# Customer Satisfaction and Brand Loyalty of Solar Water Heater Users: A Structural Equation Modeling Approach

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Abstract-Solar energy is certainly not a new concept. It has been long realized that, despite the low energy density of the incoming insolation, solar radiation has a large potential as an energy source. The objective of this study is to analyse what factors contribute to the purchase of a solar water heater and how it influences the Brand Loyalty. A standard questionnaire was framed which was used for data collection. Structural equation modelling approach has been used to test the hypothesis. This paper helps in addressing the knowledge gap and shows how Partial Least Square-Structural Equation Modelling approach can be used in carrying out the research. This study enables the organizations to identify the various areas where its attention is needed and plan for the strategies so as to have a better edge over their competitors and to attract as well as retain the customers.

Index Terms-Structural Equation Modeling, Customer Satisfaction, Brand Loyalty.

#### 1. INTRODUCTION

The need for the use of inexhaustible energy sources is known throughout the globe as the population's increase and demand for the non-renewable sources of energy swells. Non- Renewable energy sources have been depleting and its increased costs have resulted to focus more on renewable energy sources. Solar energy is one of the renewable sources of energy that is available in large quantities at no cost. In recent years India has turned out to be a leading destination for investors from developed countries (Gera, 2013). According to the potential for renewable energy, India is amongst the top 5 destinations globally for solar energy development (Kaur, 2010). A solar water heater is a device which makes use of solar energy to provide hot water for bathing, cooking and washing purposes. In some parts of the country where the requirement for hot water is more than 9 months, the solar water heater can save around 1400 units of electricity (Mercados, 2010). The use of 1000 solar water heaters of 100 LPD capacities can stop an emission of up to 1.5 metric tons of carbon dioxide per year (Mercados, 2010). The emphasis here is to determine how Perceived Ease of Use, Benefits, and Innovativeness increase the Customer Satisfaction and how Satisfaction influences Loyalty.

An important dimension in the field of Customer Relationship Management (CRM) and Marketing is loyalty (Soderlund, 2006). Customers may be loyal to a product, brand or service. Loyalty leads to positive outcomes and behaviours such as sticking to the particular brand, repeated purchase, and giving positive recommendations which may influence other consumers to embrace the product or the service. A loyal customer is an asset to the organization. They are an organizations unpaid sales force (Dehghan, 2011). Today due to the presence of many competitors in the market the competition has intensified. Organizations know that customer satisfaction is quintessential for Brand Loyalty. A loyal customer base generates more sales and increased profits (Dehghan, 2011). Customers can also be loyal when the switching costs are high or when no alternatives exist. When there are alternatives or when the costs associated with switching is low, the management finds the firms inability to satisfy its customers by making use of two feedback mechanisms: voice and exit. Exit means the customer stops purchasing the products, while voice refers to the dissatisfaction expressed by the customer. This can also influence the long term revenue. Loyalty towards a brand is possible only when the customers are satisfied. Many researchers have found that there exists a positive correlation between Loyalty and Customer Satisfaction (Dehghan, 2011).

#### 2. LITERATURE REVIEW

Solar technology has been there since ages. Its history is from 7th Century B.C. In future, energy efficient and new generation cost effective buildings will be constructed that have no need for non-renewable sources of energy. The photovoltaic power price will

match with price of traditional electricity within 10 years. Solar electricity will be used to electrolyze water and producing hydrogen for fuel cells for transportation (US Department of Energy-Energy efficiency and Renewable Energy). There are two types of solar water heater namely evacuated tube collector type (ETC) and flat plat collector type (FPC). In ETC type, collectors are made of glass tubes and are fragile in nature. ETC's work efficiently and can provide higher output temperatures than FPC's (Rawlings, 2009). FPC kind of solar water heaters have a longer life and are of metallic type. Higher cost when compared to ETC's. Suitable for low temperature applications such as swimming pool, industrial heating (Sabonnadiere, 2009) and for domestic purposes.

#### 2.1. Hypotheses Development

Perceived Ease of Use (PEU) is defined as the belief that, using a particular system would be free from effort (Devaraj, 2000). A solar water heater is easy to use and can be used independently. Operations of solar water heater are clear and easily understandable. So most of the customers believe that the solar water heater can be used with ease, without experiencing any difficulties. The perceived ease-of-use influences purchases and increases the customer satisfaction (Kim, 2007). Perceived Ease of Use influences the product usage, and has a direct impact on Customer Satisfaction. The above can be thus hypothesized as

H<sub>1</sub>: Perceived Ease of Use has a significant influence on Customer Satisfaction.

Benefit (BNF) is another variable that drives the use of technology. Usage of solar water heater saves cost. It is environmental friendly and long lasting. When the product is ambiguous it has a direct effect on customer satisfaction, on the other hand when the product is unambiguous such as a solar water heater the performance of the product has a direct impact on customer satisfaction (Youjae, 1993). Positive Benefits increases the Customer Satisfaction whereas negative benefits decrease the Customer Satisfaction (Oliver, 1980). The above can be thus hypothesized as  $H_2$ : Benefits has a significant influence on Customer Satisfaction.

Innovation (INN) refers to creation of something new say a product, a service or technology by an organization so as to satisfy the customers and increase its revenues. A solar water heater is an innovative product that makes use of rays produced by the Sun to get hot water. New variants of solar water heater are being made available in the market, which is more efficient, unique or something which has not been done before. Innovation is used as a tool by the organization's to increase Customer Satisfaction and enhance the Brand Loyalty. The innovation also is described as a process of converting an idea into a product so that the customer embraces it and provides financial benefits to its providers (Naveed et al., 2012). The above can be thus hypothesized as

# H<sub>3</sub>: Innovativeness has a significant influence on Customer Satisfaction.

Customer Satisfaction (CSN) and Brand Loyalty (BLY) is the customer's response to the company's product or service. Customer Satisfaction and Brand Loyalty are the initial and mature stages of customer's response to a company's product (Torres-Moraga et al, 2008). Customer Satisfaction can be to a product, to a brand or to product-brand. When the customers are happy with regard to the quality of the solar water heater they are using they are more likely to be brand loyal, recommend it to others and intend to do more business with the said brand. They also become organizationS unpaid sales force and recommend the brand to others. The above can be thus hypothesized as

H<sub>4</sub>: Customer Satisfaction has a significant influence on Brand Loyalty.

#### 3. HYPOTHETICAL Research Model



Figure 1: The hypothetical research model

Where PEU= Perceived Ease of Use, BNF= Benefits, INN= Innovativeness, CSN= Customer Satisfaction, BLY= Brand Loyalty.

Table 1: Definition of Key Constructs

Constructs	Definition	Author
Perceived Ease of Use (PEU)	Is one which acts as a predecessor to Perceived Usefulness; Belief that using a specific product would be free from effort; Belief that a product can be used without experiencing any difficulty.	Davis (1989); Devaraj (2000); Kim (2007).
Benefits (BNF)	Enhancing Job Performance; Unambiguous Performance of Product.	Davis (1993); Youjae (1993)
Innovativeness (INN)	Tool to increase the Customer Satisfaction; Converting an Idea into Product.	Naveed et al, (2012)
Customer Satisfaction (CSN)	A predecessor of Customer Loyalty; Extent to which perceived performance of product matches the expectations of the buyer; Client Happiness.	Sivadas (2000); Kotler (2002);
Brand Loyalty (BLY)	Repeated purchase behavior; Sticking to a brand irrespective of the alternatives available; A dimension in the field of marketing and CRM.	Kotler (2002); Soderlund(2006).

#### 4. METHODOLOGY

The research model has been analysed using Partial Least Squares- Structural Equation Modelling approach using Smart PLS 2.0 (Ringle, Wende& Will, 2005). This approach was chosen, as PLS has the capacity to handle small sample sizes. The data for this research was collected from solar water heater users and was carried out in two stages.

Surveys were conducted to gather data from the users of solar water heaters. The pilot study comprised of 30 responses. Most of the participants were quite knowledgeable to answer to the pilot study and offer initial feedbacks to improve the questionnaire. The survey questions comprised of 28 items which was reduced to 15 items by means of factor reduction. Liker type scale was used, where 1= Strongly Disagree and 5= Strongly Agree. The measurement model was tested first and then the structural model so as to evaluate the reliability and validity. Table4:LatentVariableCorrelationsanddiscriminant validity

	BLY	BNF	CSN	INN	PEU
BLY	0.8342	0	0	0	0
BNF	0.3006	0.8554	0	0	0
CSN	0.5109	0.4223	0.8579	0	0
INN	0.2609	0.2143	0.3405	0.9071	0
PEU	0.434	0.2631	0.5401	0.3088	0.769

Notes: n=200, square root of AVE is shown along the major diagonal (bold);

BLY= Brand Loyalty; BNF=Benefits; CSN= Customer Satisfaction; INN= Innovativeness; PEU=Perceived Ease of Use.

	BLY	BNF	CSN	INN	PEU
BLY5	0.9641	0	0	0	0
BLY4	0.9316	0	0	0	0
BLY1	0.4317	0	0	0	0
BNF2	0	0.9035	0	0	0
BNF1	0	0.8993	0	0	0
BNF4	0	0.64	0	0	0
CSN4	0	0	0.9652	0	0
CSN1	0	0	0.9349	0	0
CSN5	0	0	0.5128	0	0
INN2	0	0	0	0.9373	0
INN1	0	0	0	0.9183	0
INN4	0	0	0	0.8584	0
PEU3	0	0	0	0	0.694
PEU1	0	0	0	0	0.6635
PEU2	0	0	0	0	0.6635

Table 2: Factor Loadings after Reduction

Table 3: Reliability Measures

	AVE	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
BLY	0.6959	0.8636	0.261	0.8366	0.6959	0.1087
BNF	0.7317	0.8889	0	0.8141	0.7317	0
CSN	0.736	0.8889	0.3962	0.815	0.736	0.1143
INN	0.8228	0.9329	0	0.8909	0.8228	0
PEU	0.592	0.8128	0	0.6926	0.592	0

The measures of internal consistency reliability, item reliability and composite reliability was determined to verify the latent variables reliability. Cronbachs alpha and composite reliability data for the final model is shown in Table 3. If the value of alpha coefficient is greater than 0.8 it indicates there is an increased level of internal evenness. If the estimates of composite reliability is 0.9 it indicates higher values of reliability. The convergent validity is assessed on the basis of factor loading and composite reliability which indicates moderate to high acceptable range of factor loading for all items and good composite reliabilities in general. If the discriminant validity is to be determined, then for each construct the square root of average variance extracted (AVE) is matched with the association between the concept and the other concepts. Table 4 shows discriminant validity and latent variable correlations for each pair of construct.

It is observed that the square root of average variance extracted is greater when compared to the correlation that exists between the constructs. As increased measures are shown in all the rest of the approaches of reliability and validity, this result can be accepted.

#### 4.1. The Measurement Model

The results indicate that one of the hypothesis is not supported (Table 5). The model accounts for 26.1% to 39.6% of explanatory power indicating that the model is good enough. In terms of the strength through path coefficients it can be observed that the values range from 0.151 to 0.511 which indicates moderate to high strength of association between the variables. The hypotheses is supported when the t-values is above 1.96 for 0.05 level of significance (Gefen, 2000).

Following were the hypotheses which have been accepted:

 $H_1$ : Perceived Ease of Use has a significant impact on Customer Satisfaction.

 $H_2$ : Benefits has a significant impact on Customer Satisfaction.

 $H_4$ : Customer Satisfaction has a significant impact on Brand Loyalty.

Table 5: t-values of all dimensions

		Original	Sample	Standard	Standard	T Statistics	Hypothesis
		Sample	Mean (M)	Deviation	Error	( O/STERR )	•••
		(0)		(STDEV)	(STERR)		
BNF	->	0.1428	0.1505	0.0615	0.0615	2.32	Supported
BLY							
BNF	->	0.2795	0.3024	0.1408	0.1408	1.9848	Supported
CSN							
CSN-		0.5109	0.5163	0.0712	0.0712	7.1742	Supported
>BLY							
INN	->	0.0771	0.0857	0.0381	0.0381	2.024	Supported
BLY							
INN	->	0.151	0.171	0.0812	0.0812	1.8592	Unsupported
CSN							
PEU	->	0.2145	0.2152	0.0861	0.0861	2.4926	Supported
BLY							
PEU	->	0.4199	0.4058	0.1286	0.1286	3.2646	Supported
CSN							



Figure 2: The t-values

#### 4.2. The Structural Model

The postulatedprototypeconsists of fourelements as shown in figure 1 which is designed to test four hypothesis built based on the contemporary research literature. The iterative process of testing for convergent and discriminant validity of the model suggested combining items took place during the unstructured interviews with the SWH users. The path coefficient and the explanatory power for the postulated prototype ( $\mathbb{R}^2$ ) for each constructareshown in Figure 3. Though path coefficients display the strength of association between the two latent variables, the t-values (Table 5 and Figure 2) tell the importance of associations which allowanalysis of hypotheses.

With reference to figure 3 the following observations can be made:

Explanation of Variance in Target Endogenous Variable

- Brand Loyalty (BLY) is an endogenous latent variable. Its co-efficient of determination R<sup>2</sup> is 0.261.This means one latent variable, Customer Satisfaction (CSN) explains 26.1% of the variance in Brand Loyalty (BLY).
- Perceived Ease of Use (PEU), Benefits (BNF) and Innovativeness (INN) together explain 39.6% of the variance of Customer Satisfaction (CSN).

Path Coefficient sizes of inner model and its significance

- The inner model suggests that Perceived Ease of Use (PEU) has the strongest effect on Customer Satisfaction (0.420), followed by Benefits (0.279) and Innovativeness (0.151).
- The Customer Satisfaction has the strongest effect on Brand Loyalty (0.511).
- The hypothesized path relationship between PEU and CSN is statistically significant.
- The hypothesized path relationship between BNF and CSN is statistically significant.
- The hypothesized path relationship between CSN and BLY is statistically significant.

### 5. DESCRIPTIVE STATISTICS

#### 5.1. Perceived Ease of Use (PEU)

Table 6 shows the response to the perceived ease of use. Majority of respondents have perceived this dimension on the overall basis as good (8.2 percent) followed by very good (88.3 percent) and average (0 percent). Very small percentages of respondents have expressed the response as poor (2.3 percent) and bad (1.2 percent). With reference to the specific variables of study, the best perceived variables are: 'SWH system is easy to use' and 'I am able to use SWH independently' (Mean = 4.93; SD=0.26). The weakest response was observed on the item 'Operation of SWH is clear and understandable' (Mean = 4.55; SD = 1.05). Figure 4 shows the overall response for Perceived Ease of Use.



Figure 4: Perceived Ease of Use

#### 5.2. Benefits (BNF)

Table 7 shows the response to the benefits. Majority of respondents have perceived this dimension on the overall basis as good (32.7 percent) followed by very good (52.3 percent) and average (9.3 percent). Very small percentages of respondents have expressed the response as poor (4.7 percent) and bad (1.0 percent). With reference to the specific variables of study, the best perceived variable is: 'SWH saves cost' (Mean = 4.48; SD=0.63). The weakest response was observed on the item 'SWH installations attract subsidies by the Government' (Mean = 4.04; SD = 1.12). Figure 5 shows the overall response for Benefits.



Figure 5: Benefits

#### 5.3. Innovativeness (INN)

Table 8 shows the response to the Innovativeness. Majority of respondents have perceived this dimension on the overall basis as good (17.5 percent) followed by very good (34.7 percent) and average (17 percent). Very small percentages of respondents have expressed the response as poor (14.7 percent) and bad (16.2 percent). With reference to the specific variables of study, the best perceived variable is: 'My SWH has innovative features in it' (Mean = 3.83; SD=1.20). The weakest response was observed on the item 'My brand 'X' SWH provides me those features that are not available in other brands' (Mean = 2.74; SD = 1.58). Figure 6 shows the overall response for Innovativeness.



Figure 6: Innovativeness

#### 5.4. Customer Satisfaction (CSN)

Table 9 shows the response to the Customer Satisfaction. Majority of respondents have perceived this dimension on the overall basis as good (25.3 percent) followed by very good (60 percent) and average (6.8 percent). Very small percentages of respondents have expressed the response as poor (5.7 percent) and bad (2.2 percent). With reference to the specific variables of study, the best perceived variables are: 'I am satisfied with the quality of my SWH' (Mean = 4.59; SD=0.72). The weakest response was observed on the item 'I am happy with the price I have paid for my SWH' (Mean = 4.00; SD = 1.26). Figure 7 shows the overall response for Customer Satisfaction.



Figure 7: Customer Satisfaction

#### 5.5. Brand Loyalty (BLY)

Table 10 shows the response to the Brand Loyalty. Majority of respondents have perceived this dimension on the overall basis as good (36.2 percent) followed by very good (30.8 percent) and average (19.3 percent). Very small percentages of respondents have expressed the response as poor (3.5 percent) and bad (10.2 percent). With reference to the specific variables of study, the best perceived variables are: 'I say positive things about my brand 'X' SWH to other people' and 'I intend to do more business with brand 'X' in the next few years' (Mean = 4.01; SD=0.96, 0.84). The weakest response was observed on the item 'SWH from brand 'X' would be my first choice' (Mean = 3.20; SD = 1.56). Figure 8 shows the overall response for Brand Loyalty.



Figure 8: Brand Loyalty



Figure 3: The path coefficients

Table 6: Perceived Ease of Use

	Mean	Std. Dev.	Bad (1) (%)	Poor (2) (%)	Avg. (3) (%)	Good (4) (%)	V. Good (5) (%)
1. SWH system is easy to use.	4.93	0.26	0.0	0.0	0.0	7.0	93.0
2. I am able to use SWH							
independently.	4.93	0.26	0.0	0.0	0.0	7.0	93.0
3. Operation of SWH is clear and							
understandable.	4.55	1.05	3.5	7.0	0.0	10.5	79.0
Average	4.80	0.52	1.2	2.3	0.0	8.2	88.3

Table 7: Benefits

			Bad	Poor	Avg.	Good	V. Good
		Std.	(1)	(2)	(3)	(4)	(5)
	Man	Dev.	(%)	(%)	(%)	(%)	(%)
1. There is very less/no							
electrical consumption							
while using a SWH.	4.41	0.82	0.0	7.0	0.0	38.5	54.5
2. SWH saves cost.	4.48	0.63	0.0	0.0	7.0	38.5	54.5
3. SWH installations attract							
subsidies by the							
Government.	4.04	1.12	3.0	7.0	21.0	21.0	48.0
Average	4.31	0.85	1.0	4.7	9.3	32.7	52.3

#### Table 8: Innovativeness

		Mean	Std. Dev.	Bad (1) (%)	Poor (2) (%)	Avg. (3) (%)	Good (4) (%)	V. Good (5) (%)
1.	My SWH has innovative							
	features in it.	3.83	1.20	6.5	6.5	23.5	24.5	39.0
2.	SWH I am using is distinctly							
	different from other brands.	3.63	1.42	13.0	10.0	17.0	21.0	39.0
3.	My brand 'X' SWH provides							
	me those features that are not							
	available in other brands.	2.74	1.58	29.0	27.5	10.5	7.0	26.0
Av	erage	3.40	1.40	16.2	14.7	17.0	17.5	34.7

Table 9: Customer Satisfaction

	Mean	Std. Dev.	Bad (1) (%)	Poor (2) (%)	Avg. (3) (%)	Good (4) (%)	V. Good (5) (%)
1. I am satisfied with the quality							
of my SWH.	4.59	0.72	0.0	3.5	3.5	24.0	69.0
2. I am happy with the features of my SWH.	4.48	0.78	0.0	3.5	7.0	27.5	62.0
3. I am happy with the price I							
have paid for my SWH.	4.00	1.26	6.5	10.0	10.0	24.5	49.0
Average	4.35	0.92	2.2	5.7	6.8	25.3	60.0

Table 10: Brand Loyalty

				Bad	Poor	Avg.	Good	V. Good
			Std.	(1)	(2)	(3)	(4)	(5)
		Mean	Dev.	(%)	(%)	(%)	(%)	(%)
1.	SWH from brand 'X' would							
	be my first choice.	3.20	1.56	27.0	3.5	20.5	20.5	28.5
2.	I say positive things about my							
	brand 'X' SWH to other							
	people.	4.01	0.96	3.5	3.5	13.5	47.5	32.0
3.	I intend to do more business							
	with brand 'X' in the next few							
	years.	4.01	0.84	0.0	3.5	24.0	40.5	32.0
Av	erage	3.74	1.12	10.2	3.5	19.3	36.2	30.8

#### 6. **DISCUSSIONS**

Innovativeness was found to have no majorimpact on Customer Satisfaction. Not all users adopt innovation. This can be due to unawareness, hesitation in purchasing or using a new technology to avoid risks and when the people have no knowledge of technology. Though solar water heaters are available in the market most of the people are still not aware of its benefits. They prefer electric geysers and other sources to get hot water, as they are not aware of the technology. Organizations will have to focus on its target group who may be the adopters or non-adopters of their innovation. This can be overcome by good marketing strategies and public campaigns so as to address customers concerns and also to increase its sales so as to add to its profits.

PEU was found to be statistically significant and has a positive influence on CSN. This is consistent with the findings of Devaraj (2000), Kim (2007), Chung et al.,

(2012) and Kim (2013). When people believe that usage of a product or technology or a system is free from efforts it will lead to customer satisfaction. Since solar water heater is easy to use and operate it leads to CSN.BNF was found to be statistically significant and has a positive influence on CSN. This is consistent with the findings of Oliver (1980), Youjae (1993) and Davis (1993). When people believe that using a particular product gives them benefits they are certain to purchase it. Solar water heater saves cost, is environmental friendly and reliable when compared to others. BNF thus results in CSN.CSN were found to be statistically significant and has a positive influence on BLY. This is consistent with the findings of Naveed et al. (2012) and Chung et al. (2012). When the customers are happy with the usage of solar water heaters and the services offered they are likely to make more purchases, stick to the brand and also become an organizations unpaid sales force

#### 7. IMPLICATIONS AND CONCLUSIONS

The purpose of this study is to examine the associationamong the variables PEU, BNF, INN with CSN and CSN with BLY. PEU and BNF have a positive and majorimpact on CSN and INN has a weak and insignificant impact on CSN. CSN has a positive and majorimpact on BLY. The model has proven that there can be positive and negative relationships between variables. For an organization it is important to identify the variables which can cause a negative impact and initiate actions so as to neutralise its effect, maintain an edge over their competitors as well as retain their customers. Failing to do so can result in downfall and there is a possibility of customers migrating to the competitors. Customers expect more, have more choices and are lesser brands loyal these days which is due to the result of competitors offering similar products at a lesser price. To survive in the market the organization has to continually improve its products and services as well meet the unmet needs of the customer. A product say a solar water heater which is easy to use, innovative and which has benefits increases customer satisfaction, which results in customers sticking to the particular brand. This also increases the revenues of the firm.

#### 8. Research limitations and future research

The initial study focussed on finding the relationship between Perceived Ease of Use, Benefits, Innovativeness on Customer Satisfaction and Customer Satisfaction on Brand Loyalty. Secondly, the conclusions of this research was based on survey responses taken from existing users of solar water heater, so there is a possibility of response bias and it is suggested that future research can overcome this problem by employing various methodologies in addition to surveys like carrying out interviews, brainstorming sessions, expert consultations etc. Thirdly, in this research only a few variables have been taken into account in the main model. Future research on gauging Customer Satisfaction and Brand Loyalty can consider other significant factors such as Customer Service, Trust, and Perceived Control etc. For Organizations it is essential to understand the customer's needs, select the best possible alternative and implement them successfully. For an accurate prediction various statistical techniques can be used to improve the reliability and validity of the results.

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Appendix 1: The questionnaire

### Customer Satisfaction Survey in Solar Water Heater (SWH)

	Contact Information (Optional) Name
001	
002	Name of Company
003	Telephone Number
004	E-mail

### **Confidentiality statement**

The data in the questionnaire and the questionnaire itself shall be used purely for academic research purpose. No mention of the respondent or the organization to which he/she belongs shall be used anywhere.

### Questions?

If you require assistance in the completion of this questionnaire or have any questions regarding the survey, please contact:

### Ashwin J. Baliga

M.Tech Student-Engineering Management Manipal Institute of Technology, Manipal

Email: <u>baligaashwin@rediffmail.com</u>

Demographic Details
<b>Gender</b>
Age<25 years
Educational qualification Profe ional Diplom UG PG D
Income(per monthRs.)<20, D0 20, 0, -30,000 30, 0, -50,000
50 000-75 000

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Place Tickmark ( $$ )on ONE response for each item with reference to the philosophy, belief or values of your firm.									
5-SA1-	5	4	3	2	1				
1. Perceived Ease of Use (PEU)									
1	SWH system is easy to use								
2	I am able to use SWH independently								
3	Operations of SWH is clear and understandable								
4	Installers of SWH are trustworthy and competent								
5	I feel SWH is easier to use when compared to electric geysers and heaters								
6	It is easy to become skilful in using SWH								
2. Benefits (BNF)									
1	There is very less/no electrical consumption while using a SWH								
2	SWH saves cost								
3	SWH are environmental friendly								
4	SWH installations attract subsidies by the Government								
5	SWH are long lasting								
6	SWH are reliable								
3. Innovativeness (INN)									
1	My SWH has innovative features in it								
2	SWH I am using is distinctly different from other brands								
3	I purchased brand 'X' SWH due to its innovativeness								
4	My brand 'X' SWH provides me those features that are not available in other brands								
4. Customer Satisfaction (CSN)									
1	I am satisfied with the quality of my SWH								
2	I am satisfied with regard to the technical support provided for my SWH								

3	I am satisfied with the responsiveness of my brand 'X' SWH company						
4	I am happy with the features of my SWH						
5	I am happy with the price I have paid for my SWH						
6	I am satisfied with the service provided by my 'X' brand SWH service provider (After Sales Service)						
5. Brand Loyalty (BLY)							
1	SWH from brand 'X' would be my first choice						
2	I will not purchase any other branded SWH if my brand 'X' is not available						
3	It makes sense to buy the SWH from brand 'X' instead of any other brand, even though they are the same						
4	I say positive things about my brand 'X' SWH to other people						
5	I intend to do more business with brand 'X' in the next few years						
6	I would not switch to a competitor, even if I had aproblem with the products/services of the brand 'X' I am using						

Thank you very much for your patience in responding to this survey. Your inputs will be valuable to my research.

Ashwin J Baliga

	BLY	BNF	CSN	INN	PEU
BLY1	0.4317	0	0	0	0
BLY2	0.3563	0	0	0	0
BLY3	0.3141	0	0	0	0
BLY4	0.9316	0	0	0	0
BLY5	0.9641	0	0	0	0
BLY6	-0.3977	0	0	0	0
BNF1	0	0.8993	0	0	0
BNF2	0	0.9035	0	0	0
BNF3	0	0.6025	0	0	0
BNF4	0	0.64	0	0	0
BNF5	0	0.4985	0	0	0
BNF6	0	0.3773	0	0	0
CSN1	0	0	0.9349	0	0
CSN2	0	0	-0.1233	0	0
CSN3	0	0	0.0005	0	0
CSN4	0	0	0.9652	0	0
CSN5	0	0	0.5128	0	0
CSN6	0	0	0.0424	0	0
INN1	0	0	0	0.9183	0
INN2	0	0	0	0.9373	0
INN3	0	0	0	0.3154	0
INN4	0	0	0	0.8584	0
PEU1	0	0	0	0	0.6635
PEU2	0	0	0	0	0.6635
PEU3	0	0	0	0	0.694
PEU4	0	0	0	0	0.6518
PEU5	0	0	0	0	-0.2187
PEU6	0	0	0	0	0.4244

### Appendix 2: Factor Loadings before Reduction