"Impacts of Electricity Access to Rural SMEs"

Tarun Kanti Bose[1], Md. Reaz Uddin[2], Ambarish Mondal[3]

[1]Assistant Professor, Business Administration Discipline, Khulna University, Bangladesh.
[2]Assistant Professor, Business Administration Discipline, Khulna University, Bangladesh.
[3]Independent Researcher.

Abstract:

This study was intended towards evaluating the impact of electricity availability on the operation and performance of SMEs in the rural areas of Bangladesh. The results are based on a study from a survey carried out in two electrified villages in Paikgacha, Khulna. The study detected favorable changes on the production costs, profit margin, development and modernization of business, women empowerment, quality of life, and human development due to the electrification. The findings of the paper will help the stakeholders in number of areas including developing grid electricity services, supporting rural electrification programs, developing the updated framework for micro enterprise development and also overall reduction of poverty in the rural and disadvantaged areas of Bangladesh.

Key Words

Rural Electrification, Rural Micro-Enterprises, Paikgacha, Human Development.

1. STATEMENT OF THE PROBLEM:

1.1Background of the Study:

Rural Electrification in Bangladesh has commenced its inauguration in 1978, with the technical help and guidance of National Rural Electrification Cooperative Association (NRECA) of United States of America with an aim to provide the electricity outside the metropolitan areas. The project is primarily based on the innovative idea of member-owned, Palli Bidyut Samities (PBSs) which is very much identical to the rural electric cooperatives that exist in the United States (Meadows et al., 2003). The primary motives behind REP were directed towards electrification of irrigation pumps and tube-wells, agro-based industries. The main idea behind that campaign was to boost up the agricultural sector of the country. Currently the area of operation has been changed and now the rural electrification is virtually serving many more areas and industries in the rural Bangladesh. Introducing electricity into different peoples-domestic/household, industrial, irrigation equipment, commercial, street light and office use, provides the necessary infrastructure for accelerated economic activities as well as creating environment for realizing human capabilities (Nelson, 2003). Therefore it is eventually helping the business operation of many groups. SME sector and especially in rural areas of Bangladesh is a major contributor to the GDP. Therefore it vital to flourish this sector and electrification can be a major factor behind it. It is cannot be done in better ways to conduct a case study on a rural areas of the country. This study has done the same thing.

1.2 Rationale:

Rural electrification is a very important process to provide access to modern energy, especially to the poor people in developing countries like Bangladesh. Rural electrification programs in Bangladesh focus on providing development assistance through the supply of electricity services to stimulate economic productivity and enhance the quality of life in rural areas. These projects do not start with an assessment of the needs of the people that they are meant to serve. The rural electricity evaluation programs at present are confined to measure only quantifiable variables, such as the number of households electrified. Moreover impact of electrification on rural SMEs operation also seldom evaluated. This study will mitigate that gap. This study adopts qualitative technique to gauge the impact of rural electrification. The result of the study is expected to offer feedback to project planners.

1.3 Objectives:

Main Research Objective:

a. The main objective of the research is to identify the impact of electricity services on rural micro-enterprises.

Specific Objectives: In order to facilitate the general objective, two specific objectives outlined in this study:

a. To identify the cost effectiveness, time utilization, women empowerment, human development experienced by micro-enterprises in using electricity.
b. To identify the most significant changes brought to enterprises by up taking electricity services.

2. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK:

2.1 Introduction:

The SMEs worldwide are recognized as a key contributor to economic growth. The case for fostering SME growth in Bangladesh is of high significance since it offers diversified areas of contribution. There are few factors found to be critical for accelerating SMEs of the country. Rural electrification is one of those key factors. Rural electrification is well recognized as one of the important pre-requisites in uplifting living standards of the geographically and economically disadvantaged communities in developing countries (Chaurey et al., 2004; Bhattacharyya, 2005). It also assists the business conduction of diversified types of businesses. This study evaluates such impacts on rural SMEs of the country with a case study.

2.2 Small and Medium Enterprises (SMEs) — Defined:

There is no universally accepted definition of SMEs, it is virtually impossible to provide any concrete definition. There is no standard definition for SMEs in the United States also. Conventionally it is determined by the industry in within which it operates. In some cases it is defined under few important criteria like capital, income, number of employees etc. According to the definition provided by Germany SMEs are enterprises with a limit of 500 employees, while in Belgium it is only 100 (Chaurey et al., 2004). Small and cottage industries (SCIs) in the previous versions of the Industrial Policy of Bangladesh has been replaced by SME in the Industrial Policy 1999, which defines “small industry” as an enterprises (excluding cottage units) employing fewer than 50 workers and/or with a fixed capital investment of less than BDT

100 million and "medium industry" as enterprises employing between 50 to 99 workers and/or with a fixed capital investment of between BDT 100 million and BDT 300 million (Bhattacharyya, 2005).

2.3 Energy and Rural electrification:

Energy for carrying out production and other causes can be like- petroleum, gas, kerosene, and electricity. Electricity can produced by burning fossil fuels or by using renewable sources like solar, biomass, hydro or wind (Meadows et al, 2003). It also can be produced by nuclear energy sources. Rural electrification is the process of generating and spreading electrical power to rural and remote areas. Electricity is used not only for lighting and household purposes, but it also allows for mechanization of many farming operations, such as threshing, milking, and hoisting grain for storage. In areas facing labor shortages, this allows for greater productivity at reduced cost (Bhattacharyya, 2005).

2.4 Modern energy as a catalyst for SMEs:

While lack of modern energy is often characterized as a barrier to micro-enterprise development, removing this barrier does not necessarily result in micro-enterprise development. In other words, access to modern energy is neither the only nor even necessarily the most important factor influencing micro-enterprise development. Other factors such access to finance, markets, and other infrastructure are also very important. Support for the notion that modern energy can and does act as a stimulus for the emergence, growth and continued development of micro-enterprises is relatively strong in the literature reviewed (Fakira, 1994; Foley, 1990; Karekezi and Majoro, 2002). Fakira (1994 cited in Meadows, et al 2003), for example, claims that "energy is one of the critical resources needed to liberate micro-enterprises from low value, low productivity and low income activities." Allerdice and Rogerson (1997) suggest that "access to even limited amounts of electricity for micro-enterprises in non-grid–connected areas can be important to the establishment and growth of those businesses." Foley's (1990) study reports increased economic activity and higher living standards following electrification and concludes that "the arrival of an electricity supply in certain areas seems to be a crucial factor in precipitating decisions by local entrepreneurs to invest in a variety of productive enterprises." Rogerson (1997) cites evidence from KwaZulu/Natal of positive impacts of on existing SMEs that benefited from the switch to electricity including welding shops and tailors.

2.5 Research Gap:

A detailed scientific investigation on the economic impact of rural electrification has not been carried out for the case of Paikgacha. This research is expected to fill a part of this gap. Paikgacha is very important part of Bangladesh because of its Shrimp cultivation, agriculture, etc. Though Paikgacha has strong participation of our national economy, there has not more research about its development. In spite of participation of GDP, Govt. has not much attention of this Upazila. This research on rural electrification of Paikgacha and it has been tried to find out how electrification can change the economic status as well as rural enterprises.

3. METHODOLOGY:

3.1 Research Framework:

Jirbunia and Motbari villages, which located at Paikgacha upazila in Khulna district, were selected as a case study for this research. This case study involved more than one unit of observation, studying events within their real life context. The research concentrated on

collecting, analyzing and interpreting qualitative data within the selected areas of interest. The target group for this study was the SMEs which are utilizing the electricity as a power and energy resources to run their business. Structured interview along with personal observation were used to take responses from those target SMEs. This research is Qualitative in nature. It attempts to find out impacts of electricity access to rural enterprises in Paikgacha. Primary data from surveys and secondary data from government and non-government sources are used in this study.

3.2 Identification of Study Villages:

The framework poses some limitation to the final selection of the villages because of the missing data. Nonetheless, the following factors have been considered in making the final selection of the villages to be studied: 1. The period of electrification. Comparing energy use patterns, social conditions, and the level of economic development or well-being within a year or two after electrification will not provide a fair evaluation of its impact. Empirical evidence shows that economic changes due to electrification tend to be incremental and often take longer than a few years to detect. According to the theory of transition, households ascend the energy ladder in a gradual manner (Foster and Tre, 2000). 2. Proximity to the highway and markets. All villages selected are within a two or three hours walk from the nearest major highway. 3. Logistics: Time, budget, and other logistic problems involving travel and accommodation were also considered in deciding the survey villages

3.3 Types of SMEs Studied:

It was essential for this study to select the appropriate SMEs to evaluate the impact of electricity access to their operation and maintenance of business. Therefore the selected SMEs were also needed to be diversified in nature. That means it had to be of different categories like manufacturing, service, retails and other types. The impact of electricity access and advantages of that along with some disadvantages were evaluated. The types of operation includes : grain milling, hairdressing and hair cutting salons/barber shop, carpentry/furniture manufacturers, welding shops, retail shops and tailoring shops.

3.4 Research and Data Gathering Tools:

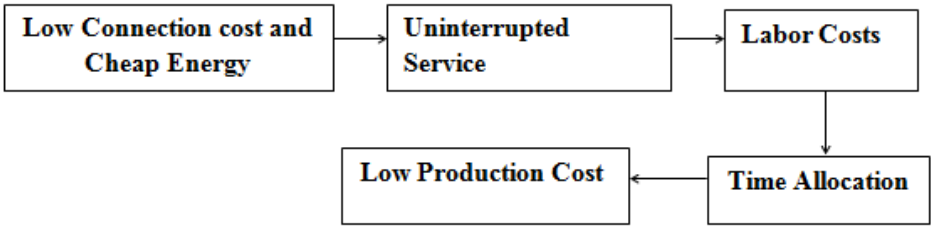
For this study the primary major data resources were the primary data which was derived through the on field survey of the respondents. In addition some secondary data were also collected to complement the primary data resources. In order to ensure the validity and reliability of the data proper and right sources of information/key informants were identified and selected from the study areas. There were frequent revisit to the field in order ensure the validity of the data collection.

3.5 Data and Compilation Methods:

Qualitative information about linkages of grid electricity services and SME's was gathered during data collection. In addition, Micro-enterprises changes were analyzed in terms of establishment, growth, expansion, decline and closure. The changes were measured by using indicators such as changes in assets of entrepreneurs and other people involved in an enterprise activities, changes in number of workers in the enterprise this measure was often favored because it is most easily and accurately remembered by entrepreneurs and it does not need to be deflated, production technologies introduced after SMEs being electrified, rate of production and changes of production processes.

4. FINDINGS AND ANALYSIS:

4.1 Impact on Production Cost:



4.1.1 Low Connection cost and Cheap Energy:

In the study area most of the enterprises are grid electricity connected but a little number of small enterprises are not yet connected. Although there have debated between electrified enterprises and non-electrified enterprises. The reasons given by these micro-enterprise owners for being connected and use grid electricity services were as follows: An initial connection is reasonable and not high, Service is reliable and its all day in non-stop service. In a day only 3 or 4 hours electricity would be off especially at noon and mid night; so most enterprises do not suffer from it, Monthly electricity bill is lower compare to kerosene, diesel and other sources and Very easy and access to use.

4.1.2 Uninterrupted Service:

In my study area grid electricity is connected. These two villages are connected to electricity before 5 years (Jirbunia) or 15 years (Motbari) ago. Before electrification the main energy sources were kerosene, diesel or battery charger. At that time people man finished their job before sunset because of energy source's shortage as well as cost. Though it was costly, the supply of kerosene, diesel, and battery was not available. The supplier was retail shops, when that retailer was failed to supply then the whole villages especially the enterprises were fallen in darkness and businesses were stopped early. So we can see in that time some retail shops would control their villages and business. But after electrification energy service is uninterrupted at the time. No one can depend on retailer. Some interviewer says that they are very happy to grid connection because now they does not depend on any supplier for energy, easy to access, cheap cost, and especially they use electricity whenever they want. Most of the businesses are operated with grid electricity for a long time.

4.1.3 Labor Costs:

Labor costs consist of the cost of the work that goes into the manufacturing of a product or the execution of a service. After electrification, various types of machinery may performing the major task of manufacturing firm so firms need less worker and now they pay little for the same task as before.

4.1.4 Time Allocation:

It is expected that with electricity, the extended evenings would be spent in socially and economically productive ways. Most impact studies agree that there have been positive changes with family spending more time together and the introduction or expansion of the small local or cottage industries. One of the findings is that the many households have changed their way of

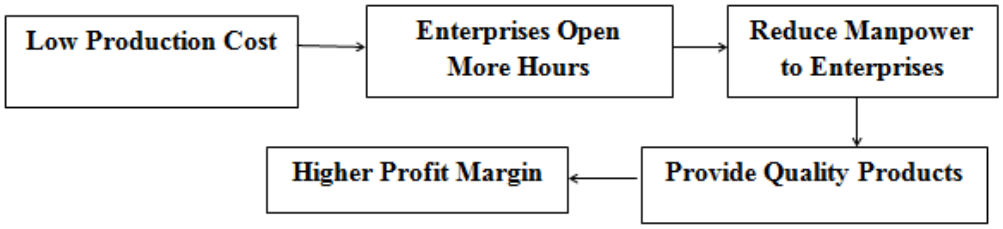
spending the evening after electrification. As compare to past studies the owner can open their firm more time for production purpose.

4.1.5 Low Production Cost:

As energy cost is low so the per unit production cost is also low for that owners can get more income. Before electrification major part of enterprises owners buys their selling products from wholesaler and they can pay a high amount for transportation. Some of the enterprises use kerosene, diesel, battery etc. as energy source that was costly to grid electric energy. For example, Grain Milling, before electrification this is not available in village. Only 1 or 2 machine operated with kerosene or diesel. But, after electrification machine start to use modern energy which is cost effectiveness and operating of machine is also easy.

4.2 Making Better Profit:

In the survey villages the electricity service is uninterrupted, low connection cost, cheap energy and for that production is low. AS the production cost is low so business may get more profit. This profit is not only the owners of the enterprises but also the general consumers. When the production cost is low then the businesses may also cut their price to attract more customers. Though the general profit margin level is low than the previous time, in the end of period the business can get higher profit because their sales volume would be increased. So we can conclude that electrification get more profit to general public.



4.2.1 Low Production Cost:

As energy cost is low so the per unit production cost is also low for that owners can get more income. Before electrification major part of enterprises owners buys their selling products from wholesaler and they can pay a high amount for transportation. Some of the enterprises use kerosene, diesel, battery etc. as energy source that was costly to grid electric energy. For example, Grain Milling, before electrification this is not available in village. Only 1 or 2 machine operated with kerosene or diesel. But after electrification machine start to use modern energy which is cost effectiveness and operating of machine is also easy. As the energy is cheap so per unit production cost is also cheap compare to diesel or kerosene energy.

4.2.2 Enterprises Open More Hours:

Household income is expected to rise after electrification. Electricity is expected to offer new income generating sources or improve existing ones. The extension of working hours into the late evenings as well as adjusting household chores at different times of the day resulting from the presence of electricity are found to aid in raising incomes. In a village where electric bulbs were not used, most of households and any type of micro-enterprises finished their last task before sunset. In one word after sunset all work would be finished and everyone prepared to bed

early. In my investigation I have to found that after electrification people are more conscious to use time. For example, a tea stole in village Motbari said that before electrification he used kerosene lamp in his stole at evening and it would be opened at 6.30 p.m. He closed his stole early because of not availability of customers. After sunset villagers go back their owns nets. But now the situation is different, electricity is available and every enterprises use electric power. With the other enterprises, the tea stole also use electricity bulbs and also use additional small lights in front of stole for that more customer would be attractive.

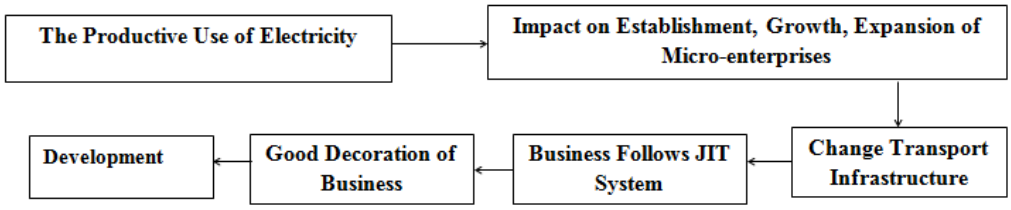
4.2.3 Reduce Manpower to SMEs:

From the survey it has been found that in a manually handled enterprise need more workers for example graining millers who need only one person to operate machine and require two or three additional workers to help him. On the other hand before electrification more man power were necessary as such 10 or 15 workers were necessary to grain rice crops. In these villages, before electrification most of the farmers were used cows to grain rice crops. For that more hours were wastage but now only 1 or 2 hour needed for huge rice grain with the help of electricity. For shrimp cultivation, my surveyed villages are specially shrimp enterprises based. Two household out of three households have shrimp enterprises and those households who have no shrimp enterprises are also engaged to shrimp enterprises. They are engaged as monthly paid labor, Daily labor etc. Most of the shrimp enterprises are large and need more labor to duty at night to save shrimp's fish from thief. Before electrification, labor was used battery torches. These torches did not cover more spaces for a one labor, so needed more labor and spent more money to wages. But after electrification shrimp enterprises use electric bulbs which have more power. It has been found that now each enterprise has only 2 or 3 labor just to help owner because at night the light can cover all the space of shrimp enterprises. From the two examples we can conclude that modern energy saves money that is cost effectiveness, easy to use, reduce operation cost of enterprises and reliable.

4.2.4 Higher Profit Margin:

In the survey villages enterprises profit margin is high and also provide quality product. As the man power is lower than the previous situation for the same task, which generates higher profits. After electrification the machines replaces with men so need not more manpower and at the same time also produce quality products. Above the two examples, for grain milling, only 2 or 3 person need to production after electrification where 10or 15 person need before electrification. As the man power is lower for the same production so profit margin must be increased. For the shrimp enterprises, after catches the fish the owner sell it to wholesaler and then wholesaler sell it to dealer. This may take a long time. Before electrification fish wastage rate is high because ice does not protect the fish properly but now large refrigerator is used to protect and that must ensure the best quality. More service, more hours and get more profit. After electrification most the enterprises open long time because customers may also come after sunset. As the customers are available, more products must sell and ultimate result would be profit.

4.3 Development & Modernization of Business:



4.3.1 The Productive Use of Electricity:

The farmers use electric light in the evenings to package the vegetables properly, produce their household utensils and prepare their produce to sell the following day. The main cash income source for some peoples especially the shrimp enterprises, tailoring, retail shops, grain milling, rice milling that can continue after sunset by using electric power. Before RE they did it during the day which hampered other farm activities, but now they do it in the night. An attempt was made to investigate qualitative impact of electricity on the production of various micro-enterprises at Paikgacha. Observations are made and questions are asked to elicit data on production of some rural enterprises. I have to interview some of the enterprises owners, workers, villagers, politicians, students, teachers etc. especially my maximum interviewers were entrepreneurs. Some production efficiency indicators, namely increased productivity per worker, price reduction per unit and increase in gross revenue per day were used to estimate the impact of electricity on micro-enterprises. I found that introduction of modern technology in form of machinery and tools provided the most dramatic and significant beneficial impact of electricity on microenterprises studied at Paikgacha. The productivity per worker increased, both in the quantity and quality of products made, leading to increase in volume of sales, hence higher gross revenues per day.

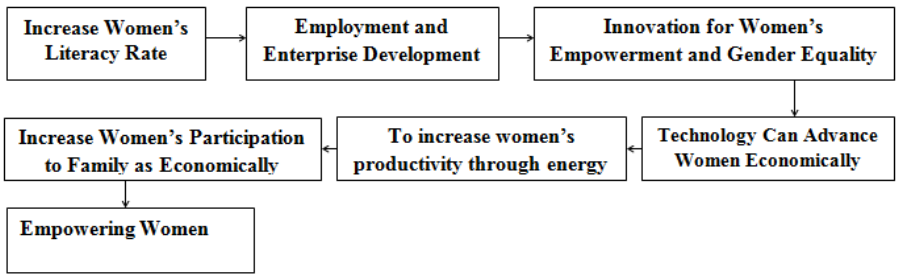
4.3.2 Good Decoration of Business:

Decoration of a business helps to attract more customers and sell more products. As energy is available and energy cost is lower than other sources so now the owners may decorate their enterprises. For example, a tea stole is small shop and its major sell would be occurred after sunset. So the owner decorates his stole with colored lighting which is very attractive. He also has a color TV with cable line.ost of the time the cinema, drama or video songs play so customers come to see TV and get tea after tea. As more customers come and sell more so earn more profit. It's all would be possible through electrification.

4.3.3 Change Transport Infrastructure:

The development of areas depends on its transportation system also. How easily people move to another place can generate to change economic scenario. Before electrification the two study area, the main transportation road was mud and basically there had not no vehicles for transport. In the rainy season the people had not go out and the enterprises had been suffered from that season. But now after electrification, the economic conditions of entrepreneurs are better than before. As the areas are getting developed gradually and the rural enterprises also have strong participation to our national economy so the govt. are more conscious to develop rural infrastructure. Now these areas have concrete road so the customers are available even in rainy day and enterprises can transport their product to one another.

4.4 Impact on Women Empowerment:



4.4.1 Increase Women's Literacy Rate:

In where female education rate is high, so that society is also developed from every side. From the situation of my survey areas, before electrification women were only involved in household work and they wouldn't have enough to go school, to read book because the day time was most important for their own task, prepare meal, look after their animals and also went to bed early because of energy cost and shortage. But now energy is available so after sunset they also have enough time to read, to watch TV, to learn computer literacy. As they are now conscious about their ability, rights and also have ability to take higher education.so education rate is increased.

4.4.2 Employment and Enterprise Development:

Women's work is crucial to the survival of poor households and an important route through which families escape poverty. When women earn an income, they are more likely than men to spend it on food, education and health care for their children and families. And research shows that women's access to employment can be empowering: it boosts women's self-esteem and bargaining power within the household, gives them more mobility and exposes them to new ideas and knowledge. From my survey eight (8) entrepreneurs of twenty (20) enterprises are women and they are doing such business tailoring, retail shops etc. The owners say that they have one or two worker or employees, so here employment may be created and enterprises also developed.

4.4.3 Innovation for Women's Empowerment and Gender Equality:

From my task I have to found how creative ideas intersect with women's economic, social and personal development. Including women in innovative pursuits can produce fundamentally deeper benefits. Innovation can catalyze change and help dramatically shift persistent inequalities between them and men. It also can arm women with the ability to recognize new opportunities and the confidence to dive into them.

4.4.4 Technology Can Advance Women Economically:

After electrification many modern technology may be introduced in this locality that can enable women to develop their economic potential, become stronger leaders and to more effectively contribute to their families, communities and local economies. Specifically, we've found that various technologies can help women increase their productivity as well as launch income-generating pursuits and entrepreneurial ventures

4.4.5 To increase women's productivity through energy:

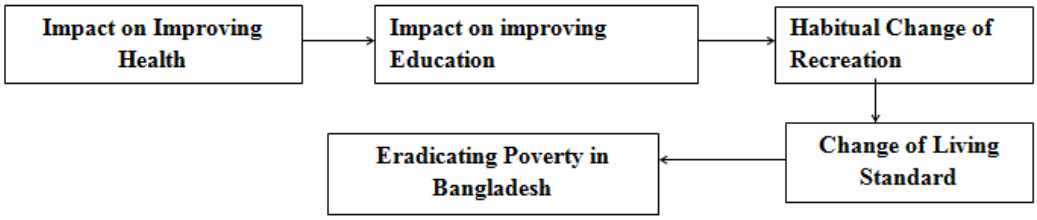
Some energy projects have the potential to help women produce more efficiently and to produce more in a quantitative sense and better quality products leading to higher incomes for the women and their families and to development in an economic sense. Examples include: electric sewing machines to replace hand machines, electric driers which give a better quality product; electric light allowing work in the evenings, refrigerators allowing the sale of cook drinks; and computer supporting business enterprise. There are in fact a huge variety of interventions possible, most of which have an important energy component.

4.4.6 Increase Women's Participation to Family as Economically:

In my survey villages most of the family earners are men because women are illiterate and also shortage of wealth they do not operate a business and also security is one of the main factor especially after sunset. As in the villages women's performs all of the household works so they

do not stay outside for a long time. But after electrification girls go to school and have much time to read apart from their household works. Women are now trying to start a new business inside home or nearby home. In these villages some of the women are involved in tailoring, sewing, agriculture, hatchery, retail shops etc. And they also open their business after sunset. As the woman's literacy rate increases and more conscious about the world and economy, their intention also higher to participate to family especially economic help along with men.

4.5 Impact on Quality of Life



4.5.1 Impact on Improving Health:

Most scholars agree that rural electrification has positive bearings on health. After the electrification of rural areas, significant social improvements took place:, new hospital is set up and the number of health centers increased. So people can easily visit to near hospital or dispensary to get better service that save time and money also. The health benefits from RE operates through a number of channels: Improvements to health facilities, Better health from cleaner air as households reduce use of polluting fuels for cooking, lighting, Improved health knowledge through increased access to television, Better nutrition from improved knowledge and storage facilities from refrigeration in dispensary.

4.5.2 Impact on improving Education:

The number of education institutions with lighting and night classes increased considerably**.** The main channels through which electrification may affect education are (1) by improving the quality of schools, either through the provision of electricity-dependent equipment, or increasing teacher quantity and quality; and (2) time allocation at home, with increased study time, though the availability of TV may decrease that time (but at the same time it may also possibly provide educational benefits). Children in electrified households have higher education levels than those without electricity.

4.5.3 Habitual Change of Recreation:

Before electrification the people of the studied areas were poor so their recreation system was poor and simple. They did not have ability to fulfill their family's demand. Now at home they have TV, CD, VCD, and Computer. For their idle time they their time with watching TV, CD and sometimes make tour to historical spot. At past, children were past their to play ground but now they play game on computer. All of these can be done for their economic ability and rural electrification helps the people to build as economically and to run electric device.

4.5.4 Change of Living Standard:

From my studied areas now people's economic condition is better now. As there have more opportunity to earn so their expenses scenario is also changed now. Before electrification in these areas the living house were very normal which was not perfect for living but now twelve (12) of twenty (20) interviewers say me they are living in pacca (building) house and ten (10)

interviewers say that they have refrigerator for household use. All interviewer are now used at least one mobile phone for personal communication and their family members also have 2 or 3 mobile phone which was dream before electrification.

4.5.5 Eradicating Poverty in Bangladesh:

The incidence of absolute income poverty at the national, urban and rural level is 42.10%, 37.90% and 43.30% in 2004. In my surveyed villages people now engaged in any work from which they can earn their livelihood. Twenty (20) samples of enterprisers out of twenty (20) owners are agreed in this case that they have better ability to fulfill their daily need. They also inform me their village's economic condition is better compare to previous. Rural electrification has facilitated economic development in the surveyed villages with some households

(i) Engaging in micro-enterprise such as using electrically driven machines or even engaging such diesel operated machines beyond day light hours.

(ii) Extending livelihood activities later into the evenings to prepare farm produce for sale, spending more time in weaving, carpentry and other chores.

(iii) Longer opening hours of the few shops in the villages and earning some income by entertaining the villagers with movies through television sets.

These activities have increased the productive output (employment) and hence income of the rural people in electrified villages. As such, rural electrification supports achieving the MDG target of having 20% of the Bangladeshi below the poverty line by 2015.

5. CONCLUSION AND IMPLICATION:

Though some opinion is against the cost effectiveness, most of business owners are agreed with low connection cost, affordable, reliable, and easy to use and also provide uninterrupted service. As a result organizations can produce more products, open more hours, sell more products and earn higher profit. When the earnings increased then it ultimately impacts quality of life such as improving health and literacy levels, raising household income, providing employment, preserving the environment, curbing rural-urban migration and stemming population growth, empowering women and many more. Some of these benefits are clear some are subtly hidden from our perceptions.

REFERENCES:

1. ADB, (2003).'Report and Recommendation of the President to the Board of Directors on a Proposed Loan and Technical Assistance Grants to the Bangladesh for the Rural Electrification and Network Expansion'. ADB Report, Manila: Asian Development Bank (ADB).
2. Barnes, D.F, (1988), "Electric power for rural growth: How electricity affects rural life in developing countries." Westview Press, Boulder.
3. Godwin, C. (2005) "Impats of Electricity Services on Micro-Enterprise in Rural Tanzania"; maleko department of energy and sustainable development, university of Twente, enschede.the Netherlands..
4. James.B, (1995). The Impact of Rural Electrification: Exploring the Silences. Energy and Development Research Centre University of Cape town.
5. Kirubi, C (2006), How important is modern energy for micro-enterprises? Evidence from rural KenyaMaster of ScienceinEnergy and ResourcesUniversity of California, Berkeley.

6. Kjellstrom, B. (1992). "Rural Electrification in Tanzania. Past Experience-New Approaches, Report prepared within the research co-operation between the Tanzania Electric Supply Company and the Stockholm Environmental Institute (SEI).ISBN 91-88116-492.
7. Meadows, K., Riley, C., Rao, G., and Harris, P. (2003). Modern Energy: Impacts on Microenterprises. Report of Literature Review for DFID KaR-R8145.
8. Nelson, E.G (2003).The Voluntary Formalization of Informal Enterprises in a Developing Economy – Tanzania. University of Twente, The Netherlands.
9. Rogerson C. M. (1997). Rural Electrification and the SMME economy in South Africa.Energy & Development Research Centre, University of Cape Town.
10. Rogerson, C. M. (2001).Insearch of the African Miracle: Debates on successful small enterprise development in Africa. Habitat International 25 (2001) 115-142; Department of Geography and Environmental Studies, University of the Witwatersrand, Johannesburg.
11. UNDP 2005b.'Energizing the Millennium Development Goals, A Guide to Energy's Role in Reducing Poverty'. UNDP Pablication, No. 109, New York: United Nations Development Programme (UNDP).
12. Warld Bank 2003. 'Monitoring and Evaluation in Rural Electrification Projects: A Demand-Oriented Approach, ESMAP'. World Bank Report, Washington D.C.: World Bank.