

Community Performance Assessment for Accessing of Rural Electrification: Evidence from Electrified in Upper Jawe, Ethiopia

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Abstract:

The present article aimed to explore that an accessing rural electrification using community participation with their performance accordingly. Briefly, this study was used to measure the cooperative performance of community through questionnaire and interview in Upper Jaw villages to access rural electrification. As a result of this study has assisted for transforming rural environment, and solely offering transformations life of people. The results showed that over 90% of the community was interested to accessed electricity in the case study area. Further, the findings this study assesses insights for making decisions in the process of accessing electrification intervention.

Keywords: the demand performance; electricity access; rural electrification

1. Introduction

Rural electrification has received a great attention in recent years due to it's a par excellence tool, which offer important for rural transformation and modernization. Apart from that, it has many possible uses for these regards [Peter Newell and Jon Phillips, 2016], and was formulated by the UNDP that set goal to accessing energy, and make modernization at all global levels by 2030 [Auroshis Rout et al., 2021]. What is more, it has a social value that influencing female empowerment, gender equality, and fighting poverty. However, it has too weak access meanwhile the recent study. Nowadays, the demand and consumption of electric energy have intensively increased at rural areas [Kumar Biswajit Debnath et al. (2015); Andrea Franco Marjan et al., 2017]. Thereabouts, nearly three billion peoples lived in the world with lack of electricity access, and unchangeable biomass [Dewa Ayu Putu and Eva Wishanti (2015); Philipp A. Trotter et al. (2017); Jiska de Groot et al. (2017); Veronica Herrera (2019); Ahmed Aly et al. (2019)]. Due to the access of electricity process was traced only the certain financial organization, for instance World Bank, and IEA World Bank (2016) and IEA (2019). In addition, slow rate of technologies, low assets of agricultural production, and lack of rural development are the problems of accessing rural electrification [John W. Mellor (2014); Kassahun Y. Kebede et al. (2015); Agnieszka H. Kazimierzuk (2019)]. Despite some growing economic outputs could be able to solve the problems of it at certainly [V. Ranganathan (1993); Stephanie Hirmer and Heather Cruickshank (2014); Md Alam Hossain Mondal and Claudia Ringler (2020)], and focused on universal electricity accessing [Benjamin K. Sovacool and Steve Griffiths, 2020].

In this regard, Ethiopia has the access problem of electrification why because a weak economy [Kotub Uddin et al. (2017) Philipp A. Trotter et al. and Ikejemba et al. (2017)]. Briefly, account for 30% of people were lived without slow down poverty and electricity access [Kiflom Gebrehiwot et al. (2019); Araya M. Teka et al. (2019)]. However, the access of electrification has reached about 42.9% [Md Alam Hossain Mondal and Claudia Ringler, 2020]. Government of Ethiopia was reported that electricity access reached at 48.27% in 2019 World Bank (2021). Some press conference released that over the past decade; the government has made encouraging progress on its electrification program, and expanded the grid network coverage to nearly 60% of towns and villages [Google, 2021]. In this regards, Ethiopia is the largest developing country in Sub-Saharan Africa. Access problem of both urban and rural electrification is the national crisis of the country. Despite some access problems was solved through trend of community's ability Kwak et al., (2013), this was based on the interest of community [Batchelor et al., 2018] for has improved electrification in rural environments [Lei Huang et al., 2017].

For example, [Synne Movik and Jeremy Allouche, 2020] showed that the performance has depended on a contemplation of community and more recently. Therefore, the present paper was also introduced a set of community performance for selecting as force that is playing accessing of electricity in the rural areas. This demand-driven might be solved the crisis of electricity access in the country. In this problem we are interested in, is whether the community performance-driven method will help to solve crisis of rural electrification? In this paper, this problem will answer based on the fact that from the upper Jawe electricity accessed trend.

2. Methodology

2.1. Data sources and Sample Description

Data of this study was first-handed material collected through questionnaire and interviews survey since 2008. Geographically, Jawie kebele directed into three: these are Upper, Mahal, and Lower. But the selection was gone under Upper one (which contains eight villages); unfortunately the agricultural production and positive factors were grown under development level rather greater than a local economy. The main agricultural production area of products, local agricultural scale, and landform were also taken into consideration. The final sample contains eight villages’ community, 300 questionnaires, and 300 valid interviews took a random sampling survey from each village. Briefly, table 1 is listed the following information: such as population, language, location, land features, households, farm animal heads, villages, income source, agricultural products, and energy sources. This paper uses a qualitative local survey to electricity access that contained a two-step filtering process under the consideration of upper eight villages were required to comply with the set criteria of (1) having no previous electricity, and (2) it’s being located around Hossana city.

Table 1 Basic pieces of information of eight villages

Name	Upper Jawe rural villages features
Location	South to Hossana, South-west Lemo,
Land features	flat, rarely hilly
Population	about 2500
Households	about 400
No. of small villages	about eight
Main income source:	agriculture
Farm animal heads:	about 300
Main agricultural products:	wheat, maize, teff, Chat, beans, pea, inset, potato, sorghum, etc.
Main language:	Hadiyyisa, Kambatisa
Main energy sources	solid biofuel (firewood), kerosene

Data source: Investigation.

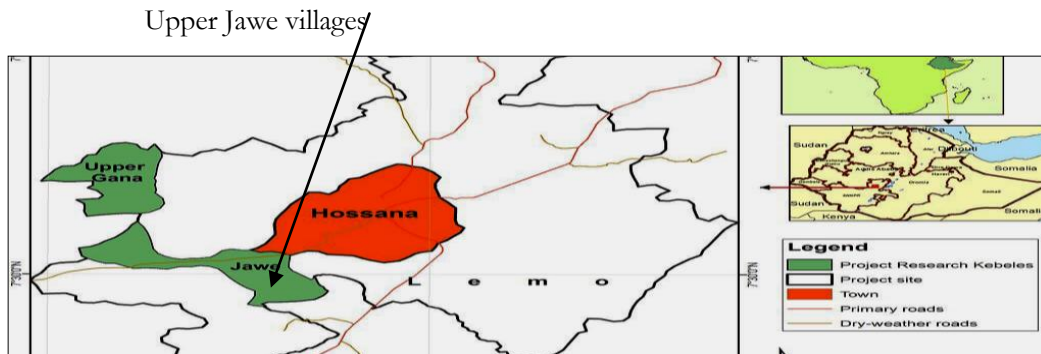


Figure 1 Location of study area in Ethiopia (map: Google Inc)
Source: Google scholar

2.2 Information from evidence village

Table 2: The concept of project proposal (PCP) from evidence

1.1	Country	Federal Democratic Republic of Ethiopia
1.2	previous title	-
1.3	region/location	SNNPR, Hadiya Zone, Ethiopia
1.4	duration	Carried on 5 years from (2008-2012)
1.5	source of budget	100% only community financed (frequency)
1.6	total budget	ETB 450,000 or \$23,376 plus many people's were involved
1.7	other sources of budgeting	00
1.8	familiarize the others designers with their ways of understanding	General Objectives: The upper jawe village's community aim to fill the demand of the electricity first, life modernization from traditional in kebele, and role model for another environment. Specific Objectives: To facilitate electricity for multi-purposes; such as: milling machines, metal welding, electronics shopping, informal school building (night school), groundwater etc.
1.9	plan of beneficiaries	- the community of upper jawe and neighbors - more than 2300 residents
1.10	implementing Organization(s)	Based on enat jawe kalhiwot church was responsible
1.11	The project was supported by any?	no

Data source from: Own investigation

Briefly, Table 2 showed that the completion process of electricity accessed was under taken from 2008-2012, and the total budget carried by ETB450, 000 or \$23,376 that was out of the vanished regular capital system. The aim was to solve crucial problems of community life and rural areas crisis. The researcher was observed that electricity is the basic tool for to development, modernization, and finding rural solution. In this deal, the only the upper portion of kebele has accessed electricity due to there was interested community over solely understood the out of electricity. Successfully, the trend was fulfilled by community interest. The present research learned some points else and investigated demand for further electricity access.

2.3. Questionnaire survey and direct interview about electricity access based on the demand of rural areas

3. 3.1. Research hypothesis

The hypothesis of this study based on the demand-driven electricity access in rural areas is rarely seen and does not care about whether electricity access is out of demand, but cares about interest of free electricity. Demand-driven electricity makes a significant economy; builds unite of community confidence, facilitates of accessibility, and the identifications of contribution. The intention of community did not worry whether the electricity access cost meets expensive but the only cared about electricity access with the demand basis. Even the electricity distribution is not easy in rural areas; as long as the rural area's electricity has difficult to implications because it needs high income growth, and costly.

2.3.2 Research methodology

The current study collected the questionnaires and direct interviews at Upper Jawe eight villages' community to explore the role of demands in rural areas' electricity access. The site was selected from there and located in the Lemo district, Hadiya zone, SNNR Government to explain the performance-driven electricity. A total of interviews and questionnaires were collected and analyzed from December 2008 to September 2008 for investigations explored earlier. The next three steps were selective thoroughly screened such as community cognitions, a lifestyle of community, and social environment; all those were helped for developing the socio-economy and preventing misleading information. The present survey was also enrolled three areas of research answers; such as first one was mainly studied the demand of community, and the second one was investigated the interest of community that having productive idea in rural areas, and the third one was explained general features of life and system of the management.

According to the research location figure 1 was briefly indicated and the desk research was included both the research design and site analysis. The on-site works was gathered surveys from the stakeholders, the government officials, and site supervision. It was explained the overall information about the villages of the study area when the site observation and it has enough opportunity for electricity access. Clearly, best explanation of demand intention electricity access and variation data were undergone in the study area.

2.3.3 Data analysis

2.3.3.1 Demands of community during pre- access electricity

If "a little concerned" is the boundary, 90% of community was more concerned about the effective interest for electricity accessing their own career. 5% of the community was a little intended about the electricity access. Only 5% of community didn't care about electricity accessing. It shows that community is still very concerned about electricity accessing.

Table 3 Demands of community during pre- access electricity

Demands	Electricity	Water	Mailing machine	washing machine	Others
No. Population	240	30	15	5	10
What's the degree of demands of communities during pre-electricity accessing for concerned electricity, water, mailing machine, washing machine and other in %?	Very concerned	More concerned	A little concerned	Not too concerned	Not concerned at all
	80	10	5	1.7	3.3

2.3.3.2. The rural community agreement intention on cost coverage of the electricity access by themselves

The 90% of community was willing to shown the intention of the agreement for costing electricity accessing by them. Only 10% of the community was refused. It showed that rural community has capability of cost coverage for accessing electricity, which has indicated that demand-driven income development.

Table 4 the rural community agreement intention for cost coverage of electricity accessing

Very Agreeable	good agreeable	a little agreeable	no agreeable
75%	13.3%	1.7%	10%

Data source: Authors calculation

2.3.3.3. The community's awareness ability of the costs of accessing electricity and then pay

The 73.17% of community was willing to chosen and paid for electricity access. It shows that most community tends to fill a crucial loss of electricity, which indicated that the prior demand-driven building is very important and effective.

Table 5: The rural community to choose and pay attention for electricity accessing

For electricity accessing, its price is often expensive. Will you still choose to it?	Yes	No	Other answers
	73.17%	20.63%	6.2%

Data source: Authors calculation

2.3.3.4 Factors that the rural communities pay attention to when they select electricity accessing

Compared to income and access, the rural community was concerned about their level of income (61.57%) and electricity access (22.41%). It indicated that income was the first impact on electricity access during the community was selected electricity accessing. They didn't worry about whether access or safety as well.

Table 6: Factors that were affected the rural community when they paid attention on selection of electricity

What do you care about the productive, when you select electricity access?	Income	Accesses	Price	safety	Other answers
	61.57%	22.41%	10%	2.92%	3.1%

2.3.3.5. The electricity access under funding guarantee

To prove community true trusted in electricity accessing; then after, the present paper revealed that there was the fund guaranteed for accessing electricity, which was safely accessed it by intention effect of electricity. This title has been designed that: the community has great binding to electricity accessing. The results showed that 97.95% of individuals were felling to guarantee by community funding. Further this result indicated that community will able to do anything as concern about the accessed electricity in study area.

Table 7: The electricity accessing under funding guarantee

	Yes, I want to trust in because of the accessing is safe and the electricity effect is moderate.	Yes, I want trust in because of the accessing is as much as safe.	Yes, I want to trust in because of the electricity effect is moderate.	No
If the funding of accessing electricity was Undertaken by the rural community, do you trust in?	58.13%	63.2%	26.23%	2.05%

4. Results and Discussion

4.1 Evaluation of demand factors in community life

The trends of evidence, concern, acceptance, agreement intention, and access are the basic features in rural community. The information obtained from table 1 that is evidence of community performances shown at financed electricity from (2008 to 2012). Unfortunately, the process was carried by community interest and their demand level reached 100%; strictly it was underestimated trend. According to [Batchelor et al, 2018], the rural community was highly interested to get electricity at that time. Of course, our study was investigated that the process of rural electrification through using qualitative method with finding the actual demand-driven rural electricity.

As can be seen, the present research soon appeared on the same site. When investigating intention of demand-driven electricity access, the paper chose the "concerning" variable for study. Under the assumption of concerning the guarantee of demand basis electricity access, the research investigated whether more concerning or a little concerning about it, a more concerning is higher than a little one. In this case, over 90% of community is more demanding concerning electricity access. 5% of the community is a small demand concerning about it. The results were shown that more extent rural community still attention to electricity access.

In addition account for 90% of community was shown the share agreement to electricity accessed by them. But only 10% of community was refused to share. The results described to more number of the community still too showed agreement on electricity access. The research was also investigated the acceptance of electricity access, the paper chose the "demand" variable for research. Under share guarantee the assumption is unfit to access electricity and to expect an effect. Therefore, the present research might be sure for further decision that has exact performance with investigation whether community is accepts to share for sustainable electricity or not. In general, it revealed that 73.17% of the rural community was shown willingness to share and pay for electricity accessing, 20.63% did not want to share or pay for electricity access, 6.2% has no choice. The results explain to some extent this community is still accepting electricity access by their interest.

The factors are influenced rural community under pre-electricity establishment in rural environment; the paper chose "factors" for research. Under the analysis of the impact of rural community during pre-electricity access was investigated and recorded in rural community. In this case, (61.57%) community had enough source of income. 22.41% of community was expected to access electricity by other body. The results showed that the level of income was the first impact to access electricity.

4.2 Importance and side-effect of demand-driven electricity access

Prior work has documented on the effectiveness of psychosocial intervention in improving quality of demand-driven access of electricity in rural community. The community has used electricity for human daily activities, reliable purpose, providing meaningful services in households, and income-generating activities. However, there were many challenges to providing electricity for remote and poor households without affordably.

Despite of electricity accessing; the sharing focused motivation was provided enforcement of exploration of it in study area. Similar to this statement; refusal action in sharing didn't accept among community, which was stress-related disorderedly forbidden in them. In this regards, there was an increased level of rural electricity access demand among them. Nevertheless, accessing rural electrification has carried on the place as a considerable urban-rural integration with controlled incomplete characterization of rural crisis.

4.3. Is what community really demands about rural area electricity accessed?

According to, accessing of electricity in rural areas the community has to show high interest to fulfill water, mailing and washing machines, and others etc. The willingness of community in rural electrification has chosen and kept it up. This may be able to force to planting electrical power in rural and remote areas. Of course, market failures on the national grids that drop their electricity demand. The continual crises have the problem of electricity access. At the same time, it leads to find a solution to community demands. Too much emphasis on demand-driven electricity access in rural community has limitation of funding guarantee, and not trust in their funding electricity accessing. Even non-rural community electrification as long as it's effect had the common features with rural electrification. In this paper, the method of association accreditation has conceived: an association of intention has binding regulation of agreement for electricity establishment cost.

4.4. How to increase the demand-driven electricity access in rural areas

There is minimizing expectation of accessing rural electrification by government or another body. Although maximizing ability of community for purpose of it over rural environment. It must be expected interest driven community through practical ways. The fact was carried on study area and done by community financed electrification method on whole eight villages in upper jawe. It was performed by demand-driven community. At present research, increasing demand-driven electricity accessing was also focused in rural area. Afterwards, this paper might be tried to find some necessary information for rural electrification and transformation.

5. Conclusions and Recommendations

The aim of this study was to assess and qualitatively analyse the impacts of the demand and community performance on rural electrification access, transformation of the environment, and rural development with fact basis in rural Ethiopia. The findings showed that the trend of community financed own electrification system in many kebeles and around study area is growing decisively. The most important benefit of this trend was access to clear and exact satisfying the demand of electricity; and minimizing government expectation of rural electrification/ without community participation. It was also generated ability of community to be free from kerosene consumption and unsafe life. The study finds the kerosene consumption is decreasing in electrified rural households rather than non-electrified one. Beyond it was explored that electrified rural areas are coming to well life styles, an increasing income, mutually transforming environment, and adapting community with technologies easily.

Considering the questionnaires/ interviews in study area, the findings present strong evidence to promote community demand adoption and utilization of rural electrification system through introducing additional enabling policy measures such as subsidies and soft loans. In addition to, the community performance is a basic tool to considering for implementing anything else; next pay attention on an agreement process among them. These findings suggest that the access of rural electrification system adoption in rural/ non electrification environment depends not only on household's income but also on several non-economic sectors to which these factors are accounted for in rural energy planning and other technologies dissemination.

Author contributions

BDH: Conceptualization, data curation, formal analysis, investigation, methodology, writing- original draft, review & editing; **LH:** conceptualization, supervision, review & editing.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have risen to influence the work reported in this paper.

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