Solar Home System: Social and Economical Impact Assessment
Bangladesh - 2015
Sevea analyses the impact value chain of projects or enterprises by first understanding the mission, the objectives and what the project/company intends to achieve. For this Impact Assessment, Sevea worked closely with Rahimafroz Solar to set the objectives and the scope of this study. In addition to understanding all the ecosystem and the stakeholders of the RS SHS activity, Sevea looked at financial viability and the program effectiveness in realizing its mission by measuring how it impacts the lives of its beneficiaries, the environment, and society as a whole. Social and Economical impact is assessed along 5 macro indicators: Health & Social Life, Education, Comfort, Household Budget and RSF Employees Empowerment. This impact Assessment will be done for 2 stakeholders, the beneficiaries/end-users and the employees of RS.

The different steps below reflect the process of the analysis, and each assessment was tailored to meet the specific needs of the activity and of Rahimafroz.

Methodology

1. Setting the objectives & the scope of the study
2. Stakeholders Analysis
3. Development of a theory of change to define the impacts map
4. Defining metric and standardized them with the IRIS base (IRIS is a common language for organizations to use when measuring and tracking their social impacts).
5. Development of questionnaires (Focus Group + Individual)
6. Setting the data collection: Strategy, Sampling and Selection
7. Data Analysis & Report

Component of the Analysis

Within the framework of the analysis, the impact of RS will be tracked in terms of:
- **Impact**: Impact created by RS on its stakeholders in terms of the change the stakeholders experience in their lives as a result of RS activities.
- **Quality**: Evaluation of the quality of RS’s services in terms of process and clients satisfaction.
- **Effectiveness**: A measure of how effectively RS is achieving its social goals.
- **Efficiency**: A measure of how costs - money, people, time, materials, etc. - are expended as part of a RS drinking water projects in comparison to either their benefits or their effectiveness.
- **Relevance and sustainability**: Evaluation of the relevancy of RS’s activity to achieve the goals of its mission in sustainable way.

Macro Indicators defined for RS SHS Activity

- **Social Impact**
  - Education
  - Comfort
  - Health & Social Life
- **Economical Impact**
  - Household Budget
  - RSF Employees Empowerment

**Our Approach**

Sevea identified five relevant principles that inform our approach to this Impact Study. These principles are also accepted as ‘Best Practice’ in the emergent global framework around the Social Impact world.

1. The key role of the stakeholders

Sevea analyses focus on the people who are important to a project/company, its stakeholders. Sevea has a clear process for involving stakeholders, in which each identifies his/her own social objectives for the project.

2. Theories of change

A theory of change tells the story about how a project/company makes a difference in the world. Sevea uses the ‘Impact Map’ as a tool to develop a project’s Theory of Change. This provides a framework for companies to better understand how their actions actually create change, by analysing the cause-and-effect chain of inputs, outputs, outcomes, and impacts. By completing an Impact Map, organisations develop a pathway into impact measurement based on their own organisational capacity and priorities.

3. Focusing only on what is important

The goal is to gather better than mere information. That means, it is needed to gather information on the things that matter to the stakeholders rather than gathering lots of information that are never used.

4. Identifying what is the difference made by the project/company

It is needed to identify the unintended negative consequences, displaced benefits and the extent to which outcomes are the result of our client’s organisation as opposed to other factors. This ensures a rigorous process that can tell the story of how the project makes a difference in the world.

5. Focusing on regular monitoring

Defining a framework to track and assess social performance on the long run in an efficient and affordable way.
Impact Pathways of RS SHS Activity

**Inputs**
- SHS manufacturing
- Distribution & Installation
- End-user Training
- End-user Financing
- Maintenance & After-sales Services

**Outputs**
- A clean, efficient and safe lighting source
- Access to a loan - SHS Affordable

**Outcomes**
- Reduction of Indoor Pollution
- Domestic Benefits and Access to Information
- Safety Enhancement
- More Time for Homework & More Productive Time

**Indirect Outcomes**
- Reduced economic loss due to illness
- Reduced health expenditure
- Increase in household incomes
- Time saving
- Work
- Education
- Leisure

**Objective**
- Economic Growth & Poverty Reduction

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**Impact Assessment: Key Choices**

**Indicators**
Before going on the field, 117 indicators were defined (with 28 standardized with the IRIS base) and that has been used to set up the surveys.

**Data Collection Strategy**
Only household customers were targeted for data collection as they represent 98% of RSF’s client. The methodology chosen for this data collection was Individual survey as it is possible to do so through RSF large number of rural staff.

**Sampling**
A statistical and comprehensive approach was adopted to select the areas for the study. In order to achieve the impact assessment goal, a site survey was conducted in which the HHs sampling has been computed through statistical method called Simple Random Sample (SRS). Sampling size is done based on SRS formula (Paul S. Levey & Stanley Lemeshow, 1999):

\[ n = \frac{z^2 \times NP(1-P)}{(N-1)e^2 + z^2P(1-P)} \]

According to the specificity of RS, the country and the study the following parameters has been chosen:
- Population Size: 500 000 (Number of RSF’s clients)
- Confidence Level: 95%
- Confidence Interval: +/-7%

As a result, 196 samples were needed for this Impact Assessment survey.

**Selection**
A data base of all the RSF’s customers (~ 500 000 lines), Maps from the Rural Electrification Board (REB) and some reports have been used to analyse the situation and fine tune the surveyed area.

First, each Activity Area of RSF has been categorized with the surveyed area. In the results presented further, the Indicators might represent a trend observed (calculated) or felt (opinion from the people surveyed). These Indicators are then analysed, gathered and crossed to get a level of impact. Then, from these results Sevea replicates the same process to evaluate the Intermediary and Macro Indicators and get final results expressed as follow:

- **High Positive Impact**
- **Positive Impact**
- **Same as before - No change**
- **Negative Impact**
- **High Negative Impact**

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**Process of Analysis**
Under each Macro Indicator (Health, Education...), Sevea defined Intermediary Indicators which are characterized through the evaluation of Indicators. These Indicators are in turn calculated directly from the information collected on the field with the questionnaires specifically designed for this study. In the results presented further, the Indicators might represent a trend observed (calculated) or felt (opinion from the people surveyed). These Indicators are then analysed, gathered and crossed to get a level of impact. Then, from these results Sevea replicates the same process to evaluate the Intermediary and Macro Indicators and get final results expressed as follow:

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- **Negative Impact**
- **High Negative Impact**

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**Level of Income per capita (High, Medium, Low)**
- Akbar Char (High)
- Dhaka (Low)
- Rajshahi (Medium)

**Level of SHS penetration (High, Medium, Low)**
- Chittagong (High)
- Dhaka (Medium)
- Rangpur (Low)

**Number of SHS installation by RSF**
- Chittagong (220)
- Dhaka (220)
- Rangpur (220)

The number of 196 samples has not been reached but this does not affect the results. Instead of having +/-7% of confidence interval the figure is situated between +/- 7 and 8. The confidence level is still the same and the results can still be extrapolated to all the RSF clients.
Social Impact: Summary

**Education**

<table>
<thead>
<tr>
<th>Intermediary Indicator</th>
<th>Level of Impact</th>
<th>Gender</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity Building</td>
<td>Larger effect for males</td>
<td>RSF has already delivered 30,000 hours of training to 100% of their employees. In most cases, these are low-income employees associated with a low level of education. The content of the training varies slightly according to the specificity of each job (Area Manager, Unit Manager, Field Staff and Technician). They indeed all have a key role to play inside the RSF business model. So, RSF is creating a base of skilled technicians and managers specialized in rural access to solar all over Bangladesh.</td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>No differentiated effect</td>
<td>100% of students can do their homework at home without any gender inequality (against 93% for female and 96% for male before). In average, they spend 1.6 additional hours studying, which makes it an average of 3.8 hours of homework per day. 88% of parents consider that the concentration of their children is better now. These results can be explained by the facts that not only does SHS provides students with better lighting conditions but they also don’t need both to share their light with several persons anymore and do the household’s chores before night (change in the timing of households chores for 41% of them). Thanks to a dedicated and quality light, studying at home is much more convenient for these children today.</td>
<td></td>
</tr>
<tr>
<td>ICT</td>
<td>No differentiated effect</td>
<td>Households have changed their source of information switching from radio to TV, bringing both news and entertainment to all the family. Now, 35% of the RS’ clients have a TV (90% of increase) but this concerns mainly the “Low Incomes” customers that can afford it thanks to their higher revenue. Almost all the people (94%) have at least 1 cellphone now and with no distinction between the 3 groups of the poverty level. In addition, Internet network is available in many parts of the country. Nevertheless as people surveyed do not have a proper appliance (smart phone) to get Internet access, Internet is not affordable for them yet. Basic access to ICT usually has an impact on Education &amp; Awareness, even if it’s complicated to measure. But this impact could be more important if the end-users had access to internet. But this would require proper appliances that are generally too expensive for most of them.</td>
<td></td>
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</table>

**Comfort**

<table>
<thead>
<tr>
<th>Intermediary Indicator</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Pollution</td>
<td>Larger effect for females</td>
<td>Thanks to a clean lighting system inside the household, the pollution due to kerosene lamp has almost disappeared. The clients have changed their kupi and hurricane with LED light which has led to a drastic decline (72%) in the number of kerosene users (96% before against 27% only now). So, the main negative impacts like the black walls or the dry eyes due to the smoke from Kupis and the bad smell of kerosene have been reduced.</td>
<td></td>
</tr>
<tr>
<td>Leisure &amp; Quality Time</td>
<td>No differentiated effect</td>
<td>The fuel purchase behavior has changed. More and more clients go to the market as required (48% against 22% before) and less and less go weekly (28% against 59% before). Although they still go to the market for other reasons (with an average time of 40 min), the fuel purchase does not seem to be a big concern for them anymore. Thus, they have more time allocated for other quality activities. 69% of clients consider having more time to spend with their children and 54% more leisure time. Moreover, the entire family can enjoy the use of new appliances. The use of fan is popular among RS customers reaching almost half of the households (43% against 10% only before). Contrary to most of Very Poor or Poor, Low Incomes families buy expensive appliances such as TV and fridge (for 70% of them).</td>
<td></td>
</tr>
</tbody>
</table>
Comfort (continuing)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Level of Impact</th>
<th>Gender</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting</td>
<td>+---------------</td>
<td>-</td>
<td>No differentiated effect</td>
</tr>
<tr>
<td>Health &amp; Social Life</td>
<td>+</td>
<td>-</td>
<td>Larger effect for females</td>
</tr>
<tr>
<td>Indoor Pollution</td>
<td>+</td>
<td>-</td>
<td>Larger effect for females</td>
</tr>
</tbody>
</table>

Household Budget (continuing)

<table>
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<th>Indicator</th>
<th>Level of Impact</th>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productive Time</td>
<td>+</td>
<td>-</td>
<td>Larger effect for females</td>
</tr>
</tbody>
</table>

ECONOMICAL IMPACT: SUMMARY

Household Budget (continuing)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Level of Impact</th>
<th>Gender</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>Wealth</td>
<td>+</td>
<td>-</td>
<td>No differentiated effect</td>
</tr>
<tr>
<td>Energy Expenses</td>
<td>+</td>
<td>-</td>
<td>No differentiated effect</td>
</tr>
</tbody>
</table>

RSF Employee

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Level of Impact</th>
<th>Gender</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Development</td>
<td>+</td>
<td>-</td>
<td>Larger effect for males</td>
</tr>
<tr>
<td>Incomes &amp; Benefits</td>
<td>+</td>
<td>-</td>
<td>Larger effect for males</td>
</tr>
<tr>
<td>Job Creation</td>
<td>+</td>
<td>-</td>
<td>Larger effect for males</td>
</tr>
</tbody>
</table>

The lack of access to financial services is particularly acute among BOP households because they are employed in the informal sector of the economy and lack the credit history to qualify for traditional loan products. For 98% of the clients (484,971 clients), their wealth has risen due to the access to loan for the purchase of a SHS. This has led to an increase of the number of appliances (%60) owned by client households. The richer the family is, the more they can afford a wider range of electrical equipment (fan, TV and fridge) bringing a higher standard of well being inside the family. Moreover, as working by night is easier with a good light, revenues of the families working at home (40%) has increased. For those selling products at home, it has helped them attract more clients. In average, the additional income gained so has been around $20 per month per household (+73%).

Prior to SHS, the annual cost of kerosene Lamp was in average $46 ($3.83/ household/month). In addition, the poorer the family was, the higher their energy expenses were. This can be explained because the poorest families usually buy very low quality equipment. At the end, poorer households paid higher overall purchasing expenses for kupti and hurricanes than wealthier households. Regarding operating costs linked to kuptis or hurricanes, the average levels of expenses related to kerosene purchase was the same between the different poverty levels. After SHS, kerosene expenses per households per month have decreased 83% ($3.37 against $0.58 now). With the depreciation of the SHS (over 5 years, duration of the warranty provided by RS) families have nowadays a monthly installment of $5 in average. Moreover, with the SHS, a strong correlation between the poverty level and the SHS installment has finally appeared. In average, the poorest households paid $1.3 more per month for the SHS than "Very poor" ones. Overall, energy expenses have increased 37% but so has the level of service. Finally, the energy budget is under control ($5.24 per month per households) with a high quality services added (lighting quality improvement and more electrical radius).

The introduction of new lighting system has divided accidents by 4, falling from 16% to 4% (some families carry on using kerosene lamps even after SHS adoption). Nevertheless, the introduction of SHS in households has brought new danger due to the electrical devices. A burning wire happened in 3% of the households. Light offers a feeling of protection to the family and contributes to push away dangerous people. Households consider the house safer now mainly for women (at 85%) and for children (at 67%).

Replacing smoke-emitting kerosene lanterns with solar-powered lights offers a far higher quality of lighting without increasing household air pollution. 79% of the households considered this smoke as a negative effect. In addition, according to a World Bank study, avoiding kerosene has important implications for the health of family members, particularly women and young children, who usually spend many hours indoor every day. SHS intervention is expected to lower incidence of illness, particularly that of respiratory diseases and gastrointestinal diseases. Nevertheless, no study has been found to quantify this reduction. Moreover, users of kerosene lamps are concerned by injuries from burns (49%) and can get eyes problems due to insufficient illuminations (62%) and dry eyes (49%). Health-related news and information acquired through electronic media, such as TV, increase hygienic practices on the part of household members.

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On a global picture, even if families spend less time dedicated to kerosene buying, no change has been observed in terms of time allocation. For the 40% of the population working at home, sewing or doing some handicrafts, productivity has evolved. The additional lights have given them the opportunity to increase their working time by night by 1.2 hours per day in average. It is interesting to note that SHS has influenced the number and the gender distribution of people working at home.
Sevea operationally supports, in developing countries, Corporations, Organizations, Projects & Social Entrepreneurs in the development of their Social Impact Strategies, mainly in the sectors of Energy & Water and BOP market.

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