

Impacts of Rural Electrification in Omuma Local Government Area of Rivers State, Nigeria

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Abstract: The study investigated the impacts of rural electrification project in omuma local government area of rivers state Nigeria. strongly, the analysis addressed two unambiguous objectives; to determine the impacts of rural electrification on land uses, explore the relationship between rural electrification and poverty eradication, and evaluate the variation of rural electrification impact across the communities. The structured questionnaire method was adopted for information achievement across the rural communities whereas Pearson product moment Correlation coefficient and analysis of variance (ANOVA) were the analytical or methodical tools pragmatic for data analysis. The examination revealed that land use activities: commercial, industrial, institutional and residential were positively impacted by the rural electrification in omuma local government. Discovered that there was a strong relationship between household income of ($R = 0.44, p < .05$), employment ($R = 0.46, p < .05$) and rural electrification. The investigation additionally shown that there was a significant difference ($p < .001$) of rural electrification impact across the communities. It is the utmost view of the research that since rural electrification impact differs across the communities, town planning authority and town planners in private and consultancy services should take cognizance of this when planning and allotting of various developmental land use activities across the communities. Specific town planning policies and programs should also focused on employment and income generation to decline poverty in the area.

Keywords: impact, rural, electrification, community and poverty

I. INTRODUCTION

Rural electrification is one of the prominent infrastructural facilities needed for the development and renovation of rural communities in sub-Saharan Africa. It is a serious and significant transformer of the physical and economic settings of a rural community. But the poor quality and deficiency of electricity in remote areas has severely increased poverty rate, human health, decrease peoples welfare, agricultural productivity, industrial, commercial activities and recreational economy of the rural populace at large. Apart from that, REMAINS a central necessity without which rural transformation is incomplete, impossible and cannot be realized (Researchers Survey 2019).

Outside the factual contents of electricity, the impacts encompass all that surround rural economic growth and stimulation of healthy living, poverty reduction, employment and income improvement of rural populace standard of living etc. However, the benefits or impacts has

also witnessed unprecedented increase in the past three decades with high level of economic development, physical and social benefits that have created immense transformation and upgraded the rural communities through the boom of commercial and mini industrial activities.

Vehemently, rural areas in Nigerian are experiencing unparalleled neglect pertaining electrification for more than 50year. But measurements proved that substantial percentage of the rural communities in Nigeria are without power supply. The existences of these remote areas without connection to national grid resulted to numerous problems. The problems include low population, non-reduction of poverty rate, poor household income, poor commercial activities including rural urban migration. However, some of the rural electrification schemes initiated by the Nigerian government to combat rural electrification failed to harvest the expected benefits as more than five hundred rural communities in Nigeria continued to exist outside power supply. The dilemma, credited the inability of the Nigeria government to determine all the necessary steps and efforts need to electrified her rural communities and decline high rate of penury.

Although many researchers quoted beneath have studied the impacts and problems associated with rural electrifications across the continents of the world. But not even one has been documented on omuma local government. It is against this background or bottleneck, the research empirically evaluate the impact of rural electrification in omuma local government area of Nigeria. Commensurately, the assessment will;

(1) determine the impact of rural electrification on various land uses in the study area. (2) explore the relationship between rural electrification impact and poverty eradication.(3) evaluate the variation of rural electrification impact across the communities.

Statement of Hypotheses

H0: There is no relationship between rural electrification impacts and poverty reduction in the area.(household income and employment)

H0: There is no variation of rural electrification impact across the communities in the area.

II. LITERATURE REVIEW

while observing that a body of collected works has been developed and affirm widely on this rural electrification's positive impact on poverty assumption and other facets of the economy, Peters and Sievert (2015) applied exclusive data set acquired in countless African countries to determine the Impacts of rural electrification revisited in the African situation. the study discovered that impact expectations of rural electrification on income, education and health should be discounted considerably for Africa. They concluded that the low levels of electricity consumption in African context can only be interchanged through the installation of low-cost solar energy as an alternatives. In the same vain, Gunthe, Jochen, and Jörg (2011) look at electrification impacts on different sign and facets of Rwanda villages with and without electricity access. The authors insisted on explanation for self-selection and regional disparities but sampled only households from the electrified villages and non-electrified villages to estimate the probability of electricity connections for all the households. their result detect counterfactual households and also discovered a vigorous signal for positive effects on lighting consumption. they maintained that rural electrification enhanced the attainment of the Millennium Development Goals.

Carl and Price (2015) surveyed the influence of the rural electrification administration of low-interest loans to incorporate farms and aid in wiring homes within United States of America in the 1930s. Their research found that many rural farm homes were electrified in the area within the period of five years. while the socio-economic impact on the low interest loans electrification added positively to the increase in crop harvest and crop efficiency that facilitated strip off drops in complete farm crop, quantity and land values, but had a very little impact on non-agrarian measures of the economy as the loans was completely repaid and the eventual cost to the taxpayer was moderately small.

Njeri (2001) investigated the comparisons of socio-economic impacts of rural electrification that involved national grid, solar and electrified households in Namibia. According to the scholar, the two power sources initiated by Namibia government for rural electrification proved that the prime advantage of the twofold electrification foundations increased high-quality lighting as well as television and other media usage. He maintained that apart from little problem of power distribution by the installed solar systems in the area, the study resolved the power sources that lay access to a related glassy of impact on the premise that the financial involvement of grid electrification are higher compared to solar home. While examining how 12 years household electric connection affects the time allocation of rural communities, Guatemalans(2011) disclosed that rural electrification scheme significantly increased electricity access, and usage subsidy. That the enterprise between public-private firms gives a particular fee for households connection whereas pivotal benefits on time consumption of

peoples were well-known from geospatial data of dissimilarities within the public domain of provided goods across the cities. meanwhile the bulky dynamics in respect to charges pertaining the electrification of homes occurred due to its distant from the electric grid. But concluded that women enlarged time spent looking for money from 2–3 hours daily.

Paula, Camila, Aline , André , Joana, Alexandre, Alexandre and Roberto (2017) applied qualitative and quantitative analysis method to assess the improvement of socio-economic development in the poorest areas of Brazil. Their findings revealed that electrification had a positive influence on all dimensions of the human Development index, including the education section having the strongest effect. their further analysis proved that electricity supply remains a prominent necessity to improve quality of life and standard of living.

Shahidur, Douglas, Barnes and Hussain (2012) considered 20,900 rural households of Bangladesh in 2005 while analyzing the welfare impacts of access to grid electricity with econometric. They established that grid electrification had significant positive benefits on household income, expenditure, and education. They added that household increase in total income was high because electrification was high and accounted 21 percent, plus 1.5 percentage point decrease in poverty per year. The research further concluded that the income and expenditure benefits of energy connection stand higher for comfortable families.

Joshua and Edson(2017) examined short- and long-run impacts of rural electrification on U.S. local economies. But the study disclose that rural electrification increases agricultural employment, rural farm population, rural property values and also had a smaller impact non-agriculture economy at local level. They explained that the impacts was greater than costs in historical measures even in rural areas without high population density for the short run. pertaining the long run analysis, the study found that rural counties earlier connected to electricity witnessed improved economic growth that continued for many years after a country's electrification whereas inaccessible rural areas including local development zones expanded in the agricultural economy. adding that rural districts close to urbanite areas with long-run population growth coincided with increases in housing costs and reductions in agricultural employment.

The Ghana Living Standards Survey (GLSS) (2013) used electricity connections communities data and Global Positioning System (GPS) coordinates Ghana. The survey revealed that (a) access to electricity improve the gross income of households compared to households without access (b) expenditure is higher for dwellers in rural communities associated to the national grid equated to rural families residing in electrified communities (c)connection to electricity increases the incomes of reasonably high-income households more than low-income households. The work concluded that electricity supply improves the gross income of all families

irrespective of the initial income level as at the time households were exposed to electricity connection.

Through Ghanaian Statistical Services, Shahidur, Douglas, and Hussain (2013) relied on geographical data called the Ghana Living Standards Survey (GLSS) of 2005/06 and 2012/2013 to investigate the income and welfare benefits of rural electrification. The result revealed that electricity accessibility expands the income of households of electrified communities and enhanced the welfare of rural communities connected to the national grid, compared to rural households living in areas without a grid connection, increases the income of all households while high-income households benefit reasonably from electricity admittance unlike the poorer households. Deliberately, Santosh Kumar and Ganesh Rauniyar (2018) look at the benefits of a rural electrification project on household income and children's schooling in rural Bhutan. The study applied the propensity score matching method and discovered that electrification had a statistically significant benefit on nonfarm income and education. They demonstrated that non-agrarian income improved by 61 per cent as children increased to 0.72 additional years of schooling and 9 minutes of study time per day. The study failed to identify significant effects on farm income but recommended that investments to decline energy shortage would improve human welfare in Bhutan.

Victor and Benjamin (2016) opines that providing rural electrification with solar solution to small businesses requires a specific design adapted towards their equipment and the impact of the use of their equipment on an isolated mini-grid has to be diagnosed and assessed before providing a localized solution to meet their consumption needs. Therefore, the need for an electrified activities zone (ZAE) that is complimentary to the existing solution for household electrification. As Marcio, Pereira, Aurélio, Vasconcelos, Neilton (2010) investigated the effect of rural electrification on the decrease of energy poverty in Brazil. Their study analyzed 23,000 rural homes or rural household from the years 2000 to 2004 and established that a quicker transformation pertaining to the sketch of power usage and a decline of power poverty. According to them, the modern method stood as an accompaniment between other variables when assessing and enumerating the actual monetary, social and energy impacts in rural electrification applied in developing countries.

Hussain, Samad, and Barnes (2012) were of the view that rural electrification enhances the decrease in time allotted for fuel collection by family members and increases time given to study by the boys and girls. The study reiterated that rural electrification similarly increases labor supply of men and women, schooling of boys and girls, income and expenditure per family, assist in drastically reduction of penury. They insisted that the higher portion of benefits increases to rich rural households while the poorer homes having a many constraint to use of electricity. The study finally revealed that limited access to electricity owed to numerous power outages, negatively affects both family

electricity connection and its consumption reduce the expected promptly.

Snigdha and Subhendu (2002) proved that the socio-economic and environmental assessment of the feasible decentralized solar photovoltaic in 'sagar dweep' rural island western Bengal, India. According to them, the study had a noticeable improvement and significant impact on education, trade and commerce, entertainment, health etc. emanated from power supply SPV plants while the level of production and agricultural activities as well as women's involvement in various economic activities outside household work revealed a definite sign of betterment.

Peter and Jonas (2008) researched the variation and the relationship between electricity and socio-economic development through cost-benefit analysis techniques for the completed rural electrification programme in Mozambique. They demonstrated that the investigation anchored on the impact of electricity on families, education, agro-business, commerce, and the public area. Their result proved that rural electrification may be feasible commercially and bring physical change in rural areas within a twinkling eye. They maintained that the main strategy practice in Mozambique, contend that low institutional quality remains a strategic hurdle to encourage enlarged access to electricity for the commoners.

Kamalapura and Udaykumar (2011) see rural electrification as an indispensable part of poverty alleviation and rural development of a country. They maintained that electrification could not attract a role in the socio-economic development of any village in India. That increasing in Gross Domestic Product (GDP) proved 8% while influence on the agrarian sector counted 1.9%. The study concluded that India Government initiated a determined target of making electricity available to all communities by 2008 and all rural homes by the year 2012 through its plans to partner rural electric corporation, rural electricity supply technology mission, state electricity boards and energy sector reforms.

Girma, Girmay, Dereje (2015) pragmatically examined the causal relationship between the massively accomplished rural electrification project and poverty reduction in the context of Ethiopia. The research determined the impact of rural electrification project on family welfare such as income, health and education, and development of both on-farm and off-farm commercial activities. Their findings revealed that the impact of electricity on reduction of poverty had a positive and significant impact while the impact on household income and other theoretically key variables were discovered to be insignificant with a poor sign.

III. METHOD AND PROCEDURE

The survey research design was adopted in this study while primary and secondary data forms the sources. The secondary source of information used in this research was obtained from previous and relevant work on impact of rural electrification

and related areas from published materials alone. The published sources of secondary data were obtained from a number of references such as books, research work, conference/seminar and working paper, government records and reports from textbooks; academic and professional articles in journals and google search on the subject of investigation. The primary data were obtained through designed questionnaire and field trip while a 4 point likert scale of questionnaire was designed for the study to draw response from the rural dwellers to cover topics such as the personal information of the respondent, positive impact of rural electrification in the study areas. However, the sample frame applied in this study originated from the area delineated for investigation, and consumed the total number of 213 with the average of one (1) household in an individual compound. However, the smaller nature of the area under investigation prompted the sampling of the whole six communities found in the locality. A total of 213 copies of questionnaires were distributed to the public in the entire six communities (ogba, ajuloke, eberi, obiohia, ofeh and ohim-oyoro) 213, representing 70 percent were returned in Omuma rural area. umuogba used up 41 questionnaire representing (21.%), eberi consumed 45 questionnaire representing (23%) umuajuloke had 33 questionnaire representing (17%) obiohia had 29 questionnaire representing (15%) ofeh consumed 25 representing (13%) and ohim-oyoro 20 representing (11%). See the table 1 below.

Table 1: the sampled communities and populations.

S/N	Community	Projected population	Household population	No of compounds	Sample size	%
1	Umuogba	1,100	200	73	45	23%
2	Eberi	1,900	175	61	41	21%
3	Umuajuloke	980	120	44	33	17%
4	Obiohia	902	105	37	29	15%
5	Ofeh	775	98	26	25	13%
6	Ohim-oyoro	520	81	32	20	11%
TOTAL		6,177	779	273	213	100%

Source: * Adapted from Ubani, Adiele and Neebee 2019*

Data presentation and analysis

For the purpose of this research, data were identified, used and presented in tables and figures via percentage value, Pearson product moment correlation and analysis of variance (ANOVA) statistical techniques. The impacts of rural electrification were ascertained and confirmed.

Impact of Rural Electrification on Land Uses

passionately, the impact of rural electrification on the area were determined from the research. the impact were also felt contemporarily all over the rural land uses and retained as the effect and dividends rural residents derived from rural electrification. These impacts were assessed with mathematical percentage budgeting method (MPBM) were between 0 - 4 percent was termed the least percentage which

signifies impact not felt by a particular rural land use while between 4-9 percent proved rural electrification impact been felt by different land uses. However, a percentage value (%) was acquired by subtracting the total answer for each land use of the impacted rural electrification by 100% score. Therefore, the research considered 40.9% or above as the examination value for determination or refusal of rural electrification impact for each land use in the area by the examiner. The percentage score(%) was then ranked in order of importance from the highest to the lowest (i.e. 1st to 6th) .

IV. RESULTS

Demonstrating the percentage evaluation value score of the research, rural electrification impacted only on four land uses in the region. The result presented in Table 2, opined that rural electrification impacted higher on residential and commercial land uses in omuma local government area of Rivers state Nigeria. With the assessment percentage value of (62.1%) and (55.6%) respectively. The impact was severely surveyed in order of positioning by institutional land uses that accounted (55.6%), Institutional land use (5.1%) and industrial (44.2%). This implies that the rural electrification project or power supply available in omuma rural communities builds equal opportunity for different land use activities to strive, compete and expand various facet of rural economy targeted at eliminating poverty and deflating rural residents from migrating to urban locations. See the table below.

Table: 2 Impact of Rural Electrification on Land Uses in Omuma Hemisphere

S/N	Land uses/Variables	% of Impacts	Rank
1	Residential	55.6 %	2 nd
2	Agriculture	0.5%	5 th
3	Commercial	62.1 %	1 st
4	Institutional	51%	3 rd
5	Industrial	44.2%	4 th
6	Recreational	0.3%	6 th

Researchers survey field 2019

Hypothesis

H0: There is no relationship between rural electrification impacts and poverty reduction in the area.(household income and employment). For the determination of the first research statement of hypothesis, Pearson product moment correlation analysis or assessment apparatus was applied.

Household income: The result on the relationship between rural electrification and improvement of household income demonstrated a positive relationship analysis of (t – cal 2.16,p<.05) with the coefficient correlation of (0.44). the research analysis clarified that there is a satisfactory positive relationship between the rural electrification and household income improvement across the rural communities that constitute the area. This implies that the connectivity or presence of electricity in omuma region improves the

developmental landscape of the area via the attraction and spreading of certain land use activities such as restaurants, hotels, brothels, provision stores, butchering, computer and photocopier centers, chemist stores, recharge card printing, laundry services, barbing and beauty salon, cold rooms, tailoring/fashion and designing, shoe making, iron welding work and automobile workshop. All these developmental and land use activities are triggered by rural electrification outside household subsistence farming practices in rural communities, generate income to their owners, bridge isolation, reduces subhuman living condition caused by poverty and as well expand rural economy or the internally generated revenue of omuma local government at large. Apart from rural electrification’s aim of poverty eradication, it also transform the rural communities in Nigeria.

Employment: The assessment on the relationship between rural electrification and employment generation maintained a correlation coefficient of (t – cal 2.16, p<.05) with the coefficient correlation of (0.46). This suggests a positive relationship and corroborates the facts that when once a rural community is electrified, the more it entice the establishment of commercial and mini industrial activities in the area, the more the residents (especially the youths) gains employment, and the higher the reduction of penury rate in the region. However, the connectivity or electrification of rural communities in developing world remains part of the panacea to curtail the spread poverty rate.

Table 2: Pearson Product Moment Correlation analysis for household income and employment

R	(df)	T- cal	T- tab	Sig.
0.44	19-2 = 17	2.16	2.09	0.05
R	(df)	T- cal	T- tab	Sig.
0.46	19-2 = 17	2.16	2.09	0.05

Researchers survey 2019.

H0: There is no variation of rural electrification impact across the communities in the area was examine through the analysis of variance coefficient (ANOVA).

Rural electrification impact variation across the communities: For the communities impacted by rural electrification, the result submit that there is a significant different of the impact of rural electrification across the rural communities at { F = 15.959; sig. = 0.001; at P < 0.05. The 6 different test conducted with analysis of variance revealed that the impact of rural electrification were practically the same for eberi and umuogba communities with the value of 2.83 and 2.79 respectively. But differs meaningfully for umuajuloke, obiohia, ofeh and ohim oyoro with the value of 2.63, 2.54, 2.53 and 2.50 correspondingly. This implies that rural electrification project was held across the communities of the local government but concentrated high commercial and mini industrial activities that generate employment for the timing youth and improve household income at eberi the administrative headquarters of the area and her neighbouring community umuogba. However, the study concluded that there is a significant household poverty reduction rate at umuogba and eberi than other communities in the area. See table 3 beneath.

ANOVA Result for Rural Electrification Impacts Across the Communities in the Area

Eberi Mean ±SD	Umuogba Mean ±SD	Umuajuloke Mean ±SD	Obiohia Mean ±SD	Ofeh Mean ±SD	Ohimoyoro Mean ±SD	F	P
2.74± 0.22	2.71± 0.22	2.57± 0.31	2.54± 0.31	2.51± 0.31	2.50± 0.31	15.959	< 0.001

Source: authors research survey 2019

V. RECOMMENDATIONS

1. To eradicate poverty and expand rural economy in Nigeria, rural electrification should be carried out in all the rural areas across the nation to improve the living standard of rural dwellers and attract both commercial and mini industrial activities furnish rural economy, generate employment and decline poverty. Such electrification or national grid connections should also be enacted as act on annual budgetary system of any developing nation.
2. Rural communities already electrified but experiencing poor and inadequacy power supply on daily basis in various land uses, facets should be restore with constant power supply. So that land use

activities such as institution, commercial and industrial related that perceived energy supply as the only source of their operation and job creation will retain their location in rural areas to improved household income through employment that eradicate poverty and other sought of things associated with it across the globe. Inadequate rural power supply practices should be discouraged to reduce the relocation of certain land uses to urban setting.

3. Since rural electrification or improved rural power supply enhanced household food preservation in remote areas, agrarian policy makers should take into consideration the improvement or electrification

of remote communities when planning and introducing of crop varieties in rural areas as schemes initiated for rural development anchored on poverty eradication.

4. The existing crucial laws and act establishing rural electrification should be revisited by Nigeria national assembly and state assemblies with the aim of reviewing and sanctioning of those sections that neglect or contraveners the electrification of rural communities without impediments.
5. Struggle should be made to provide electricity in all the rural communities of Nigeria so that agro and allied industries whose raw materials are available in rural communities with cheap prices can be harness for production, employment and improvement of households income within the rural settings so that areas perceived as rural will develop with economic expansion.
6. As the rural electrification impact differs for the communities, the area town planning authority and town planners in private and consultancy services should take cognizance of this when planning and allotting of various developmental use activities to the communities in the area. Specific town planning policies and programs in the area should also focused on employment and income generation to decrease poverty in the area.

VI. CONCLUSIONS

The impact of rural electrification in remote areas is not experienced within Omuma local hemisphere alone, but a serious developmental and economic expansion strategy that can take place in any rural county of the nation as this research established that the electrification of Omuma locality cut across the whole communities and villages that constitute the area. Consequently, The research investigated the impact of rural electrification in omuma local government. two null hypotheses formulated in the study was; there is no relationship between rural electrification impacts and poverty reduction in the area (household income and employment) and the impact of rural electrification does not varies across the communities in the area. 4 land use activities explicitly: commercial, residential, institutional and industrial felt the impact of rural electrification. Nevertheless, the consequence of the relationship between rural electrification impact and household income, employment ascertained positive relationship whereas the impact of rural electrification varies across the communities in omuma locality.

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