

## Customer Satisfaction of the Solar Home System Service in Bangladesh

Shamsun Nahar Momotaz\* and Asif Mahbub Karim\*\*

*In Bangladesh rural electrification through Solar Home System is becoming more popular day by day particularly for remote, inaccessible areas where there still exists no infrastructure for conventional energy supply. It presents an attractive alternative to conventional electricity such as no monthly bills, no fuel cost, little repair and maintenance costs, easy to install any where etc. Solar Home Systems have already made significant headway in Bangladesh. A total of 3,00,000 solar panels had been installed in more than 40,000 villages of 456 upazilas of all districts of Bangladesh. Daily on average 44 MW electricity is being produced by these solar panels. But the commercial success of solar home systems in Bangladesh depends on the extent to which it can make the end users satisfied, which will motivate users to invest money in Solar Home Systems and make long-term relationship with the service provider. In this consideration the present study made an effort to assess the customer satisfaction of the Solar Home System service in Bangladesh by adopting the SERVQUAL model as the basis of conducting the research. A total of 70 users of the Solar Home System (of which 46 are household consumers and 24 are of retailers) in Dhaka Division were selected to collect information. From the study it has been found that most of the consumers are found just satisfied with the Solar Home System service and there is little gap exists between expectation and perception of the consumers of the Solar Home System service in Bangladesh. From a managerial point of view, the understanding of the customer satisfaction can suggest guidelines for customer relationship management.*

**Keywords:** service, customer satisfaction, solar home system, SERVQUAL

**Field of Research:** Marketing

### 1. Introduction

Availability of adequate electricity is an indicator of the standard of living of a country. But the Access to electricity in Bangladesh is one of the lowest in the world; coverage today stands around 42% of the total population (Ministry of Power, Energy and Mineral Resources, Peoples Republic of Bangladesh, 2010). The chances of reaching the remaining 58% of the people by conventional power may not likely to happen in near future. Moreover only about one-third of rural households currently have access to electricity with about 16 million households yet to be electrified (worldbank 2011). To supply electricity with quality light, reliable service and long term sustainability, Solar Energy System is considered as an important emerging option by the policy makers. Solar Energy is inexhaustible and pollution free. The tropical climate of Bangladesh is an advantage to the utilization of solar energy resources to meet various energy needs. Solar Home System or Solar Photovoltaic System use solar energy for generation of electricity. Photovoltaic (Photo for light and Voltaic for Battery

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\* Shamsun Nahar Momotaz, Assistant professor, Department of Business Administration, Stamford University Bangladesh. E-mail: shmsnnahar@yahoo.com

\*\* Asif Mahbub Karim, Assistant professor, Department of Business Administration, Stamford University Bangladesh. E-mail: asifmkarim@ymail.com

## Momotaz & Karim

or Solar Cells) convert sunlight directly into electricity and does not require any kind of conventional fuels. Solar Home Systems can be used to light up homes, shops, fishing boats etc, and also to charge cellular phones, run televisions, radios and cassette players. It can directly reduce considerable amount of green house gases like CFC eventually keep our environment healthy. So the rural electrification through solar Photovoltaic technology is becoming more popular, day by day in Bangladesh particularly for remote, inaccessible areas where there still exists no infrastructure for conventional energy supply. It presents an attractive alternative to conventional electricity such as no monthly bills, no fuel cost, very little repair and maintenance costs, easy to install anywhere etc. This helps to build a sense of ownership and technology transfer. It also creates employment opportunities and contributes to national income. By using these systems rural people can improve their social condition through education, running TV, CD, DVD players, lighting, telecommunication through Solar Home System powered mobile phones etc.

Though the market is growing rapidly but the experience of application of Home Systems for rural electrification is still limited in Bangladesh. Scaling up of Solar Home Systems assisted by the development partners are being implemented through two types of organizations like government owned and private organizations. The solar home system component of the RERED (Rural Electrification and Renewable Energy Development Project) of Government of Bangladesh is implemented by a Government owned financial institution named as the Infrastructure Development Company Limited (IDCOL). It has been promoting dissemination of solar home system (SHS) in the remote rural areas of Bangladesh through its 'Solar Energy Program' with the financial support from the World Bank, Global Environment Facility (GEF), KfW, GTZ, Asian Development Bank and Islamic Development Bank since January 2003. IDCOL provides refinancing facility to the Partner Organizations (POs) and also channels grants to reduce the SHS cost as well as support the institutional development of the POs. In addition, it provides technical, logistic, promotional and training assistance to the POs. Renowned POs are Grameen Shakti, Bangladesh Rural Advancement Committee (BRAC), Srizony Bangladesh, Coastal Association for Social Transformation Trust (COAST) etc. The household consumers and retailers can buy Solar Home System either in cash or on credit. Different POs extend credit on different terms and conditions to the consumers for purchasing the systems. The loan duration varies from 1-5 years and the interest rate varies from 8%-15% per annum on a reducing balance method, and from 10%-15% per annum on an equal principal payment method. In all the instances, the repayment frequency is monthly. Through this way Solar Home System industry has already made significant headway in Bangladesh. The commercial distributors of Solar Home Systems also show increasing annual sales across Bangladesh, despite declining subsidies and rising prices of Solar Home systems. A total of 3,00,000 solar panels had been installed in more than 40,000 villages of 456 upazilas of all districts of Bangladesh and daily on average 44 MW electricity is being produced by these solar panels as seen in the solar electricity is coming to Dhaka (Karmaker 2009). But the initial high costs, lack of demonstration of the technology, awareness and adequate after sales service etc., are seen as the barriers in the promotion of solar energy based electricity. So the commercial success of the Solar Home System service in Bangladesh depends on the extent to which it can make the end users satisfied, which will motivate users to invest money in Solar Home systems and make long-term relationship with the service provider. But till today this industry cannot play a vital role to fill this gap due to lack of

understanding of the factors affecting customer satisfaction of the Solar Home System service in Bangladesh. So there is a clear need to conduct a research on the customer satisfaction of the Solar Home System service in Bangladesh and to provide guidance to the GOB to help strategies and priorities for the improvement of the market. In this consideration the present study made an effort to assess the customer satisfaction of the Solar Home System service in Bangladesh on the basis of a survey conducted in some selected areas of Dhaka Division. To the best of the knowledge this study is the first of its kind based on the customer's perspective. When such studies confirm, support, and strengthen the findings of this research and offer additional strategic guidance, the service of the Solar Photovoltaic Systems in our country could be significantly improved. The study concentrates on analyzing the current usage, current expenditure, mode of payment, price, contribution etc, of the SHS service in Bangladesh with the perception of household consumers and retailers. Finally the study focuses on analyzing the customer satisfaction of the SHS service through the SERVQUAL model and recommends on improving the overall customer satisfaction of the SHS service in Bangladesh.

## 2. Literature Review

The objective of this study is to contribute to the understanding of customer satisfaction Solar Home System service in Bangladesh. People find it is important to comprehend the dynamics of this industry from the perspective of the customer who is the final arbitrator of how to purchase and use the system. Therefore, an understanding of the factors that influence customer satisfaction ought to be useful in guiding the Solar Home System industry to design and deliver the right offering.

### 2.1. Concept of Service

According to Webster's New 20th Century Dictionary (second edition), people defined service, two decades ago, as "anything useful, such as maintenance, supplies installation, repairs, etc. provided by a dealer or manufacturer for people who have bought things from him". But today we believe this definition is not sufficient to cover what does service mean. Davidoff (1994) have argued service as a useful labor that does not produce a tangible commodity in a customer-oriented point of view. Kotler and Armstrong (2008) defined the term service as any activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything.

The production of service may or may not be tied to a physical product. A company's offerings often include some services (Lovelock 2004). In other words, services are deeds, processes and performances (Zeithaml & Bitner 2003).

Kotler and Armstrong (2008) found that compared with manufacturing firms, service marketers face several unique problems in positioning and promoting their offerings. Moreover it is more difficult for consumers to evaluate the quality of services than the quality of products. This is true because of certain distinctive characteristics of services like intangibility, inseparability, variability, perishability etc.

### 2.2. Customer Satisfaction

Customer satisfaction is at the heart of marketing. The literature on customer satisfaction and repurchase intentions demonstrates the role of service quality and perceived value as critical in influencing satisfaction and choice. Customer satisfaction measurements help to promote an increased focus on customer outcomes and stimulate improvements in the work practices and processes used within the company (Bhave 2002).

Customer satisfaction is a judgment that a product or service has provided or is providing a pleasurable level of consumption-related fulfilment (Oliver 1997). An extensive literature has explored the role of satisfaction in determining post-purchase attitude and intentions and has demonstrated that satisfied customers engage in repurchase behaviour. The relevance of customer satisfaction in winning loyal customers has been empirically verified by a number of studies which found that satisfaction is a leading factor in determining loyalty (Garbarino 1999 & Anderson 1994).

Parasuraman et al. (1988) defined service quality as the outcome of effective service delivery which occurs when customers receive service that is superior to their expectations. Satisfaction is an attitude or evaluation, which is formed by the consumer comparing their pre-purchase expectation of what they would receive from the product to their subjective perceptions of the performance they actually receive (Oliver 1980).

Other authors have claimed that the incorporation of expectations is necessary to measure service quality (Parasuraman et al. 1988 & Carman 1990). Among the contemporary instruments for measuring service quality, SERVQUAL has got attention by the researchers in various fields including insurance, bank, education, Information Technology (IT) etc. as it deals with users' views regarding services (Parasuraman et al. 1985, 1988, 1991).

### 2.3. Conceptual Model for Measuring Service Quality

The SERVQUAL is based on the concept of a "service quality gap" that exists between the customers expected level of services (from the previous experience and word-of-mouth communication) and their perception of actual level of service delivery. And the model also identifies five gaps that cause unsuccessful delivery like consumer expectation- management perception gap (gap 1), management perception- service quality specification gap (gap 2), service-quality specification-service delivery gap (gap 3), service delivery- external communications gap (gap 4) and expected service-perceived service gap (gap 5). Based on this service-quality model the researchers identified the following five determinants of service-quality in order of importance.

- 1. Reliability:** Ability to perform the promised service dependably and accurately.
- 2. Responsiveness:** Willingness to help customers and provide prompt service.
- 3. Assurance:** Employees' knowledge and courtesy and their ability to inspire trust and confidence.
- 4. Empathy:** Caring, individualized attention given to customer.

**5. Tangibles:** Appearance of physical facility, equipment, personnel and written materials.

Among the five major service gaps, this study is concerned about the last one, i.e. the gap between the expectation and perception of the service provided by the Solar Home System industry in Bangladesh.

### 2.4. Service of Solar Home System

Hiranvarondon et al (1999) suggested that dissemination of solar PV systems required an implementation strategy that initially identifies the type of system needed. Governments could accelerate the dissemination by removing barriers to market expansion, by removing excessive duties and taxes, and by removing subsidies on products that compete with solar systems. They also listed the role of key players involved in the promotion and dissemination of solar systems in developing countries like national governments, donor agencies, educational and research institutions and private sectors or NGOs.

Cabraal, Cosgrove & Schaeffer (2000) noted that successful solar PV market development for rural electrification requires the removal of financial and institutional barriers and the other major issues to be considered are the high initial costs, the establishment of a responsive and sustainable infrastructure and the guaranteeing of quality products and services. These findings were based on their studies in Indonesia, Sri Lanka, the Philippines and the Dominican Republic.

### 2.5. Solar Home System Service in Bangladesh

The present study considers analyzing the customer satisfaction and usage of Solar Home System in Bangladesh. But to the best knowledge no study has been found to assess the customer satisfaction of Solar Home System service in Bangladesh. In this perspective, the present study may claim to have some extent of novelty in discussing the satisfaction Solar Home System service in Bangladesh. Actually very few papers dealt with the Solar Home System service in Bangladesh. Khan, HJ and Huque AJ (1998) shown a significant market for Solar Home systems in Bangladesh. The report provides market estimates based on administrative districts and household income categories. By this measure, about 4.8 million rural Bangladeshi households could pay for a solar home system. This accounts for nearly 45% of all unelectrified rural households. They showed that the rural households typically do not have sufficient income for purchasing a Solar Home System in cash. So the use of credit or other forms of extended payment can expand the potential market significantly. A more conservative market estimate "*Existing SHS market*" was obtained through the survey conducted for the study, based upon the current expenditure level of the households. Ability to pay for the services is measured by the current expenditure for lighting and battery charging, most of which is to be replaced by a SHS. This market is approximately 4,70,000 households. The authors conducted a survey of 606 households and 95 commercial enterprises in three different districts like Natore, Gopalganj and Kishoregonj of Bangladesh which focused on the middle and higher income groups of the rural population in the selected areas. 80.5% of the surveyed holdings have shown an interest in obtaining any SHSs. The survey did not reveal wide regional variations in the preference for SHS. Moreover the study reveals that the

## Momotaz & Karim

owners of shops in rural markets have significant interest in using small solar systems for lighting to facilitate their business operations. The authors recommended the following important issues:

- A market size of approximately 0.5 million households is envisioned for solar electrification, which has the potential of extending to 4 million in the future. National and regional plan for implementation of large scale program for SHS in rural electrification should be developed using predetermined criteria for qualification of solar PV programs. This plan should be consulted in association with the conventional master plan in place with Rural Electrification Board of Government of Bangladesh for expansion of rural electrification, considering 61% of the respondents have opted for service from the existing Palli Bidyut Shamyities.
- The survey shows that solar battery charging stations are not a suitable option for electrification in Bangladesh and should therefore be avoided in future implementation of solar PV programs.
- Appropriate measures should be taken for local certification and quality control of hardware.
- Use of trained distributors and maintenance contractors are recommended for sustainability of the systems.
- Large scale demonstration of SHS in different geographic regions should be initiated to create awareness for SHS.
- Considering the results obtained on willingness to pay for different levels of service and the variation of income and assets of the potential users, it is recommended that the SHS should be sized according to the desire of the users, i.e., options for service levels should be made available.
- Quality of service must be ensured from the beginning of any future SHS program through standardized systems and effective implementation of regulatory rules.
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Ahmed and Taufiq (2008) discussed that the factors contributing to the successful promotion of solar PV based rural electrification are suitable finance schemes to address the problem of high initial cost, adequate means of providing regular and proper maintenance and supplying spare parts and viable choice of available configurations to suit the consumers' needs and affordability.

Aziz, Chowdhury and Hammad (2009) found that the customers are largely satisfied with the availability and quality of the financing and sales services of the partner organizations. The study has measured the satisfaction level of the consumers in eight areas of the SHS service namely number of appliances supported, stability of electricity, quality of electricity, frequency of breakdowns, helpful information from the company, financing facilities of the company, troubleshooting services. The responses indicate that most of the consumers are either satisfied or highly satisfied with the SHS they use in their homes or rural small businesses. No respondent reported a high level of dissatisfaction regarding any of the parameters, and overall dissatisfaction is low.

Keeping all these considerations in mind, the researcher has undertaken the issue as a research agenda, with a view to fulfill the vacuum that now exists with the service provided by the Solar Home System industry of Bangladesh.

### 3. Data and Methodology

#### 3.1. Objectives of the Study

Within this paper, the general objective of the research is to assess the Customer Satisfaction of the Solar Home System service in Bangladesh.

In order to study the above mentioned issue the specific objectives basically consisted in:

- To gain an understanding of the current usage pattern of Solar Home System in Bangladesh.
- To assess the monthly expenditure for lighting by rural households and retailers in Bangladesh.
- To explore the preferable mode of payment of the consumers for a Solar Home System in Bangladesh.
- To analyze the preferable price of a Solar Home System in Bangladesh.
- To assess the gap between the expectations and perceptions of the Solar Home System service in Bangladesh.
- To analyze the overall contribution of the Solar Home System service on rural household & retailers and
- To recommend for the improvement of the Solar Home System service in Bangladesh.

#### 3.2. Methodology

Efforts were made to find out Customer Satisfaction of the Solar Home System service in Bangladesh. The target population of this study was the customers of Solar Home System in Dhaka City who are provided services by the SHS service providers. This study only considered two types of customers such as household customers and retailers. For conducting this research total 46 household customers and 24 retail shop owners of some areas of Dhaka Division like Binnadangi Bazar, Singair, Manikgonj proper of Manikgonj District and Shakhipur of Tangail district were selected to collect information. As these areas are near to Dhaka city so the response from the locality to a lot extent will match with the perception of the residence of Dhaka. The samples were selected by adopting the convenience sampling procedure as there is no data available regarding the total number of customers of the Solar Home System service in Bangladesh. This study used questionnaire based survey to collect necessary data. Both the open-ended and close-ended questions were included in the questionnaire. Questionnaire was carefully developed and tested before it was finalized. Efforts were made to find out customer satisfaction of the Solar Home System service in Bangladesh.

Here SERVQUAL Model is used to assess the gap between the expectations and perceptions of the customers of the Solar Home System service in Bangladesh. 15 variables were selected for this evaluation on the basis on focus group discussion with the users of Solar Home Systems. Data were collected on the basis of five-point *Likert* scale, ranging from 1= strongly disagree to 5=strongly agree. For analyzing the data, the “t-test” was used where null hypothesis was that there is no gap exists between the customer’s expectation and perception of service delivered by the Solar Home System industry.

### 4. Findings

#### 4.1. Findings on Household consumer Satisfaction of the Solar Home System Service

##### 4.1.1 Current usage of the Solar Home Systems

In Bangladesh the Solar Home Systems with different capacity like 10 watts to 85 watts are available to rural household consumers to choose according to their needs and to meet their financial capacity. From the survey of selected sample it has been found that most of the respondents (39%) use the Solar Home Systems with capacity of 50 watts through which they can run 4 lights (6 Watt each), 1 Black & White TV point and 1 mobile phone charger. The next use was found with the 40 watts through which consumers can run 3 lights (6 Watt), 1 Black & White TV point and 1 mobile phone charger.

##### 4.1.2. Daily Usage of Solar Home Systems

From the survey it has been found that most of the respondents (63%) of the selected sample run the Solar Home Systems in their houses for 4-5 hours, 13% were found for 3-4 hours and 11% for 1-3 hours. In Bangladesh rural people usually go to bed early at night and rise very early the morning. So they can manage all of their household activities and studies easily within 4-5 hours from the sunset.

##### 4.1.3. Period of using the Solar Home Systems by the Household Consumers

It has been revealed from the survey of the selected sample that 44% of the respondents had been using the Solar Home Systems in their houses for 2 year and 18% of the respondents had been using for 3-4 years.

##### 4.1.4. Current Expenditure for Lighting

From the survey it has been revealed that for credit purchase of the Solar Home Systems the household consumers need to pay on an average U\$ dollar 313.69 for the package, U\$ dollar 67.00 as down payment and U\$ dollar 9.17 as monthly equal installment payment until the fulfillment of the purchase price. The above time may vary in accordance with customer preference and early settlement. Though this expenditure for lighting per month is more costly than the cost of lighting with traditional system of Hurricane as U\$ dollar 4.39 but the consumers were found happy to get more benefits than the cost like brighter light, safe environment etc. Here the 1U\$ dollar equals 81.25 Taka (Local Currency Market, The Daily Prothom Alo 2012).



### 4.1.5. Perception of the Costs of Solar Home Systems

#### **Cost of the Solar Home Systems and the affordability of the household consumers:**

It has been revealed from the survey that most of the respondents of the selected sample (76%) agreed that the cost of the Solar Home Systems is within their purchasing ability, so they easily could afford the Solar Photovoltaic Systems in their houses.

#### **Preferred mode of payment of the Solar Home System**

The surveyed households showed a strong preference for obtaining Solar Home Systems on credit payment. Nearly 94% of the respondents showed preference for purchasing the system with monthly installment while only 6% liked to pay in cash at time of purchase. The rural households typically do not have sufficient money to purchase a solar home system in cash. So the use of credit or other forms of extended payment can expand the potential market significantly.

#### **Preferable price of the Solar Home Systems**

It has been found from the survey that on an average the consumers prefer U\$ dollar 265<sup>23</sup> as the final price, U\$ dollar 57<sup>23</sup> as the down payment and U\$ dollar 5<sup>84</sup> as the monthly installment of the Solar Home Systems.

### 4.1.6. Gap between the Expectation and Perception of Household Consumers of the Solar Home System Service

For analyzing the data, the “t-test” was used where null hypothesis was that there is no gap exists between the customer’s expectation and perception of service delivered by the Solar Home System industry. Table 01 shows the respective scores of expected mean, actual mean, t-value, and associated P-value. From the “t-test” it has been found that for eight of the variables there was no gap found between the expectation and perception of customers of the Solar Home System service like the reasonable price of the system, good quality of the system, enough capacity of the system, longevity of the system, sustainability of the system, regular warranty support of the system, reasonable monthly installment cost of the system, and availability of the system providers. But for seven other items an intense gap has been found between the customer’s expectation and perception of service delivered by the Solar Home System industry like convenient use of the system, maintenance cost of the system, availability of loan from the system providers, credibility of the providers, friendly behavior of the personnel, the leaflet, catalog etc. provided with the system and availability of the parts of the system in the local market. The result is stated in the table 01:

## Momotaz & Karim

**Table 01: Gap between the household consumers' expectation and perception of service delivered by the Solar Home System industry:**

Sl. No.	Items	Mean Scores		“t” Value	P-value
		Expected	Actual		
1	Reasonable price of the SHS	1.22	2.00	-4.201	.000
2	Good quality of the SHS	1.15	1.76	-4.362	.000
3	Enough capacity of the SHS	1.22	2.02	-4.618	.000
4	Longevity of the SHS	1.37	2.02	-5.318	.000
5	Sustainability of the SHS	1.37	2.15	-4.552	.000
6	Regular warranty Support of the SHS	1.48	2.09	-3.308	.001
7	Convenient use of the SHS	2.22	2.222	.000	1.000
8	Maintenance cost of the SHS	1.80	2.00	-1.57	.251
9	Availability of loan from the SHS providers	1.39	1.57	-.944	.348
10	Reasonable monthly installment cost of the SHS	1.50	2.26	-.3.455	.001
11	Credibility of the SHS providers	1.89	2.11	-1.335	.185
12	Friendly behavior of the SHS providers	2.26	2.14	.129	.898
13	The Leaflet, catalog provided with the SHS	2.74	2.54	1.308	.194
14	Availability of the SHS providers	1.76	2.15	-3.346	.001
15	Availability of the parts of SHS in the local market	3.39	3.11	1.481	.142

a = Significance at .05% Level

### 4.1.7. Contribution of the Solar Home Systems to the Household Consumers (% of respondents)

Most of the respondents of the selected sample strongly agreed that the Solar Home systems contribute most to the students as they can utilize more time to study at night and get supervision from their guardians also. They next strongly agreed with the contribution of the system as availability of the option of mobile phone charging followed by meeting up the shortage of lighting in the house, the entertainment in their houses like playing TV, DVD, availability of the bright light in the house, efficient use of the time at night and working more household works at night, reduced labor for lightening the house and healthy environment in the house as there is no emission of gas, dust etc, from the Solar Home systems. All these factors contribute positively to the living condition of rural households. The findings are shown in table 02:

## Momotaz & Karim

**Table 02: Contribution of the Solar Home Systems to the household consumers (% of respondents):**

Sl. No.	Variables	Strongly Agreed	Agreed	Neutral	Disagreed	Strongly Disagreed
1	The students can get more time to study at night	91.3%	4.3%	4.3%	-	-
2	The efficient use of time at night	56.5%	21.7%	21.7%	-	-
3	More household works can be done at night	56.5%	28.3%	15.2%	-	-
4	Friends and relatives can visit home at night	13%	34.8%	43.5%	6.5%	2.2%
5	The total environment of the home has been improved	8.7%	41.3%	41.3%	-	8.7%
6	Healthy environment in the house as there is no emission of gas, dust etc, from the SHS	21.7%	63%	10.9%	-	4.3%
7	Reduced labor for lightening the house	47.8%	39.1%	8.7%	-	4.3%
8	Bright light at the night	71.1%	21.7%	2.2%	-	4.3%
9	Entertainment in the house like watching TV, playing DVD etc,.	73.9%	15.2%	2.2%		8.7%
10	Meet up the shortage of lighting in the house	73.9%	21.7%	-	-	4.3%
11	Availability of the option of Mobile charging	78.3%	10.9%	-	-	10.9%

### 4.1.8. Overall Satisfaction of the Household Consumers of the Solar Home System Service

Most of the household consumers of the selected sample (about 74% of the respondents) have been found as just satisfied with the Solar Home System service of the industry and only 13% of the respondents have been found as highly satisfied. The result is described in the table 03:

**Table 03: Overall satisfaction of the household consumers of the service of Solar Home System service:**

<b>Variables</b>	<b>percentage</b>
Highly Satisfied	13%
Satisfied	73.9%
Neither Satisfied nor Dissatisfied	6.5%
Dissatisfied	4.3%
Highly Dissatisfied	2.2%

## **4.2. Findings on Retailer Satisfaction of the Solar Home System Service**

### **4.2.1. Current Usage of the Solar Home Systems**

The Solar Home Systems with different capacity (20 watts to 65 watts) are available to retailers so they can choose the right one according to their needs and financial capacity. From the survey it has been found that most of the retailers (42% of the respondents) use the Solar Home Systems with the capacity of 50 watts through which they can run 4 lights (6 Watt each), 1 Black & White TV point and 1 mobile phone charger. The next use was found with the 40 watts through which consumers can run 3 lights (6 Watt each), 1 Black & White TV point and 1 mobile phone charger.

### **4.2.2. Daily Usage of the Solar Home System**

From the survey of the selected sample it has been found that most of the retailers (50% of the respondents) run the Solar Home Systems in their retail stores for 4-5 hours, 29% for 3-4 hours and 17% for 5-6 hours.

### **4.2.3. Period of Using the Solar Home System by the retailers**

It has been revealed from the survey that 42% of the retailers had been using the Solar Home Systems in their retail stores for 2-3 years and 25% for 2 years.

### **4.2.4. Current Expenditure for Lighting**

From the survey of the selected sample it has been revealed that if the respondents want to purchase the Solar Home Systems through credit where they need to pay on an average U\$ dollar 313'69 as the final price of the system, U\$ dollar 49'88 as down payment and U\$ dollar 8'23 as monthly equal installment payment until the fulfillment of the purchase price. The above time may vary in accordance with customer preference and early settlement.

### 4.2.5. Perception of the Costs of Solar Home Systems

#### Cost of the SHS and Affordability of the Retailers

It has been revealed from the survey of the selected sample that most of the retailers (75% of the respondents) agreed that the cost of the Solar Home Systems is within their purchasing ability. Though the monthly installment of the systems is more expensive than the lighting with traditional hurricane (U\$ dollar 3'81) but the respondents are found happy to get more benefits than the cost like brighter light, safe environment etc.

#### Preferred Mode of Payment of the Solar Home Systems

The surveyed retail shop owners showed a strong preference for obtaining systems on credit payment. Nearly 96% of the respondents showed preference for purchasing the system with monthly installment while 4% opted to pay in cash.

#### Preferable Price of the Solar Home Systems

The surveyed retailers preferred U\$ dollar 195'90 as the final price of the system, U\$ dollar 55'39 as the down payment and U\$ dollar 4'62 as the monthly installment of the system.

### 4.2.6. Gap between the Expectation and Perception of Retailers of the Solar Home System Service

From the "t-test" it has been found that for most of the variables there is no gap found between the expectation and perception of retailers with the Solar Home System service except the longevity of the SHS, sustainability of the SHS, regular warranty support of the SHS, maintenance cost of the SHS, availability of loan from the SHS providers, credibility of the SHS providers, the Leaflet, catalog provided with the SHS, availability of the SHS providers and availability of the parts of SHS in the local market. But for few other items no intense gap has been found between the expectation and perception of retailers of the Solar Home System service like reasonable price of the SHS, good quality of the SHS, enough capacity of the SHS, reasonable monthly installment cost of the SHS and friendly behavior of the SHS providers. The result is described in the table 04:

## Momotaz & Karim

**Table 04: Gap between the expectation and perception of retailers of the Solar Home System service:**

Sl. No.	Items	Mean Scores		“t” Value	p-value
		Expected	Actual		
1	Reasonable price of the SHS	1.33	1.83	-2.365	.022
2	Good quality of the SHS	1.13	1.88	-5.254	.000
3	Enough capacity of the SHS	1.33	2.00	-3.762	.000
4	Longevity of the SHS	1.58	1.63	-.267	.791
5	Sustainability of the SHS	1.46	1.50	-.283	.778
6	Regular warranty Support of the SHS	1.46	1.58	-.791	.433
7	Convenient use of the SHS	1.79	2.13	1.425	.003
8	Maintenance cost of the SHS	1.54	2.13	-2.051	.046
9	Availability of loan from the SHS providers	1.00	1.04	-1.000	.323
10	Reasonable monthly installment cost of the SHS	1.46	2.46	-4.034	.000
11	Credibility of the SHS providers	1.71	1.54	1.185	.242
12	Friendly behavior of the SHS providers	2.08	1.63	2.577	.013
13	The Leaflet, catalog provided with the SHS	2.13	1.88	1.614	.113
14	Availability of the SHS providers	1.58	1.63	-.249	.804
15	Availability of the parts of SHS in the local market	3.08	3.04	.205	.838

a = Significance at .05% Level

### 4.2.7. Contribution of the Solar Home Systems to the Retailers (% of respondents)

Among the respondents it has been found that, all of the respondents strongly agreed that they can do more business transactions at night and get bright light at the night by using the Solar Home Systems at their shops. About 83% strongly agreed that healthy environment is available at the shop as there is no emission of gas, dust etc, from the system and their labor for lightening the shop has been reduced, 75% respondents strongly agreed that the system met up the shortage of lighting at the shop whereas about 58% respondents strongly agreed that they can get more time at night and can charge their mobile phone sets. Half of the respondents strongly agreed that the total environment of the shop had been improved as there is no sound pollution of using a generator. About 46% respondents strongly agreed that the number of customers at the shop increases at night due to the availability of lighting, TV and DVD players at the shop. So the Solar Home Systems help the rural retailers in generating income, for instance, by extending working hours and creating a convenient environment for business. The result is described in the following table 05:

## Momotaz & Karim

**Table 05: Contribution of the Solar Home Systems to the retailers (% of respondents):**

Variables	Strongly Agreed	Agreed	Neutral	Disagreed	Disagreed
The shopkeepers can get more time at night	58.3%	33.3%	8.3%	-	-
More Business transactions can be done at night	100%	-	-	-	-
The number of customers increases at night	45.8%	50.0%	-	-	4.2%
The total environment of the shop has been improved	50.0%	29.2%	20.8%	-	-
Healthy environment at the shop as there is no emission of gas, dust etc, from the SHS	83.3%	16.7%	-	-	-
Reduced labor for lightening the shop	83.3%	16.7%	-	-	-
Bright light at the night	100%				
Entertainment at the shop like watching TV, playing DVD etc,	50%	8.3%	8.3%	29.2%	4.2%
Meet up the shortage of lighting at the shop	75%	25%	-	-	-
Availability of the option of Mobile charging	58.3%	-	25%	12.5%	4.2%

### 4.2.8. Overall Satisfaction of the Retailers with Solar Home System Service

Most of the retailers are found just satisfied with the service of SHS whereas only 21% found highly satisfied with it. The result is described in the table 06:

**Table 06: Overall satisfaction of the Retailers of the service of Solar Home Systems:**

Variables	percentage
Highly Satisfied	20.8%
Satisfied	75%
Neither Satisfied nor Dissatisfied	4.2%

### 4.3. Managerial Implications

From a managerial point of view, the understanding of the customer satisfaction and usage of Solar Home System service in Bangladesh can suggest guidelines for customer relationship management by emphasizing on customers' perceptions and evaluations within a continuous relationship. The service providers should offer a good quality system at a reasonable price with adequate capacity and longevity to meet up

the requirements of the customers. Moreover they should maintain a better after sale service at reasonable cost for the customers for convenient use of the systems and also arrange training on technical and better service delivery to their personnel. In this way they will become credible to their customers. This will contribute to the strengthening of Solar Home Systems customers' loyalty.

### 5. Summary and Conclusions

Rural electrification through Solar home System is becoming more popular, day by day in Bangladesh particularly for remote, inaccessible areas. But the intensified competition challenges make the customers satisfaction an essential prerequisite for the achieving a sustainable competitive advantage and, hence, the Solar Home Systems industry's overall success. As in today's competitive environment service marketers put great effort on developing customer satisfaction in order to maintain competitive edge research can be undertaken for outlining of what needs to be done to improve the service of the Solar Home Systems in Bangladesh. For that purpose the researcher tried to judge its customer satisfaction with this research. From the research it may be concluded that Solar Home System service has profound and far-reaching economic, socio-cultural and demographic impacts on life and living of the rural people in Bangladesh. It has significant and sustained impact on household and commercial activities. And by watching TV people are now keeping informed about the latest state of sports, culture and political developments. Most of the respondents are found just satisfied with the Solar Home System in Bangladesh. They are found dissatisfied with some service quality variables like convenient use of the system, longevity of the SHS, sustainability of the SHS, availability of loan from the system providers, maintenance cost of the system, warranty support of the SHS, credibility of the providers, friendly behavior of the personnel, the leaflet, catalog etc. provided with the system and availability of the parts of the system in the local market. So the service providers should take proper care of these variables to improve the overall service quality of SHS service in Bangladesh. The service providers should offer a good quality system at a reasonable price with adequate capacity and longevity to meet up the requirements of the customers. Moreover they should maintain a better after sale service at reasonable cost for the customers for convenient use of the systems and also arrange training on technical and better service delivery to their personnel. The findings of this study may be generalized after taking into consideration certain limitations. This study considers only the users of Solar Home Systems in some areas of the Dhaka Division. To the best of the knowledge this study is the first of its kind based on the customer's perspective. When such studies confirm, support, and strengthen the findings of this research and offer additional strategic guidance, the Solar Home System service in our country could be significantly improved.

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## Momotaz & Karim

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