AN ANALYSIS OF THE SOCIO-ECONOMIC IMPACT OF SOLAR HOUSING SCHEME ON RURAL LIVELIHOODS IN TAMIL NADU

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Abstract:

Infrastructure plays a crucial role in promoting economic growth and development of a nation. Since India adopted the strategy of developed countries to achieve rapid economic growth by accelerating industrial development a number infrastructural developments have been taking place. These developments have further widened the rural-urban divide. A large proportion of the population living in rural India still suffer from severe infrastructural inadequacies. According to census of 2011, only 45.9 % of the houses in rural areas are said to be in good condition. While 47.6% of the houses are in livable condition about 6.5% of the census houses in rural areas in India are said to be in dilapidated condition. Grass, Thatch, Bamboo, Wood and Mud etc., are the predominant material in roof in 20% of the rural households. The domestic consumption of electricity has been growing at a faster rate compared to other sectors due to increased urbanisation, higher disposable income and changing lifestyles. However, electricity as a source of lighting is only accessible to about 55% of the rural households and a majority of the rural households suffer from inadequate housing facilities which have an impact on quality of living. Most of the houses provided by the Government are either too small or lack basic facilities like proper sanitation.

In order to address challenges in infrastructural inadequacy, in the rural economy the Government of Tamil Nadu has pioneered the launching of a comprehensive program that

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encompasses provision of rural housing, adequate sanitation facilities, better health and basic energy requirement. The Solar Powered Green House Scheme of the State Government of Tamil Nadu is committed to construct 3 lakh houses during a period of 5 years from 2011-12 to 2015-16 with solar lighting system for the benefit of the rural poor. The Chief Minister's Solar Powered Green House (CMSPGH) Scheme is the first ever comprehensive scheme in the country that focuses on addressing the basic electricity need as well as housing need. The present study has been undertaken with the purpose to understand how the scheme has affected the living conditions of the rural beneficiary households. The study also tries to identify how the solar lighting and the housing facility is valued by the beneficiaries.

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Key Words: Solar Lighting, Solar Housing, CMSPGH Scheme

Introduction:

Tamil Nadu being the fourth largest economy in the country after Maharashtra, Uttar Pradesh and Andhra Pradesh, is also the most urbanised state with 49% of its population living in Urban areas. The focus of rural development in Tamil Nadu is Economic Growth with social justice. It aims at improving the living standards of the rural population by providing efficient and adequate quality services. Though rural poverty has reduced remarkably there are regions still which lack the basic socio-economic amenities. According to the Census 2011, about 76.8% of the households in Rural Tamil Nadu do not have sanitation facilities and 6.5% of the households have no access to any of the basic consumer durables and assets. Electricity is accessible as a source of lighting in about 90.8% of the households whereas the rest of them are still dependent on the conventional sources.

In order to provide the access to better housing condition and basic lighting facilities to the rural poor the Government of Tamil Nadu had launched the Solar Powered Green House Scheme 2010. The Scheme is committed to construct 60000 houses called as "Pasumai Veedugal" at a unit cost of Rs.180,000 during the 12th five year plan period. Each house is designed to measure

300 square feet. An exclusive solar lighting system has been installed for lighting purpose comprising of a Solar panel, Battery, Inverter and 5 CFL lights. The beneficiaries are selected from the BPL families in the ratio of 29:1:70 for SC, ST and others respectively.

The Chief Minister's Solar Powered Green House Scheme (CMSPGH) is the first ever comprehensive scheme in India that focuses on addressing the basic electricity need as well as housing need. The solar lighting system supports 5 Compact Fluorescent Lamps (CFL) of 9 Watts, one each in living room, bed room, kitchen, toilet and veranda. The CFLs receive power from a 100 watt solar photovoltaic (SPV) installed. However in the consecutive years guidelines were issued to install Light Emission Diode (LED) based lights in not exceeding 30000 houses. This includes two numbers 7 Watt LED each in hall and veranda, two numbers 5 Watt LED in each kitchen and bedroom and a 3Watt LED in toilet. Power is generated from a 50 Watt solar panel in case of LED lights. An amount of Rs.30,000 per house has been allocated for the SPV lighting system. The CFLs or LEDs can be operated for 5 hours a day. During the year 2012-13 of the 60,000 houses taken up for construction, the lighting systems in 49650 houses were CFL based while 10,350 houses were LED based. The solar wiring has been done under the scope of Tamil Nadu Energy Development Agency (TEDA) while the Rural Development and Panchayat Raj Department is responsible to complete the civil works of the houses for installation of the lighting system by TEDA. The solar home lighting system has a grid backup. Therefore the lights receive power from the grid in case of a battery or inverter failure. Further, a call centre has also been established to address the grievances of the beneficiaries.

The Objectives of this study are:

a. To study the benefits derived from the solar lighting system.

~~b.~~ To analyse the changes in the socio economic conditions of the beneficiaries scheme and examine the overall satisfaction from the scheme.

c. To understand the beneficiary satisfaction with the overall scheme.

d.

Background of the study

Adequate housing is one of the basic requirements of human life. According to United Nations' Right to Adequate Housing Toolkit, "The human right to adequate housing is more than just four

walls and a roof. It is the right of every woman, man, youth and child to gain and sustain a safe and secure home and community in which to live in peace and dignity". It also provides seven elements of the right to adequate housing. It includes legal security which ensures security of tenure and protection against forced eviction, affordability which is achieved when financial costs involved in housing does not force people to compromise on other basic commodities such as food, health care, education etc., habitability which includes adequate space, protection from different kinds of weather conditions, accessibility that provides for the specific needs of the disadvantaged and marginalized groups of the community, location that facilitates access to various services and cultural adequacy. Another foremost important element is the availability of services, materials, services facilities and infrastructure. This element stresses upon the need to have an adequate housing infrastructure with access safe drinking water, adequate sanitation facilities, energy for cooking, heating and lighting etc.

The Census data of India provides a detailed report on the housing conditions of the people in India. It provides information on the housing conditions, amenities available to the households, such as the availability of drinking water, access to electricity, cooking fuel and a number of other facilities available to households. The Census data generally classifies the houses into permanent, semi-permanent and temporary houses depending upon the predominant material used in the construction of the walls and the roof. It identifies the number of houses with permanent and temporary roof materials such as tiles, asbestos sheets, brick, stone, concrete, thatch, grass, wood, bamboo, mud etc. Those houses constructed with thatch, grass, wood, bamboo are all treated as temporary houses. This information is also available for states and districts within states. As per the Census data for Tamil Nadu about 5 % of the urban households and 20% of the rural households live in temporary houses.

Galster (1987) defined housing satisfaction as "a psychological measure of the perceived gap between a respondent's residential needs and aspirations and the reality of the current residential context." According to him housing satisfaction is a function of home owner's prior residential experiences, perceived status, household and dwelling characteristics, neighbourhood characteristics and household needs among other variables.

Theories of Residential Satisfaction and of human needs run parallel to each other. Shelter appears as one of the basic need for human well being in every study of human needs and quality of life. Maslow proposed human needs in the form of a hierarchy. The housing and the lighting feature of the CMSPGH scheme has been successful enabling the beneficiaries to meet the first two levels of needs, namely the physiological and the security needs as in the Maslow's hierarchy. This study focuses on the success of the scheme in addressing the housing and lighting needs of the rural poor households.

Methodology of the study

Post Occupancy Evaluation (POE) is a renowned approach applied in a number of studies that focusses on residential satisfaction. According to Preiser et al. (1988) POE has been defined as the act of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time. The POE had its origin in late 1960's in the form of case studies. The POEs then has been said to have focussed on residential environment and housing design. While several technical evaluations are made during planning, programming, designing and construction, POE measures building performance in terms of lighting levels, spacing and other housing features. It primarily focuses on the experiences of the users. The present study is based the experiences of the beneficiaries' of the CMSPGH Scheme. As the beneficiaries have already occupied the houses constructed under the CMSPGH scheme, POE is considered to be the most appropriate approach to study the scheme.

The present study is completely based on the qualitative primary data collected through a Focus Group Discussion (FGD) with selected beneficiaries of the scheme in the district of Trichy. Powell and Single define focus group as "a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research." It provides an in depth knowledge on the research problem under study by generating discussions and arguments among the participants. Trichy being the first district to have completed the implementation of the scheme for the year 2011-12, it was chosen to conduct the focus group discussions and to understand the beneficiary's experiences and response to the scheme.

Tiruchirappalli also known as Trichy is situated in the central south-eastern part of India has a geographical area of 4403 square kilometres. More than 50% of the population of Trichy lives in rural areas. Agriculture being the primary occupation of majority of the population in rural areas, Rice, millets, pulses, sugarcane, groundnut, gingili and cotton are the major crops cultivated. According to the Tamil Nadu Human Development Report that was published in 2003, Trichy ranked 7th in Human Development with a Human Development Index of 0.671 and 21.6% of the population were below poverty line. The district was ranked 13th in terms of real GDP per capita. As per the census 2011 Trichy has a population of about 27 lakhs. It is one of the densely populated districts of Tamil Nadu. The overall literacy rate is about 83.56% while the literacy rate in rural areas is about 76.69%. The district has a higher sex ratio of about 1010 females per thousand males.

The Focus Group Discussion (FGD) was conducted in the Panchayat office of the Allur village of Andhanallur district in Trichy. 8 beneficiaries were chosen from this village from among who were willing to participate in the focus group discussions. Maximum care was taken to ensure participation of beneficiaries from different social and economic back grounds. The focus group met on May 07, 2014. The participants were informed about the purpose of the interview and consent was taken from all of them. A number of open-ended questions were framed related to the scheme to collect all the essential information about how they have benefitted from the scheme and to understand the beneficiary's opinion general comments about scheme and its implementation. The focussed group discussion lasted for about 25 to 30 minutes. A number of open ended questions were examined to see the impact the scheme had on the livelihood of the beneficiaries.

Analysis of the FGD

The study indicates that the housing infrastructure has influenced a number of aspects governing residential and housing satisfaction which in turn reflects in the responses of the beneficiary households on housing satisfaction. There were varied responses with respect to the performance of the solar lighting system and the utility that the beneficiaries derived out of it.

The general response given by the participants, who were the beneficiaries of the scheme, was that the scheme had brought about a drastic change in their lives by improving their dwelling

conditions. All the participants highlighted the fact that they were living in dilapidated housing structures with poor infrastructural facilities. About five respondents did not have sanitation facilities in their previous house. Two of them said that they were living in rented accommodation where they paying a rent of Rs.500 and that this scheme has enabled them to move into their own houses where they are able to enjoy more freedom than in a rented accommodation. They feel happy and contended to be living in their own houses. And they also feel that their social status has improved with the help of this scheme. This indicates the impact of the scheme on the psychological well being of the beneficiaries.

All the respondents shared their experiences when they were living under poor housing conditions prior to availing the scheme. They are now highly satisfied in the present housing structure. Though they had to spend some money out of their pockets for the construction house they were highly motivated to take up the scheme so that they could live in the houses of their own. Many felt that if this scheme hadn't been there they would have been living in same conditions as before with poor housing infrastructure. The focus group participants also shared the immense problems they had to face especially during rains in poor housing structures. But now they feel much safe and secure and need not worry even when there are heavy rains. The additional space people have in their homes has led to increased privacy for the residents. They seem to have more privacy now than before with more space. The solar lighting system has provided them a reliable source of lighting especially during power cuts. While all other houses in the neighbourhood become dark during power cuts the beneficiary houses are lit up with solar lights with which they feel safe and comfortable. They are able to do their domestic work and other activities even during power cuts. The participants feel that the scheme has given them an opportunity to better housing infrastructure that they had aspired for.

The scheme also had an impact on the household's access to electricity connection. Three participants of the focus group said that they did have a proper grid connection, while three other participants did not have a separate grid connection and were sharing a common line with their neighbour. The other two participants said that the electricity connection was under the hut service where electricity was provided free to run a fan and a light alone. The respondents also had issues that the electricity supply in their areas was not regular and they face long hours of

power cuts on certain days while it is at least 2 hours every day. Power supply is also said to be fluctuating. Those who were sharing a common meter with the neighbour said that they had no knowledge of the amount of power they consumed and just shared whatever was the monthly bill. While one of them said that they were paying a sum of Rs.100 every month to the neighbour for electricity irrespective of what their consumption was. Those who were under the hut service had no problem of electricity bill except for the frequent power cuts. And they were also concerned that they could not use high load appliances like televisions, mixers or grinders since the power supply erratic.

All those who did not have a separately metered grid connection were asked to take the connection before installation of the solar lighting system. Since the Solar lighting system provided was with a grid back up, all the beneficiaries who did not have a separate meter for electricity and were not billed for the consumption are now metered and are obliged to pay electricity bill for their electricity consumption directly to the electricity board. The scheme has gone a long way in streamlining and structurally organizing the payment mechanism with respect to electricity. The International Energy Agency(2010) proposes certain preconditions for successful rural measures. Effective metering, billing and payment recovery are observed as some of the preconditions for successful rural electrification measures. The CMSPGH scheme has made it mandatory for the beneficiaries to have a separate TNEB metered line for installation of the solar lighting system through by which the all the beneficiaries who consuming electricity without any charges are now being metered and are made to pay the consumption charges. The program has thus been successful in streamlining the Grid connections.

The respondents said that they were doing all their domestic chores with solar lights. Three participants said that their children were able study under the solar lights. Some of them said that said they could keep it on while watching television also and need not worry about the electricity bill. Some were very eager in saying that they only have solar lights in every room and no other light. They feel it is more reliable and saves electricity. They feel safer during nights even when there is a power cut. However two participants were not really happy with the brightness of the light. They feel that the lights are not bright enough and that it provides only minimal lighting. They also said that they had problems initially when the system was installed. The lights were

not glowing for more than half an hour and that it was rectified only after many follow ups with the concerned authorities.

When questioned about the changes in the electricity bill majority opined that their expenses have increased as far as electricity is concerned. This was because those who were under the 'hut service' connection and were not paying any electricity charges are now forced to pay at least the minimum charges bi-monthly. These people strongly disagreed to the fact that solar powered lights were reducing their electricity bills. Some of them are also doubtful as to whether the lights are glowing with the power generated by the solar panel or if it was taking electricity from the grid. The participants also feel that with better housing facilities they have been able to purchase many electrical appliances that reduced their domestic work burden and therefore their electricity consumption has also increased. Two of them said that they would be happier if the solar power system could support television and fans which will greatly help them in reducing their electricity bills. This indicates that the solar lighting system provided does not have the capacity to meet the basic energy requirements of the rural poor.

All the respondents strongly feel that the money provided under the scheme, was definitely insufficient to construct the house as per the guidelines provided by the government. All respondents said that they had a real struggle to raise the money to complete the construction of the house. Since the money was released in three instalments in various stages of building construction the respondents had to spend money out of their pockets initially. Two respondents said that they had to spend about a lakh extra over and above what was sanctioned under the scheme, while five of them had spent about 2.5 lakh more. One of the respondents had spent about 3.5 lakh more for construction. Six of the participants have pledged jewels to private money lenders to raise the required funds. Only one participant had managed to borrow from a co-operative bank by pledging some jewellery. Some of them have also sold their jewellery and one participant had sold a small piece of land belong to one of their family members. Some of them have also borrowed from their own relatives and friends. The respondents also said that the scheme was offered only if they had the capacity to raise additional funds required and complete the construction of the house. Those who had spent more than two lakhs extra were able to construct stair cases to the terrace and also managed to lay tiles for the flooring. They felt that

tiled flooring is easier to clean. One of the respondent had also constructed an extra small room since there were more members in this family. Most of the respondents said that they had managed to raise money by all possible means to complete the construction on time and that they never hesitated to spend more on housing as it was an asset they created and any expenditure on it only increases its.

All those who had borrowed from private money lenders were concerned about the high rates of interest. The rate of interest varied from 5% to 10% and the amount paid as interest were in some cases as high as Rs.6000 per month. Few of them said that they were refused loans by government bank as they had no adequate assets to surrender as security. All the respondents felt that a loan from a government bank at a very low rate of interest would be of great help and would reduce their debt burden. The beneficiary responses here show the turmoil that they had to face due to lack of institutional credit facilities. They have been exploited with high interest rates by private money lenders due to the urge to complete the housing construction within the stipulated time.

The respondents have also acquired some electrical gadgets after the change in their housing infrastructure. Every one opines that their earlier housing structures had inadequate space to accommodate any household appliance which prevented them from buying any. The present housing structure has adequate space to accommodate household appliances which has also lightened the burden of domestic work. All of them feel that their economic status has improved with better housing amenities and household appliances. Three of the participants had purchased washing machines, four of them have purchased refrigerators, the others have also purchased few electrical appliances such as television, water pump, grinder, ceiling fans, DVD players and so on after moving to the new house. Two of the respondents said that they have still not purchased any large electrical appliance but they could buy them any time when they get some income and that they would not have a space constraint when they decide to buy these appliances. All those who had bought larger household electrical appliances cited space as the major motivating factor. With larger space availability they wanted to fill their houses with essential household appliances that would also reduce their domestic burden.

When asked about the working of the solar lighting system most of them were satisfied with the system. However two participants said that they had problems with the solar lighting initially when the systems were installed. The lights were not glowing for more than half an hour and that it was rectified only after many follow ups with the concerned authorities. While most of them said that regular maintenance is being done by the concerned authorities two of them said that the frequency of visits for maintenance has reduced and not as how it was when the systems were newly installed. However they did not have any complaints with the system. One of the participant said that there was a problem with the battery supplied and that was resolved in few days. The International Energy Agency (2010) while recommending the preconditions for successful implementation of stand-alone systems in rural electrification efforts stresses upon the need for management and maintenance through adequate training and guaranteed assistance structures. The sustainability of the lighting system is highly questionable when faced with service and maintenance related issues.

Almost all the respondents said that they feel better with improved environmental conditions in terms of space, sanitation facilities etc. Some felt that in their previous housing they were frequently exposed to mosquito and insect bites which have comparatively reduced. They also feel that the present house is free from dust. The women participants felt that they are able to maintain the house and keep it clean and that cleaning was difficult in the previous dwelling. Five of the participants said that they did not have sanitation facilities in the previous house while the other three said that they had very poor sanitation conditions without proper connection. Despite provision of better sanitation facilities as part of the scheme one of the participant said that they are not using the toilets in the house. Most of them felt that they do not have frequent stomach ailments as before. The women participants who had acquired new household appliances felt their domestic burden had reduced greatly and they do not really feel exhausted as how it used to be earlier. And men feel that they are able to sleep better and are free from frequent insect and mosquito bites.

With respect to the execution of the scheme, five of the participants were really happy with the implementation. They are very happy with the support that they had received from the local panchayat head which motivated them to take up the scheme. One of the female participant, who

heads her family and had no one in the family to support her said that her house was the only house with concrete structure in their locality. The other houses are all small huts built with temporary material. She was greatly thankful to the panchayat head, who had also supported by providing guarantee for borrowing funds. She was purely motivated by the panchayat officials who had been a great support even during construction of the house. However, the other three participants were not quite satisfied and were complaining of delay in delivery of construction material and receipt of payment instalments. They also felt that the amount sanctioned under the scheme was very less.

In response to the last question, all the participants were satisfied with the scheme and five of the participants were highly satisfied with the scheme. All of them feel that there has been an immense improvement in their living conditions which could be solely attributed to this scheme. Six of them felt that the funds granted under the scheme are construction could be increased so that people may not get into debt burden. Most of them felt that the solar panel should be of higher capacity so that they can use it for other electrical appliances such as television and fans. Two of the participants expressed their dissatisfaction with the lighting system. They said that it does not really reduce their electricity bills and sometimes doesn't work. They feel that it is not of much use to them rather that money could be provided for construction of the house. Three participants said that the funds should be given to the beneficiaries on time even before construction so that they need not borrow and spend and then wait for the release of the funds. Overall the beneficiaries consider this scheme as a blessing for their families that has enabled them to live in better housing conditions with reliable and secure lighting facilities.

Summary of Findings

The responses of the participants of the FGD indicate the following:

- The CMSPGH Scheme has brought about a drastic change across various socio economic dimensions in the lives of the rural beneficiaries.
- It has provided for the basic needs of lighting and housing. The solar lights acting as a backup during power cuts.
- People who rented homes now own their own place due to the scheme
- The scheme has also streamlined the electricity payment mechanism

- However, the solar lighting system faces the biggest challenge with regard to maintenance in the long run. But despite various challenges, the beneficiaries are happy with the scheme as it has brought huge changes in the standard of living for them.

Conclusion

The Nobel Laurette Amartya Sen, in one of his lectures on 'Standard of Living' delivered at Cambridge University, talks about the different ways in seeing quality of living. "*You could be well off, without being well. You could be well, without being able to lead the life you wanted. You could have got the life you wanted, without being happy. You could be happy, without having much freedom. You could have a good deal of freedom, without achieving much. We can go on."* He addresses two basic questions that are essential for any evaluative purpose:- 1)What are the objects of value? 2) How valuable are they? The question "what object?" is said to be an elementary aspect of "how valuable?" According to Sen, the objects should be those that have direct and intrinsic relevance in the assessment of standard of living and this relevance has to be distinguished from irrelevance on the one hand, and indirect or derivative relevance on the other. He further simplifies it and states that if an enhancement of some variable increases the standard of living, when everything else remains the same, then that variable is clearly an object of value in the evaluation of standard of living. Thus the Solar lighting system and the housing infrastructure provided by the CMSPGH scheme could be considered as an object of value that has enhanced the lives of the rural poor.

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