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The Analysis of Socio-economic Impacts of Solar Renewable Energy: A Case Study of Patuakhali

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Abstract–*The aim of the study is to analyze the socio-economic impacts of solar renewable energy to develop lifestyle of rural people of Patuakhali district. Solar renewable energy is environmental friendly technique to meet rural electricity demand. The researchers used positivism research philosophy, deductive research approach and quantitative research method to conduct the study. The effects of solar renewable energy at socio-economic development indicates to increase studying hours of children, improving entertainment opportunity and increasing business functions at rural areas of Patuakhali. It can improve the rural lifestyle and create mobile business opportunity for generating household income.*

Keywords: *Lifestyle, Patuakhali, Renewable Energy, Socio-Economic Development, Solar Energy.*

1. INTRODUCTION

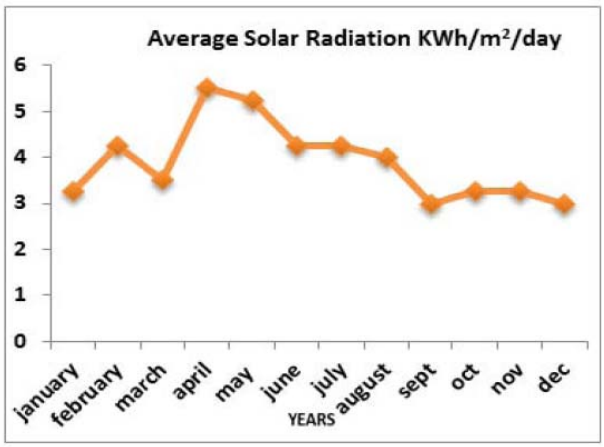
Bangladesh is facing challenges from vulnerability of energy crisis for both household and commercial use as a low income based developing country. Natural gas is the heart of this country's energy use where 81.72 percent electricity can generate by non-renewable energy resource. The electricity demand is increasing and it put pressure on non-renewable energy resources such as natural gas and coal (Ullah et al, 2012). The alarming threats of energy crisis are compelling the policy makers of Bangladesh to choose renewable energy resource development. The potential renewable energy resources of Bangladesh are solar, biomass, biogas, and hydropower energy (Islam et al, 2006; Islam, 2009; Deb et al, 2013). Solar energy is most effective renewable energy resource that can provide home based energy supply at rural areas of Bangladesh (Wahi and Ahsan, 2012). Bangladesh is trying to popularize solar energy for mitigating the demand of electricity where grid electricity is not present. The selection of study area is vital for study to collect primary data. The researchers are taken Patuakhali district of Bangladesh as study area for analyzing the socio-economic impacts of solar renewable energy. Only 4.2 million households are getting electricity supply about 25 million households of Bangladesh (Deb et al, 2013).

Most of the rural areas households are not getting grid electricity and thus can indicate huge demand of electricity to develop rural socio-economic conditions. The target for solar energy development is rural households those are out of grid electricity network (Shahriar et al, 2011). The rationale of the study indicates to analyze the rural people's socio-economic development after installing Solar Home Systems (SHS) that is environmental friendly power system. Solar energy installation at rural households is not only providing environmental friendly energy resource but also providing the socio-economic development of rural areas of Bangladesh (Baten et al, 2009; Rahman et al, 2013). Patuakhali is a southern district of Bangladesh where rural areas electrification is very low under grid electricity network. The impact of solar renewable energy develops socio-economic condition of rural people of Patuakhali and its investigation is the problem statement of the study.

2. LITERATURE REVIEW

The excessive pressure on electricity supply for both household and commercial use has increased a lot that can attract rural people to use environmental friendly solar renewable energy (Asaduzzaman et al, 2008; Khalid et al, 2012; Trainer, 2013). Total 38 percent population of Bangladesh has access to grid electricity supply to meet their electricity demand (Deb et al, 2013). Total 62 percent people's electricity demand leads to use solar energy at rural areas of Bangladesh as alternative electricity supply (Ullah et al, 2012). The non-renewable energy resources have limitation and excessive pressure on these energy sources cannot lead sustainable development of energy resource management (Rahman et al, 2013). The policy of Government of Bangladesh is moving towards the utilization of renewable energy resources for ensuring environmental friendly sustainable energy security (Sarkar et al, 2003; Wahi and Ahsan, 2012). Different government and nongovernment organizations are working for the development of renewable energy technologies (RET) adaptation to meet the demand of energy (Islam, 2009). The supply of electricity and quality of lights of solar energy system is important for developing long term sustainability of SHS at rural areas of Bangladesh (Khalid et al, 2012).

The reliability of solar renewable energy can increase at rural areas as alternative electricity supply (Deb et al, 2013). The appeal of SHS energy feature has broad market acceptance at rural areas for existing barriers of large scale implementation to get grid electricity supply (Asaduzzaman et al, 2008). Rural people of Bangladesh use solar energy for mitigating their electricity demand. Bangladesh is trying to overcome the lacking of using solar renewable energy resource at rural areas to adapt scientific process of electrification (Baten et al, 2009). The use of solar renewable energy is becoming popular at rural areas for depleting the use of non-renewable fossil fuel (Sarkar et al, 2003; Wahi and Ahsan, 2012). Solar energy is vital source for solving the electricity power crisis at rural areas of Bangladesh (SarkaDeb et al, 2013). The geographic location of Bangladesh is vital for utilizing the solar energy where the amount sunlight is sufficient to develop solar energy based rural electrification system (Islam et al, 2006; Baten et al, 2009; Ullah et al, 2012). Monthly average solar radiation curve of Bangladesh is given below:



Source: Rahman et al, 2013

Fig. 1: Monthly Average Solar Radiation in Bangladesh

The analysis of Fig. 1 indicates the value from this curve over 3 is effective to use solar energy for setting SHS but value over 4 is highly effective to use solar energy as electricity energy. The months of February, April, May, June and July have value above 4 that is highly productive for using solar energy (Shahriar et al, 2011). Therefore, all the months are effective for producing electricity by solar energy (Rahman et al, 2013). According to the analysis of Deb et al. (2013), solar power system provides 4373 hours electricity per year in Bangladesh. The use of SHS can provide effective electricity supply to develop the lifestyle of rural people. The leading organizations of installing SHS at rural areas of Bangladesh are Grameen Shakti, REB, BRAC, IDCOL, Rahim Afrooz, Integrated Development Foundation, BRIDGE, TMSS, Srizony Bangladesh and few others (Ullah et al, 2012). The use of SHS is cost effective for rural people that can provide long term service to get electricity service by solar renewable energy.

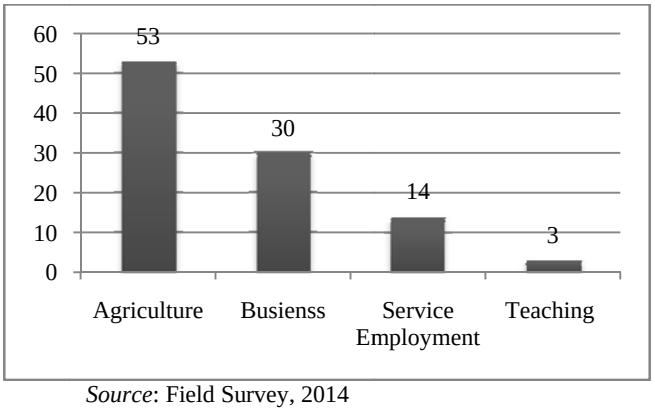
3. METHODOLOGY

The methodology of the study is indicating to use positivism research philosophy with the aid of deductive research approach. Case study based research strategy has developed with questionnaire survey on solar energy installed households. The researchers have used quantitative research method to analyze the socio-economic impacts of solar renewable energy resource. The researchers have conducted 36 questionnaire surveys on rural households of Patuakhali district. The researchers has used both open-ended and close-ended questionnaire for making the research outcome fruitful. The respondent SHS installed households are selected from purposive sampling procedure.

4. FINDINGS AND ANALYSIS

Energy issue is concentrating to socio-economic impacts where the solar renewable energy makes the research fruitful to analyze the conditions of village households. The researchers have analyzed the installed SHS respondent household's leading earning sources that can analyze by a Fig. below:

The analysis of Fig. 2 indicates the primary data findings representation of SHS installed household's major income source where leading earning source is agriculture with 53 percent response. Total 30 percent households earning source is business, 14 percent households earning source is service employment and only 3 percent households earning source is teaching.



Source: Field Survey, 2014

Fig. 2: Major Earning Source of SHS Installed Households

4.1 Impact of Lighting Facility

The researchers have analyzed the lighting facilities of SHS installed households and the finding represents these households are using kerosene lamp before SHS installation and electricity lights after SHS. Solar renewable energy resource improves the lighting facility of rural people of

Patuakhali that helps to increase the socio-economic status of SHS installed households.

4.2 Impacts on Lifestyle

The daily working system and lifestyle of rural people of Patuakhali has changed after the use of solar system based electricity. The household activities before and after SHS has analyzed by the researchers to represent primary data findings, those are given below by a table:

Table 1: The number of hours per day for Social Activities before and after SHS installation

Social Activities	Before SHS	After SHS	Change
Studying Hours of Children at Evening	2	4	Additional 2 hours
Television Watching Hour	1	5	Additional 4 hours
Radio Listening Hour	4	2	Decrease of 2 hours
Women's Sewing Hours	1	3	Additional 2 hours
Evening Gossiping Hours of Male Person	1.5	3	Additional 1.5 hours
Daily Sleeping Hours	8	6	Decrease of 2 hours

Source: Field Survey, 2014

The analysis of table 1 represents significant change at lifestyle of SHS installed village households of Patuakhali where the evening studying hours of children has increased 2 hours. The television watching hours increased 4 hours per day and the television watching place was at village common place. SHS provides opportunity to watch television at home and that is another significant change of SHS installed households. Radio listening hours decreased 2 hours because household members are watching television instead of listening radio. Women's sewing hours was only 1 hour at day time but that also increased 2 hours and increasing time comes from evening hours. Male persons evening gossiping hour was 1.5 hours before installing SHS and it also increase 1.5 hours due to the presence of better light quality. The lifestyle has changed after SHS installation because family members sleep 8 hours before SHS and they sleep 6 hours at present time and can decrease 2 hours sleeping time.

4.3 Impact on Poverty Reduction and Household Income Generation

The researchers have found a positive relation within SHS installation and income generation of SHS installed households that can help to reduce their poverty. Women are engaging with sewing activities and it can help to generate family's income and to reduce the poverty. The socio-economic impact of SHS to reduce poverty and increase family income can analyze by a table below:

Table 2: Income generating hours per day before and after SHS installation

Income Generating Activities	Before SHS	After SHS	Change
Mobile Phone Business Hours	0	10	Additional 10 hours
Grocery Shop Business Hours at Evening	2	4	Additional 2 hours
Tailoring Hours	1	3	Additional 2 hours
Sewing Hours	1	3	Additional 2 hours
Pharmacy Business Hours at Evening	2	4	Additional 2 hours
Furniture Business Hours at Evening	1	4	Additional 3 hours

Source: Field Survey, 2014

According to the analysis of table 2, mobile phone business was not established before SHS and SHS provide opportunity to conduct 10 hours mobile phone business per day. SHS has significance to add 2 hours at evening grocery shop business, tailoring hours and sewing hours that can increase family income. Pharmacy business also increased 2 hours at evening and furniture business also increase 3 hours at evening and that can help to develop socio-economic conditions of rural people of Patuakhali due to effective use of SHS.

4.4 Impact on Household Assets

Mobile phone use becomes effective at rural areas of Patuakhali by solar electrification and increases mobile phone household assets. The use of television, radio and cassettes are increasing household assets of rural people after the installation of SHS.

5. CONCLUSION

The use of solar energy at Patuakhali is a scientific technique to use abundant sunlight to meet rural household electricity demand. It can provide support to improve the lifestyle of rural people by developing their socio-economic status. Solar renewable energy provide electricity supply to rural people those are not connected with grid electricity. It can increase electricity supply without any pressure to non-renewable energy resources such as natural gas and coal. Home based solar electrification is cost effective for rural people and helping to increase the studying hours of their children. It can provide more sewing and tailoring opportunity for rural women to increase household income. Rural business hours and entertainment opportunity also increase due to the effective use of solar renewable energy.

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REFERENCES

[1] Asaduzzaman, M., Barnes, D.F. and Khandker, S.R. 2008. *Restoring Balance: Bangladesh's rural energy realities.* ESMAP Report. World Bank, Washington DC.

[2] Baten, M.Z., Amin, E.M., Sharin, A., Islam, R. and Chowdhury, S.A. 2009. *Renewable Energy Scenario of Bangladesh: Physical Perspective,* International Conference on the Developments in Renewable Energy Technology (ICDRT), Dhaka, Bangladesh.

[3] Deb, A., Bhuiyan, M.A.M. and Nasir, A. 2013. Prospects of Solar Energy in Bangladesh, IOSR Journal of Electrical and Electronics Engineering, Vol. 4 (5), pp. 46-57.

[4] Islam A.K.M.S., Islam, M. and Rahman, T. 2006. Effective renewable energy activities in Bangladesh, *Renewable Energy,* Vol. 31 (5), pp. 677-688.

[5] Islam, S. 2009. *Renewable Energy Development in Bangladesh*, IDCOL, Madrid, Spain.

[6] Khalid, M.B., Tariq, M.S.H. and Iftakhar, N. 2012. *Impact of Solar Home System to Meet Energy Crisis and Contribute to Poverty Alleviation in Rural Areas of Bangladesh*, Conference paper on "the developments in Renewable Energy Technology, Dhaka, Bangladesh.

[7] Rahman, M.S., Saha, S.K., Khan, M.R.H., Habiba, U. and Chowdhury, M.H. 2013. Resent Situation of Renewable Energy in Bangladesh: Renewable Energy Resources Existing in Bangladesh, Global Journal of Researches in Engineering, Electrical and Electronics Engineering, Vol. 13 (5).

[8] Sarkar, M.A.R., Ehsan, M. and Islam, M.A. 2003. Issues relating to energy conservation and renewable energy in Bangladesh, *Energy for Sustainable Development,* Vol. 7 (2), pp. 77-87.

[9] Shariar, K.F., Ovy, E.G. and Hossainy, K.T.A. 2011. *Closed Environment Design of Solar Collector Trough using lenss and reflectors,* World Renewable Energy Congress, Sweden.

[10] Trainer, T. 2013. Can the world run on renewable energy? A revised negative case, *Humanomics,* Vol. 29 (2), pp. 88 – 104.

[11] Ullah, M.H., Hoque, T. and Hasib, M.M. 2012. Current Status of Renewable Energy Sector in Bangladesh and Proposed Grid Connected Hybrid Renewable Energy System, *International Journal of Advanced Renewable Energy Research,* Vol. 1 (11), pp. 618-627.

[12] Wahi, R.R.-H. and Ahsan, N.U. 2012. *Feasibility Study of Solar Home System in Rural Areas of Bangladesh: Prospect, Progress and Challenges,* Proceedings of the Global Engineering, Science and Technology Conference, Dhaka, Bangladesh.