the general population.

In addition to questionnaires, the researcher used other data collection tools such as interviews, documentation review, and observation. Interviews were conducted face-to-face with local leaders to gain deeper understanding of the challenges and progress related to renewable energy usage. Documentation such as books, reports, and journal articles provided secondary data, while field observation allowed the researcher to assess the real-life application of renewable energy, employment opportunities created, and its impact on local livelihoods. These methods together enriched the data and supported comprehensive

2.3 Data Analysis

Data analysis in this study involved organizing and interpreting collected information into meaningful patterns using both descriptive and inferential statistics. Microsoft Excel was used to summarize data through frequencies, percentages, and other relevant outputs aligned with the study objectives. The analysis process included editing for completeness and accuracy, coding to categorize responses, and tabulation to present data clearly. Validity was ensured using standardized tools that accurately reflected the research objectives, while reliability focused on the consistency of results across participants. Ethical considerations were strictly followed; participants were informed about the voluntary nature of the study, assured of confidentiality, and were not required to disclose identifying information. Permission to use the data collection instruments and conduct fieldwork was obtained from relevant authorities. Limitations of the study included challenges such as poor weather during data collection and limited internet access, which occasionally slowed progress. To overcome this, study focused on Gihundwe and Kamembe Sectors and targeted only selected households and officials within Rusizi District.

3. Results

3.1 Use of Renewable Energy in Rusizi District

3.1.1 Types of renewable energy used in Rusizi district

The local community members in Rusizi district were asked to say the types of renewable energy that they used in different activities. Their responses are presented in the following table.

Table 3: types of renewable energy used by local community (N=398)

Type of energy	Frequency	Percentage
Solar energy	102	25.63
Biogas	17	3.27
Biomass	4	1.01
Hydro-power	227	57.3
Wind energy	0	0
Wood energy	48	12.06
Geothermal	0	0
Total	398	100

Source: Primary Data, February 2025

As indicated in Table 3, 25.63% of the population used solar energy, 3.27% used biogas energy, 1.01% used biomass energy, most of them, 57.3% used hydro-power energy, 0%

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used wind energy, 12.06% used wind energy while none of them 0% used geothermal energy. All the types of renewable energy are not used in Rusizi district because the findings show that hydro- power energy is mostly used rather than other types but wind and geothermal were not used. This pushed the researcher to recommend policy makers to do their best to use all renewable energies where it is possible. The extent to which hydro-power energy is used is supported by the policy of the government of Rwanda which envisaged to increase the access to electricity from 75% to 100% by connecting all productive users such as: industries, commercial facilities, schools, health facilities, agro-processing plants and other facilities, (Rwanda, 2024)

3.1.2. Types of activities in which renewable energy is used

The study has identified the types of activities which are carried out by using renewable energy. The results are presented on the table below.

Table 4: Types of activities done using renewable energy(N=398)

Type of activities	Frequency	Percentage
Educational activities	55	13.82
Domestic activities	185	46.48
Commercial activities	118	29.65
Industrial activities	31	7.79
Total	398	100

Source: Primary Data: February, 2025

The table above indicates the local community members in Rusizi district use renewable energy in different activities to boost their socio-economic growth. The findings indicate that 55(13.82%) use renewable energy in educational activities, 185(46.48%) use it in domestic activities like: cooking, lighting the houses, ironing the clothes and operating air conditioning. 118(29.65%) use renewable energy in commercial activities while 31(7.79%) use renewable energy in industrial activities like: coffee washing stations and food processing. This means renewable energy is frequently used at home to carry out different domestic activities rather than other areas.

3.2 Socio-Economic Status of the Local Community

3.2.1. Opinions of local community on the impact of renewable energy use

The low poverty rate in Rusizi district as well as other districts in Rwanda is evident. According to EICV the government intervention that helps rural population assist 93% of the poor, on the other hand, 57% of the benefits would go to non-poor, since the rural poverty rate is 43%.

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Table 5: Impact of renewable energy use on socio-economic growth

Impact of renewable energy use	SA		A		SD		D		Total	
	Numb	%	Numb	%	numb	%	Numb	%	numb	%
It reduces employment rate	164	41.21	108	27.14	34	8.54	92	23.12	398	100
It increase domestic energy	218	53.77	74	18.59	49	12.31	60	15.08	398	100
It creates new economic activities	107	26.88	185	46.48	40	10.05	64	16.08	398	100

Source: ***Primary Data: February, 2025***

Table 5 shows that 41.21% strongly agreed that the use of renewable energy reduces employment rate, 27.14% agreed, 8.54% strongly disagreed whereas 23.12% disagreed. Secondly, 53.77% strongly agreed that it increases domestic energy, 18.59% agreed, 12.31% strongly disagreed while 15.08% disagreed. Finally, 26.88% strongly disagreed that the use of renewable energy creates new economic activities, 46.48% agreed, 10.05% strongly disagreed while 16.08% disagreed. Therefore, the use of renewable energy is very crucial in increasing the income through employment opportunities created to the citizens, the increase in domestic and commercial energy as well as new infrastructures built in the areas where the renewable energy is used**.**

The findings above are genuinely asserting the due importance of using renewable energy in the socio-economic growth of the population. The report (RENA,2019) identified that 162 countries have adapted the use of renewable energy target and this has increased the economic performance of countries as result of renewable energy consumption and exploitation of less polluted resources, (Eckhart, 2019)

3.2.2 Assets acquired by local community members after using renewable energy

The researcher assumed that local community members who used renewable energy have improved their socio-economic status by increasing the value of owned assets. The findings are presented in table 6.

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Table 6: Assets acquired by local community after using renewable energy

Types of assets	Number	Percentage
1. Electronic assets		
Cell phone	206	51.76
Computer	26	6.53
Television	167	41.96
Total	398	100
2. Transportation assets		
Bicycle	292	73.37
Motorbike	85	21.36
Vehicle	21	5.28
Total	398	100
3. Furniture		
Bed	197	49.50
Sofa and tables	139	33.92
Cupboard	63	15.83
Total	398	100

Source: Primary Data: July, 2021

The table above shows that 51.76% have bought cell phones, 6.53% bought computers and 41.96% bought television. As for electronic assets 73.37% of respondents purchased bicycles, 21.36% of respondents purchased and 5.28% purchased vehicles. It also seen that 49.50% bought the beds, 33.92% bought sofa and tables while 15.83% bought cupboards. This implies that most of the respondents had bought new assets after adopting the use of renewable energy which confirmed that the use of renewable energy contributed a lot to the socio-economic growth of the local community in Rusizi district. Investment in renewable energy could result in the development and expansion of businesses which in turn would stimulate the creation of employment as well as increase earnings (Kahsai I, 2019). From economics we denote that the creation of employment is a social factor towards the improvement of standards of living for people. In their study they used the real GDP, employment and renewable energy to determine the causal relationship between energy and economic growth and development.

3.3.2. Acquisition of domestic animals after using renewable energy

The table below shows the acquisition of domestic animals bought by the local community members because of using renewable energy.

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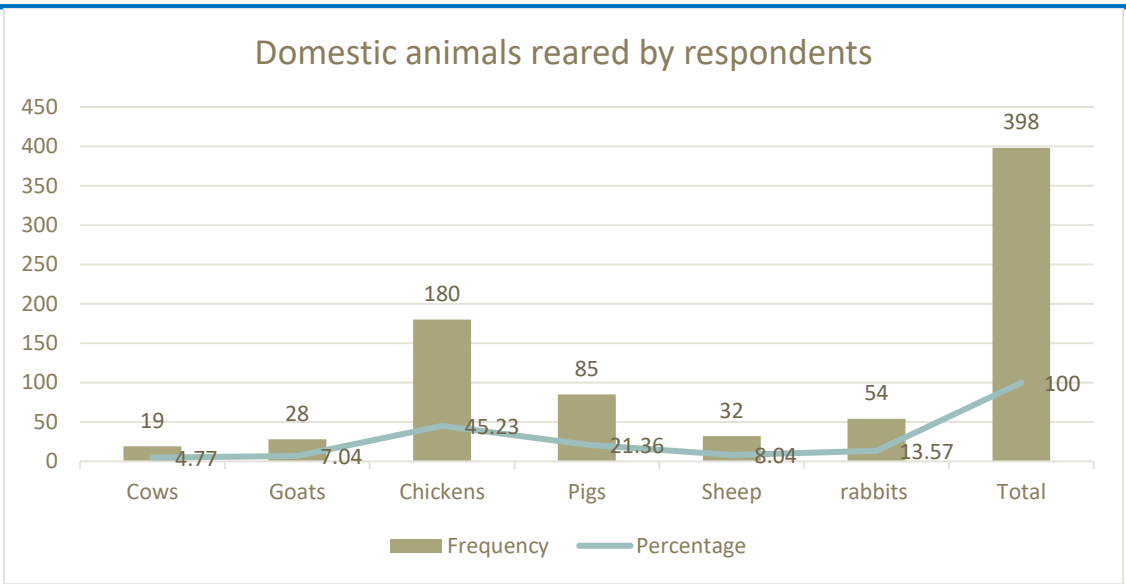

Source: Primary Data: February, 2025

Figure 2: Domestic animals reared by local community

Table above shows that 45.23% of respondents purchased chicken, 3.77% of respondents purchased Cow, 7.04% of respondents purchased Goats, 21.36% of respondents purchased pigs, 8.04% purchased sheep while 13.57% of respondents purchased rabbits to provide them with meat and money. The use of renewable energy helped people to save money and bought or increased the number of domestic animals that they owned hence their socio-economic growth. Some animals are reared for meat while others are reared for money. Therefore, they generated income and boosted the socio-economic status of the owners. Renewable energy plays a critical part in Rwanda's socio-economic growth, and it is linked to other economic sectors. Another study that shows the relationship of economic growth and renewable energy is by (Wesseh & Lin, 2020). They point out that the usage of renewable energy is an effective tool towards the economic growth of the East African region was one of the regions under the study that they used for their analysis.

3.3.3. Business created after the use of renewable energy in Rusizi district

Table 7: Types of business created after the use of renewable energy

Type of business created	Frequency	Percentage
Hair and beauty salon	97	23.37
Small shop (boutique)	146	36.68
Grinding machine	79	19.85
Bar restaurant	76	19.10
Total	398	100

Source: Primary Data, February, 2025

Table 7 shows different businesses created by local community members in Rusizi district after the use of renewable energy. 97(23.37%) started hair and beauty salons, 146(36.68%)

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started small boutiques, 79(19.85%) have bought grinding machines of different kinds while 76(19.10%) opened bar restaurants. After analyzing the findings, it was very clear that employments opportunities were created and income generating activities had increased where they used renewable energy. So, the research found out that renewable energy use is very important if the community needs to improve economically. Energy is a crucial requirement for the sustainability of modern societies and more importantly its economic wellbeing (Rafindadi A, & Ozturk I, 2017). Economic development and growth need more defined access to energy. This is because if energy supply is consistent then activities constituting to development such as healthcare, education, income generating activities as well as job creation will be available in an economy. Therefore, efficient use of clean energy in an economy has positive repercussions on the economy. This is further supported by IRENAs analysis carried out to determine the value creation that is brought about by using renewable energy (IRENA, Renewable Energy and Jobs – Annual Review 2017, 2017)This include positive impact on job creation, income generation activities, GDP, balance of trade and others.

3.3.3. New infrastructures built after using renewable energy

Across the district, there are many infrastructures which were built after the use of renewable energy in their villages. Their responses are presented in the table below.

Table 8: Infrastructures built as a result of using renewable energy

Type of infrastructure	Frequency	Percentage
School	104	26.13
Health post	92	23.12
Food processing industry	48	12.06
Church	105	26.38
Bridge	49	12.31
Total	398	100

Source: Primary Data, February, 2025

As the table above shows, there are a lot of infrastructures built in the area of the study after the use of renewable energy. 104(26.13%) said that in their village there were built schools, 92(23.12%) said the health post were built, 48(12.06%) said food processing industries were built, 105(26.38%) said the churches were built while 49(12.31%) said that bridges were built.

Therefore, if the new infrastructures are built, the population grow socially because of the facilities new them like schools, hospitals, new markets, to mention but few. Economically, new infrastructures make the easy and quick flow of money due to new jobs and high consumption of the manpower in the area where the infrastructures are being built. According to (IRENA, The Socio-economic Benefits of Solar and Wind Energy, 108., 2024), renewable energy deployment has the potential to increase income, improve trade

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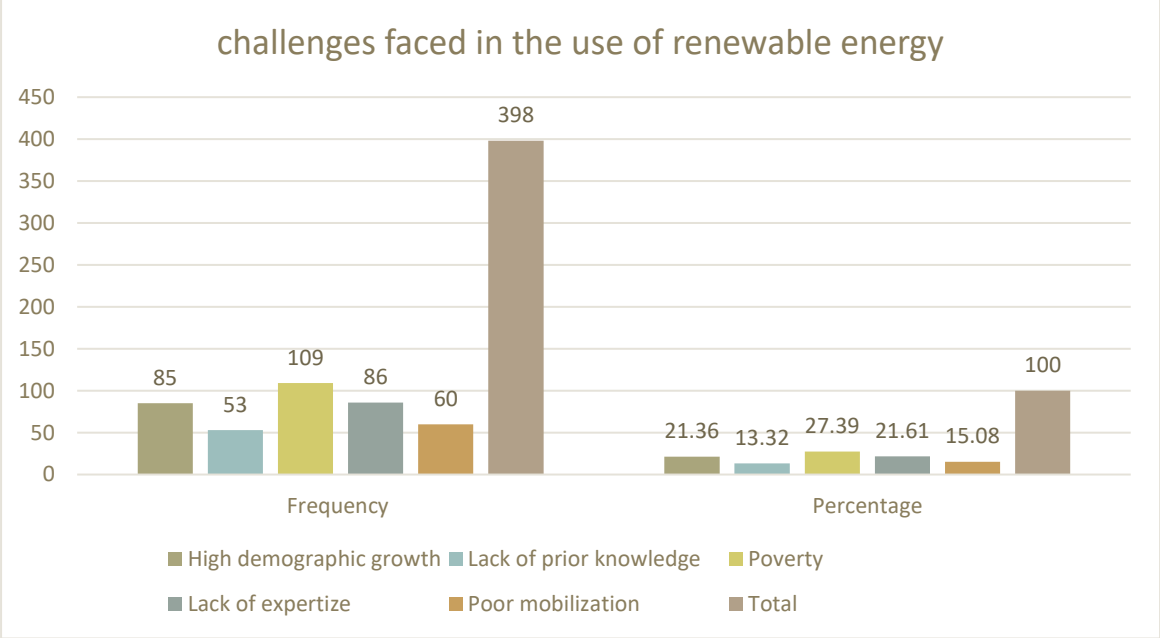
balance, contribute to industrial development and job creation. The report further states that the value created from the deployment of renewable energy resources can inform towards maximizing on policy creation. Through the creation of this policies then value can be created in various ways in terms of environmental impacts which as reduced gas emissions as well as economic activity such as increase in infrastructures and creation of jobs among others.

3.4 Challenges Associated with the Use of Renewable Energy

Local community members in Rusizi district were asked to identify different challenges that they faced in their use of renewable energy. Their responses are presented in the figure that follows.



Source: Primary Data, February, 2025

Figure 3: challenges faced in the use of renewable energy

In the figure 3 above the main challenges that local community members faced as presented as the following: 85(21.36%) faced high demographic rate, 54(13.32%) faced the lack of prior knowledge about the use of renewable energy,109(27.39%) faced poverty, 86(21.61%) faced the lack of expertise while 60(15.08%) said that the mobilization about the use of renewable energy was poorly done. Like other national and international policies, the use of renewable energy is still challenging in Rusizi district respectively because of the disposal to traditional and nonrenewable energy but the researcher gave recommendations based on the challenges associated with the use of renewable energy.

3.5. Discussion of the Findings

The findings of the research showed that the population of Rusizi district used different types of renewable energy such as: hydro-energy, biomass energy, biogas energy and solar energy. However, wind and thermal energy are not used due to different reasons associated to the lack of infrastructures and resources. Rwanda's development strategy is laid out in the latest seven year plan. The national strategy for transformation (NST1) for 2017-2024 as guided by the Sustainable Development Goals (SDGs) the use of renewable energy is a

cross-cutting area under the transformer (GoR, 2017).

The socio-economic growth of the citizens in the area of the study before using renewable energy in their activities, few respondents said that they educated their children in Nursery level, 60.3% of respondents attended Primary level, 19.2% of respondents educate their children secondary level and 3.8% attended up to university level. In this research all respondents agreed that different types of renewable energy was used in Rusizi district. after analyzing the findings, the research found out that there is a positive impact of using renewable energy on socio-economic growth of the local community.

After using renewable energy, the results have shown that 97% of respondents are insured and these with difficulties of having health insurance are equivalent to 3.0%. The money gained from their activities were stated or improved from credits, thus it helps them to pay community health insurance. The local community members got school fees of their children and themselves after using renewable energies. Renewable energy had the highest correlations with output which plays an important role in economic growth (Bhattacharya, Parmati, & Ozurtk, 2015). According to Prandecki (2014), sustainable energy which is the main focus towards a renewable energy is that energy should consider a balanced approach not only as problem of sustainability but also the inclusion of social and environmental needs for economic development which include employment , trade in the industry and many others in addition to the growth of the economy in terms of GDP.

Investment in renewable energy could result in the development and expansion of businesses which in turn would stimulate the creation of employment as well as increase earnings (Kahsai & Xiarchios, 2014). From economics we denote that creation of employment is a social factor towards the improvement of standards of living for people.

Another finding shows the socio-economic growth and the use of renewable energy is by (Wesseh & Lin, 2016). They point out that the usage of renewable energy is an effective tool towards the economic growth of the East African region was one of the regions under the study that they used for their analysis. The study further states that Rwanda have the potential of substituting non-renewable energy with renewable energy as it shows the policy which enables it to combat with greenhouse gas emissions. Greenhouse emissions are detrimental to the economic growth of a country as quite an amount of money is spent dealing with climatic changes such as drought and floods.

The shift towards renewable energy also has socio-economic benefits in an economy. According the IRENA's report IRENA (2017), renewable energy created 400 thousand jobs the period of five years. Further to this in its report, it states that women can expand the pool of skills in this sector through the creation of employment opportunities as clean energy is more attractive to them as it focuses on local and global sustainability. In a survey done by them on 90 renewable energy companies, it showed that 35% of the workface was represented by women was greater than in the traditional sector but lower in the broader economy. (Mininfra, 2020).

According to IRENA (2014), renewable energy deployment has the potential to increase income, improve trade balance, contribute to industrial development and job creation. The report further states that the value created from the deployment of renewable energy resources can inform towards maximizing on policy creation. Through the creation of this policies then value can be created in various ways in terms of environmental impacts which as reduced gas emissions as well as economic activity such as increase in income and

creation of jobs among others. The creation of these policies is what creates an enabling environment for the investment in renewable energy deployment. Some of the factors that contribute to an enabling environment could be by integration of local businesses, favorable conditions for foreign direct investments among others.

4. Conclusion

Based on the findings, the study achieved its objectives and concluded that various forms of renewable energy such as hydro-power, solar, and biomass were widely used by the population of Rusizi District in commercial, educational, and domestic activities. The use of these energy sources positively influenced the socio-economic growth of the community. Respondents reported improved income levels, increased savings, better access to health services, enhanced housing, and the expansion or creation of new businesses. Additionally, access to renewable energy contributed to children's education and general household well-being. The study also revealed increased investments in assets such as motorcycles, bicycles, household equipment, and real estate, illustrating the economic transformation facilitated by renewable energy use. Considering these findings, it is recommended that Rusizi District authorities support access to income-generating programs and simplify procedures for renewable energy-related loans. Efforts should also be made to introduce underutilized sources like wind and geothermal energy. Future researchers are encouraged to explore broader dimensions of renewable energy and its sustainability impacts across other regions in Rwanda.

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