East African Journal of Education and Social Sciences
EAJESS November –December 2022, Vol. 3, No. 6, pp. 166-173
ISSN: 2714-2132 (Online), 2714-2183 (Print). Published by G-Card
DOI: https://doi.org/10.46606/eajess2022v03i06.0247.

Contribution of Rural Electrification in Improving People's Livelihood in Tanzania: A Case of Mpanda District, Tanzania

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Abstract: The study sought to establish the contribution of rural electrification in improving people's livelihood in Mpanda District, Tanzania using the descriptive design. Convenient sampling technique was used to select 158 heads of households with electricity in five remotely located wards. Data collection instruments included questionnaire, Focus Group Discussion and Interview Schedule. Validity was ensured through accurate construction of research instruments and the use of multiple instruments helped to increase the reliability of the study findings. Data was analyzed through descriptive statistics and the content analysis approach. The study concludes that electrification supported such economic activities as shops and kiosks, groceries, restaurants and hair cutting and beauty salons. Furthermore, it improved domestic activities like lighting, charging phones and listening to radio. It made life easier and more pleasurable by allowing businesses and kiosks to function even during the night hours. Electricity supported children's education by allowing them to study at night. It also expanded knowledge of people through watching television channels and movies. Finally, rural electrification enabled villagers to receive health services closer to their homes and at a lower cost. The study recommended that government authorities should supply electricity in rural areas in order to increase the use of the service for economic and domestic activities which will enhance the economic status of the rural area people.

Keywords: Electrification; rural area; livelihood; economic activities; Mpanda District

How to cite: Diyammi, M. P. and Mkude, E. D. (2022). Contribution of Rural Electrification in Improving People's Livelihood in Tanzania: A Case of Mpanda District, Tanzania. East African Journal of Education and Social Sciences 3(6)166-173. **Doi:** https://doi.org/10.46606/eajess2022v03i06.0247.

Introduction

Electrification is an essential tool in improving people's livelihood as it creates and expands economic activities and social services (Lahimer et al., 2013). Electrification supports the development of human activities (Oluwatofunmi & Pappis, 2019), stability of electricity is paramount in improving the economy of people and in that way, accomplish the Sustainable Development Goals (SDGs) (Laura, et al., 2019).

Rural electrification is one of most essential strategies for improving economic growth, social development and lifestyles of people in villages. It improves rural communities' security, trade, health care delivery, housing and infrastructure, agricultural operations and industrial development. It increases the use of electric appliances and creates new job options. It also increases rural students' habit of studying at night (Ayaburi, et al.,

2020) and improves the environmental conservation by replacing kerosene and firewood with electricity (Muchapondwa, et al., 2021). In addition, Rural Electrification reduces respiratory diseases as people shift from using kerosene, charcoal and firewood to use electricity for domestic purposes (Peters & Sievert, 2015).

The study of Khandker et al. (2012) found the existence of long term positive impact on infrastructure, industrial sector, trade, income of the people, employment and rise of towns. In addition to that, agricultural and non - agricultural production already promoted increase in labor supply, land value and housing development. For instance, the Government of the United States of America established various programs and projects to ensure availability of energy in rural areas with the aim of improving its rural people's livelihood.

Compared to other regions, Sub-Saharan Africa has a low rate of electricity supply and connections (Gerald et al., 2018). As a result, African nations have recently made attempts to increase the rural electricity supply via grid upgrades, solar and wind technology upgrades, among others. This attempt has been aided by various donors, such as the World Bank and specific donor countries, which work with state governments to implement rural electrification programs (Muchapondwa et al., 2021).

In South Africa, rural electrification played a vital role in stimulating the economic growth in rural areas by creating and increasing economic activities both at the household level and at the community level. It improved women participation in income generating activities whereby women started working outside their homes and joined the formal labor force (Dinkelman, 2011). There was also a shift in the use of wood as a source of energy to electricity for both cooking and lighting. The rural electrification in the country resulted in people's migration to areas with electricity for the purpose of looking for a jobs or establishing businesses (Dasso, & Fernandez 2015).

In Rwanda, the government took various mechanisms to improve the rural electrification programs for the aim of bridging the gap between rural and urban communities in order to achieve the SDGs. According to Bensch and Peters (2010), rural electrification in Rwanda brought various benefits in the areas of trade, industries and education. The rural electrification further allowed people to use electric appliance such as phones and television which widened the communication platform in the rural context.

While Tanzania is one of African nations that have prioritized on rural electrification in order to speed up the rural development (Toman & Peters 2017), statistics indicate that only 24.5% of people in rural areas and 73.2% of people in urban areas have electricity (United Republic of Tanzania, 2020). As a result, the government of Tanzania made various efforts towards electrifying the rural areas. Such efforts which include the establishment of the Rural Energy Board (REB), the Rural Electricity Agency (REA), the Rural Energy Fund (REF) and the Electricity Act of 2008. With the development of new hydro-power plants and the extension of grid infrastructure to rural regions, the country has increased power generation and supply in the rural areas. As a result, rural electrification grew from 24.5% in 2010 to 48.7% in 2020 (Rural Energy Agency, 2020; United Republic of Tanzania, 2020). In Mpanda district specifically agriculture opportunities has risen that could create employment and increase value for crops, in reality rural area including Mpanda expected to benefit much with rural electrification.

Little is known about rural electrification's effect on rural lives in Tanzania. Particularly, there is insufficient literature to explain about rural electrification in Mpanda District where this study was conducted. Therefore, this study investigated on the contribution of rural electrification in improving people's livelihood in the district.

Literature Review

Economic Importance of Rural Electrification

Rural electrification in Bolivia resulted in significant improvements and growth of various income generating activities in rural areas such as cottage factories, welding services, grocery stores that sell cold drinks, garages and tailoring services. These revenue producing services increased family income and enhanced the rural livelihood (Vela-Cobos, Cavero, Platero, & Sánchez-Fernández, 2021). In his study on rural electrification expansion and its role in shaping agriculture and food security in India, Ray (2021) found that Indian rural electrification served people in agriculture sector through irrigation scheme. In addition, rural electrification advanced the income of Indian rural people.

Muchapondwa, et al. (2021) conducted a study in Kenya on challenges of sustainable electrification and found that rural electrification leads to overall

economic growth through improved agricultural productivity. Gerald et al. (2018) conducted a study in Mudzi District, Zimbabwe and found that electricity increased economic activity in the rural area including increased small businesses, milling services, saloons, internet cafés, coffee and tea processing industries where people worked to earn a living.

Social and Domestic Importance of Rural Electrification

According to Khandker et al. (2012), rural electrification in Bangladesh increased schoolchildren's study time at home. The study further found a link between rural electricity and respiratory problems in which with the absence of electricity, most homes used kerosene and other harmful forms of energy for cooking and lighting which in most instances are the source of respiratory diseases. On the contrary, the introduction of the rural electrification provided safe and reliable sources of energy for lighting and cooking. According to Riva et al. (2018), rural electrification reduces coughing and respiratory diseases through improved indoor air quality.

Rural electrification expanded access to basic health services in electrified districts in Peru. It also enhanced availability and accessibility to communication and information. This helped to decrease poverty, enhance rural healthcare services and close the rural-urban growth gap (Blimpo, 2019). Fetter and Usmani (2020) argued that rural electrification reduced the risk of witchcraft allegations following the improved lighting of streets and houses in India. Ijoma (2021) argued that rural electrification encourages women to work by relieving them of regular duties like gathering firewood. Instead, they utilized the additional time to earn money, thereby contributing to the household's revenue. Furthermore, the use of electricity is resulted into minimization of indoor air pollution, it is connected with human health for example lung function (Torero, 2015). Therefore, electrification is essential in propelling national development

Methodology

Design

This study employed the descriptive design that enabled collection of in-depth information at a single point in time. It provided an opportunity to identify characteristics regrading rural electrification and improvement of people's livelihood. This design is relevant to this study because it is fast and cost effective.

Population and Sampling

The target population involved five remotely located wards in the district: Mtapenda, Nsimbo, Kapalala, Kasokola and Magamba. From these wards, 158 head of families were conveniently selected from the households with electricity in the sense that only those who were willing to participate and were available during the time of data collection were picked.

Data Collection and Instruments

Data collection instruments included questionnaire, Focus Group Discussion and Interview Schedule.

Validity and Reliability

Validity in this study was ensured through accurate construction of research instruments based on the objectives of the study. Experts in the field were consulted to check the instruments against research objectives and give comments for further improvement prior to data collection. After conduction a pilot study, questions which were found to be irrelevant were adjusted to suit the objectives of the study. Furthermore, the use of multiple instruments helped to increase the reliability of the study findings.

Statistical Treatment of Data

The study employed both qualitative and quantitative data analysis approaches. Quantitative data was analyzed through the Statistical Package for Social Sciences in terms of frequencies and percentages. The qualitative data generated from the interview and the FGDs was analyzed using the content analysis approach which involved summarization basing on the themes and main issue raised by respondents.

Ethical Consideration

The researchers followed all the ethical principles from data collection, presentation and discussion. They requested the participants to provide the informed consent before they were involved in the study. Confidentiality was well observed by assuring respondents of how their disclosed information and identities would not be hidden. Anonymity was strongly considered at all the stages from data collection, data analysis and interpretation. Moreover, the researchers observed dignity, privacy, safety and justice to participants.

Results and Discussion

This section presents findings of the study based on the research questions that guided the study. Discussion of results was enhanced by literature.

Demographics of the Respondents

Table 1 presents demographic information of respondents. Majority were males who constituted 80% while females constituted only 20%. The reason for male domination is that issue of electrification for livelihood improvement were intended to be answered by heads of families and in most families, family heads were males. Majority of respondents ranged between 40 and 49 years who constituted 37% of the total sample. The second age group in frequency ranged between 30 and 39 years with 30%. The third age group was of 20 and 29 years old with 29%. This shows that the study collected data from the working class of people who are the main users of electricity. These were the people who were either the owners of businesses or the working force in various industries. Hence, they suited the subject matter.

Table 1: Age of the Respondents

Variables		Frequencies	Percent
Sex	Male	127	80
	Female	31	20
	TOTAL	**158**	**100**
Age groups	Below 20	3	2
	20-29	45	29
	30-39	48	30
	40-49	59	37
	50 and above	3	2
	TOTAL	**158**	**100**
Education	Non-Formal	5	3
	Primary Education	101	64
	Secondary Education	52	33
	Total	**158**	**100**
Duration since connecting to the electricity	5 – 10	145	92
	Less than 5	13	8
	Total	**158**	**100**

Concerning education qualification, most of the respondents (64%) had attained primary education; 33% had attained secondary education while 3% had not attained any formal education. This implies most of respondents were literate people who were able to read and provide answer independently.

Most of the respondents' houses (92%) had been electrified for the period of 5-10 years. Those who had acquired electricity for less than 5 years constituted 8%. The 5-10 years duration of using electricity by the majority was good enough for one give required information on how electricity had helped in improving the households.

Research Question 1: What is the role of electrification in sustaining economic activities?

In order to answer this question, it was necessary to establish through questionnaire the number of respondents who used the electricity for commercial purposes. Out of the sample of 158 respondents, 124 (79%) used electricity for economic activity while 34 (21%) used the electricity for non-economic activities. Therefore, the majority of respondents used electricity for commercial purposes. The 124 respondents who used the electricity for a variety of economic activities were asked to list their major economic activities that involved the use of electricity from the national grid as reflected in table 2. The listed activities include shops and kiosks (27%), grocery and restaurants (17%), stationary services (15%), carpentry and workshops (15%), commercial poultry (10%), hair cutting and beauty salons (7%), welding workshops (6%) and grain milling services (3%). During the Focus Group Discussions, other activities mentioned as having increased to some extent as a result of rural electrification include guesthouses, garages, tailoring and sewing machines, brick making with electricity, charging cellular phones and burning or copying CDs or DVDs.

Results further established that none of respondents who used electricity for commercial

purposes started their business before but it decreased after the electrification. Furthermore, 17 (14%) started their businesses before but the business remained constant after the electrification. It was also revealed that 27 (22%) started their businesses before electrification but their businesses increased after the electrification. Finally the majority (80%) started their businesses after electrification. These results indicate that electrification increased the rate of businesses.

During the interview, one of respondents stated that "rural electricity has made life easier and more pleasurable in our communities by allowing businesses and kiosks to function even during the night hours" (Respondent 12, 15th Aug 2021)." It was also revealed that

> prior to the introduction of electricity, milling machines were powered by diesel, which increased the cost of milling. When there was no petrol, people had to wait for two to three days to receive the milling service. But, we can now grind our crops at a lower cost since there is electricity" (Respondent 15, 19th Aug 2021).

Table 2: Economic activities carried by electric users

Activities	Started before but decrease after electrification	Started before but remained constant after electrification	Started before and increased after electrification	Started after electrification	Total
Shops and Kiosk	0	3	8	23	34 (27%)
Grocery and restaurants	0	10	7	4	21(17%)
Stationary services	0	0	0	19	19(15%)
Carpentry and workshops	0	2	6	10	18(15%)
Commercial poultry	0	1	1	10	12(10%)
Hair cutting and beauty saloons	0	0	5	4	9(7%)
Welding workshops	0	0	0	7	7(6%)
Grain milling services	0	1	0	3	4(3%)
Total	**0(0%)**	**17(14%)**	**27(22%)**	**80(64%)**	**124(100)**

Table 3: Social activities engaged by electric users

SN	Item	Mean	Interpretation
1	Communication	4.76	Very high improvement
2	Health services	4.64	Very high improvement
3	Studying and Learning	4.57	Very high improvement
4	Security	4.28	Very high improvement

One more respondent held the view that *"*prior to installation of electricity, it was extremely expensive to obtain welding services; there was only one welding practitioner in our area who was using gas for welding. There are now more than 5 welding workshops in the village*"* (Respondents 24, 26th Aug 2022).Therefore, electrification is an important factor for sustainability of businesses. The findings are similar to those of studies conducted by Vela-Cobos et al. (2021) and Lozano and Taboada (2021) who discovered that different economic activities were being performed in rural areas as a result of rural electrification with the intention of increasing household income earnings (add some more literature to support the findings of your study.

Research Question 2: What is the role of electrification in sustaining social activities?

In the context of the social impact of rural electrification, respondents were asked to express their thoughts on the improvement of social activities in their community as a result of electrification. Respondents indicated their opinions using the Likert scale with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree and 5 indicating strongly agree. The goal was to establish if rural electrification improved social services as appears in table 3. Interpretation of the mean scores was as follows: 4.21-5.00 = very high improvement, 3.41- 4.20 = high improvement, 2.61 -3.40 = moderate

improvement, 1.81 - 2.60= low improvement and 1.00 - 1.80= very low improvement.

In table 3, respondents rated all the four social services namely communication, health services, studying and learning and security between 4.21 and 5.00 which denotes very high improvement. Therefore, all social activities or services studied were considered enhanced or made more accessible to rural populations due to electrification.

During interviews, respondents indicated that electricity had transformed the social standing of their localities. One of respondents said,

> In our community, electricity helps to improve our children's education by allowing them to study at night. The advantages are extend not just to kids but also to teachers. There is ample time for teachers to read and prepare lessons during the night due to electricity (Respondent 11: 7th Aug 2021).

One more respondent revealed that "electricity has assisted us in expanding our knowledge by watching television channels and entertaining us by watching movies" (Respondent 2; 4th Aug 2021).

It was further asserted in the Focus Group Discussion that rural electrification enabled villagers to receive health services closer to their homes and at a lower cost. Villagers used to go for kilometers in search of health services, spending a lot of time and money in the process. Following the electrification of the studied rural areas, dispensaries were supplied and equipped with electrical instruments to improve the delivery of medical services. Refrigerators, sterilizers, electric fans, heaters and other appliances were among equipment supplied to the rural dispensaries after electrification.

It was revealed that public lighting had made nighttime security feasible. The availability of electricity had allowed health centers to function into the nights. Services that were previously unavailable at health care facilities due to lack of electricity had begun to be provided; these included vaccine storage and minor surgical treatments. Furthermore, electricity was assisting rural populations in gaining more information and skills by allowing them to watch television programs. It is well known that many sorts of useful information (such as market news) were obtained through watching television and listening to radios.

These findings are consistent with the conclusions of a research conducted by Fetter and Usmani, (2020) in India whereby electrified houses had higher social advantages than non-electrified households due to lighting that allowed children to spend more time studying and adults could devote more time to do home activities, reading books and magazines especially at night. The findings were also consistent with those by Tonini et al. (2022) that rural electrification in the Matembwe village of Njombe region contributed to the improvement of health services by providing remote clinics with permanent nurses as well as professional and specialist doctors who began to visit the remote clinics on a regular basis.

Research Question 3: What is the role of electrification in sustaining domestic activities?

Respondents were asked to express their thoughts on the improvement of domestic activities in their community as a result of electrification. Respondents indicated their opinions as indicated in table 4 using the five Likert scale.

Table 4: Domestic activities engaged by electric users

SN	Item	Mean	Interpretation
1	Lighting	5.00	Very high improvement
2	Charging phones	4.85	Very high improvement
3	Listening to radios	4.72	Very high improvement
4	Ironing clothes	4.68	Very high improvement
5	Watching TV	2.82	Moderate improvement
6	Refrigeration of food	2.32	Low improvement
7	Cooking food	1.85	Low improvement
	OVERALL RESULTS	**3.71**	

The goal was to establish if rural electrification improved social services. Interpretation of the mean scores was as follows: 4.21-5.00 = very high improvement, 3.41- 4.20 = high improvement, 2.61 - 3.40 = moderate improvement, 1.81 - 2.60= low improvement and 1.00 - 1.80= very low improvement.

Table 4 shows the findings on the domestic impact of electrification in the rural areas surveyed. In the table, respondents rated the first four domestic services namely lighting, charging phones, listening to radios and ironing clothes between 4.21 and 5.00 which denotes very high improvement. Therefore, the four domestic activities or services studied were considered enhanced or made more accessible to rural populations due to electrification. The fifth item (watching TV) was rated at the moderate rate while the last two were considered at a low improvement rate.

Lighting was revealed to be the most prevalent usage of electricity in homes at night. It was utilized to power electrical gadgets such as fans and blenders. Lighting aided children's nighttime reading, adults' nighttime homework completion and social events such as ceremonies that increased socializing. In the FGDs, it was further revealed that electrification contributed to an improvement of household situations of rural families. The findings were similar to those of Stritzke et al. (2021) who revealed that electric lighting in the home provided a variety of benefits. These included prevention of various health concerns such as eye pain caused by the use of candles and kerosene lights as well as extension of evening activities, leading people to continue working productively long after daytime.

Conclusions and Recommendations

The study concludes that electricity supported such economic activities as shops and kiosks, groceries, restaurants and hair cutting and beauty salons. It improved domestic activities like lighting, charging phones and listening to radio. It made life easier and more pleasurable by allowing businesses and kiosks to function even during the night. Electricity supported children's education by allowing them to study at night. It expanded knowledge of people through watching television channels and movies. Finally, rural electrification enabled villagers to receive health services closer to their homes and at a lower cost as dispensaries were supplied and equipped with electrical instruments to improve the delivery of medical services.

It is recommended that government authorities should supply electricity in rural areas in order to increase the use of electric power for economic and domestic activities which will enhance the economic status of the rural area people.

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