



## PREFERENCE AND SATISFACTION TOWARDS SOLAR WATER HEATER AT HOUSEHOLDS – A STUDY WITH SPECIAL REFERENCE TO POLLACHI TALUK

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### **Abstract:**

Energy is the basic input required to sustain the economic growth and to provide basic amenities of life to the entire population of a country. Energy can be an effective weapon in the battle against abject poverty, especially in the developing countries. The main objectives of the study is to identify the factors influencing the use of solar water heaters. A sample of 200 respondents has been chosen for purpose of the study. Convenient sampling method is adopted to select the sample. The study makes use of statistical techniques such as simple percentage analysis, Chi- square test and weighted average rank method in analyzing the data for finding the result. This study concluded that most of the consumers are aware about solar products through their friends and most of them using solar products. Solar products ensure the green quality of products. There is significant scope in future for direct energy through the installation of solar products.

**Key Words:** Energy, Solar Water Heaters, Consumers & Aware

### **Introduction:**

India is a developing and fast-growing large economy and faces great challenges to meet its energy needs in a responsible and sustainable manner. India ranks sixth in the world in terms of energy demand accounting for 3.5 per cent of the world commercial energy demand. India is a sunny country with a solar energy potential of 20 mw every square km. Solar energy is one of the renewable energy which it is the simplest and is easy to use. Solar water heater use the solar energy from the sun to generate heat (not electricity) which can be used to heat water for showering, space heating, industrial processes or even solar cooking. Solar energy is the primary energy source for our planet as it is responsible for providing energy for planet growth (photosynthesis) and providing the warmth that makes our plant habitable. Solar water heater device has been around for even 100 years. A solar water heater is one of the most effective ways of cutting a household's carbon footprint by reducing reliance on dirty fossil fuel usage. Solar power system has been applied to heat water for night time activity in rural areas. The system will provide hot water availability throughout the day. Solar water heater is a solar collector box, insulation material, and absorber plate. At present, only a tiny fraction of it is being tapped. Solar energy can be used directly in two forms producing heat or light. Production of light and electric current from the sun's rays uses 'photovoltaic technology', which involves direct conversion of sunlight into electricity. The thermal form, which is used for cooking, water heating or purification, drying and fruit ripening, distillation or producing steam for power generation, is more economical. Solar thermal technologies have a special relevance in India due to high availability of resource, average radiation is 4.5 - 6 kwh/m<sup>2</sup>/day with average 280 clear days. In view of the increasing energy demand in all the sectors there is immense potential especially in domestic and industrial sector to meet thermal energy demands. Activities in this field were started in India by Department of Non-Conventional Energy Sources (DNES) by undertaking various research and development and demonstration projects in the field of solar energy. An amount of Rs. 600 crore has been tentatively allocated for research, design and development in the energy sector for the 11<sup>th</sup> Five Year Plan. During the last Five Year Plan period Rs. 72.65 Crores was spent for the same activities. The Ministry has financially supported about 600 R&D Projects particularly in solar energy sector.

### **Statement of the Problem:**

Solar water heaters are produced by many companies and sold in their brand names. In recent years the demand for solar water is growing among households. Competition in the market is intense and companies have to adopt various marketing strategies for improving their share in the market. Various promotional activities such as sales promotion, personal selling, publicity and advertisements are used by firms to achieve certain specific marketing objectives. Satisfaction level of the customers plays an important role in marketing. In this context, it is imperative for every company to assess the awareness level, usage pattern, factors influencing purchase of the brand, problems associated with use of SWH, service level and satisfaction level of the customers. The outcome would throw light on the measures to be taken up for designing and implementing appropriate marketing strategies by the companies in future. This research raises the following questions, Does the customers are aware about their Solar Energy Devices available in the Market? What are reasons for choosing Solar Energy Devices? What are the factors influencing while buying solar water heaters?

### **Objectives of the Study:**

The following are the objectives of the study

- ✓ To identify the factors influencing the use of solar water heaters.
- ✓ To assess the satisfaction level of the consumers towards solar water heaters.

### **Significance of the Study:**

This study is used to analyze the usage and customer satisfaction towards solar water heaters in Pollachi Taluk. Solar water heater system is an effective water heating system without electricity. This study is especially designed to know that factors influencing the customer to purchase solar water heater and their level of satisfaction. The study helps to understand how far the customers are satisfied with solar water heater.

### **Methodology:**

Questionnaire method has been followed for the purpose of collecting data. The required primary data were collected through a well-structured questionnaire. The sample respondents were interviewed personally at the house. Questionnaire meant for customers includes questions relating to personal information, awareness, preference and level of satisfaction towards solar water heater at households.

### **Sampling:**

The data required for the study have been collected through structured questionnaire in order to assess the level of satisfaction towards solar water heater at households. A sample of 200 respondents has been chosen for purpose of the study. Convenient sampling method is adopted to select the sample.

### **Framework of Analysis:**

To give a scientific back up to the study the statistical tools have been applied. Simple percentage method is used to explain the collected data. In order to identify the relationship between brand loyalty and the selected socio economic variables, the Chi – Square technique ( $\chi^2$ ) and weighted Average ranking has been administered.

### **Limitations of the Study:**

The limitations of the study may be as follows

- ✓ The area of study is conducted only in Pollachi Taluk.
- ✓ The data collected for the study is primary data, which is based on the questionnaire and hence the result would bear all the limitations of primary data.
- ✓ The period of study was conducted only for six months.
- ✓ The findings are applicable only to the respondents of Pollachi Taluk. Hence care has to be exercised while extending this results to other areas.

### **Review of Literature:**

Enas R. Shouman (2016) in their study captioned, “Economics Analysis of Diesel and Solar Water Pumping with Case Study Water Pumping for Irrigation in Egypt”, made an attempt to know the reasons for choosing solar products. The study was based on both primary and secondary data. Then the customers have been selected using a simple random sampling method. Sample size is 272 respondents. The statistical tool used was regression analysis. The study concluded that An economic analysis of the water pumping for irrigation and human purposes using PV and diesel are discussed for three pumping systems; PV system, hybrid PV-Diesel system and Diesel unit.

Graham L. Morrison (2016) in their study captioned, “Packaged Solar Water Heating Technology Twenty Years of Progress”. “Social Impact of Solar Home System in Rural Bangladesh: A Case Study of Rural Zone”. Questionnaires were used to collect data from 450 respondents by using quota sampling. The statistical tools used were T test and specific customer ranking. In this study a passive solar water heating system was also fabricated, by using indigenous and locally available materials.

Nagamani. M (2016) in their study captioned, “A Study on Awareness and Usage of Solar Products among Women Graduates – An Empirical Study”, aims to focus on the impact of awareness of solar products among women graduates. This study is based on Primary data collected from 50 respondents by means of a structured questionnaire. Random sampling technique was applied and statistical tools like Percentage Analysis and Chi-Square were carried out to analyze the data and draw interpretation. This study concluded that most of the consumers are aware about solar products through their friends and most of them using solar products.

Ganapathi Bala Subramanian. S and Dr. P. Ravichandran (2015) presented an article entitled, “A Study on Consumers Satisfaction towards Solar Energy Products in Coimbatore District”, reveals the purpose of the study is to analyse the satisfaction level of Solar Energy System consumers in Coimbatore District. The primary data were collected from the Solar Energy Products consumers in Coimbatore District. Sample size was restricted to 75 respondents of domestic and non-domestic solar energy product consumers. The sample size was selected on the basis of judgement sampling method. The collected data were analysed using statistical tools like Percentage analysis and Chi-Square test. This study concluded that Solar Energy Products has huge market in the near future because of importance given by both state and central government, improvement of services and new technology are the need of the hour to improve the consumers satisfaction towards the solar products.

Prakash Kumar Sen and Nishita Kispotta (2015) in their study captioned, “Study on Solar Water Heater and Its System Performance”, aims to explore that the solar energy is one of the renewable energy which it is the simplest and is easy to use. Solar water heater use the solar energy from the sun to generate heat (not electricity) which can then be used to heat water for showering, space heating, industrial processes or even solar cooking. Solar water heater device has been around for even 100 years. The collected data were analysed using statistical methods like simple percentage. The sample size decided for the study was 100. The system will provide hot water availability out the day. The solar water heater used for supplying hot water during the day. The study that solar water heater is a solar collector box, insulation material, and absorber plate.

#### **Analysis and Interpretations:**

##### **Socio-Economic Profile of Respondents:**

The personal profile of respondents namely, age, area of Residence, gender, marital status, educational qualification, occupation, type of family, number of earning members in the family, total non-earning members in the family, size of the family, monthly income, family income per month are presented in the following tables.

Table 1: Demographic Profile

S.No	Determinants	No of Respondents ( N=200)	Percentage (%)
	<b>Age</b>		
	Up to 25 years	98	49.00
	26 to 40 years	92	46.00
	Above 40 years	10	5.00
	<b>Area of Residence</b>		
	Urban	62	31.00
	Semi-Urban	28	14.00
	Rural	110	55.00
	<b>Gender</b>		
	Male	80	40.00
	Female	120	60.00
	<b>Marital Status</b>		
	Married	102	51.00
	Unmarried	98	49.00
	<b>Educational Qualification</b>		
	Up to HSC	23	11.50
	Under-Graduate	52	26.00
	Post-Graduate	60	30.00
	Professional	37	18.50
	Diploma	17	8.50
	Others	11	5.50
	<b>Occupation</b>		
	Agriculturists	36	18.00
	Business	35	17.50
	Government Sector Employee	15	7.50
	Private Sector Employee	52	26.00
	Professionals	13	6.50
	Home Maker	21	10.50
	Others	28	14.00
	<b>Type of Family</b>		
	Joint	79	39.50
	Nuclear	121	60.50
	<b>Number of Female Earners in the Family</b>		
	One	55	27.50
	Two	110	55.00
	Above Two	35	17.50
	<b>Total Earning Members in the Family</b>		
	One	57	28.50
	Two	87	43.50
	Above Two	56	28.00
	<b>Size of the Family</b>		
	Up to three	71	35.50
	Four	70	35.00
	Above four	59	29.50

	<b>Monthly Income</b>		
	Up to Rs.15,000	80	40.00
	Rs.15,001 to Rs.25,000	44	22.00
	Above Rs.25,000	76	38.00
	<b>Family Income Per Month</b>		
	Up to Rs.25,000	59	29.50
	Rs.25,001 to Rs.50,000	85	42.50
	Above Rs.50,000	56	28.00

It is clear from the above table that out of 200 respondents, majority of the respondents belong to the age group up to 25 years. Majority of the respondents belong to rural area. Majority of the respondents are female. The majority 102 (51%) of the respondents are married. Most of the respondents are Post graduates. Majority 52 (26%) of the respondents are job in private sector. Majority of the respondents belong to nuclear family. Majority of the respondents in the family belong to earning category. 87 (43.50%) are non-earning of two members in the family. The majority 70 (35.00%) of the respondents have four members in their family. Most of the respondents earning per month is up to Rs.15,000. Most of the respondents family income is up to Rs.25,001 to Rs.50,000.

#### **Purpose of Using the Solar Water Heater:**

Solar water heating systems, use free heat from the sun to warm domestic hot water. A conventional boiler or immersion heater can be used to make the water hotter, or to provide hot water when solar energy is unavailable. These results are presented in the following table.

Table 2: Purpose of Using the Solar Water Heater – Weighted Average Ranking

Purpose of Using the Solar Water Heater	1	2	3	4	5	6	7	8	9	10	11	Total	Weighted Average Ranking
Save money	75	24	11	15	9	11	26	7	14	3	5	200	I
Reducing the usage of Gas and Electricity	15	32	25	15	21	14	16	30	13	16	3	200	II
Eco-Friendly	23	19	22	28	16	16	18	13	22	11	12	200	III
Tax benefits	21	28	13	18	18	21	21	21	15	18	6	200	IV
More hot water capacity	18	27	19	14	26	15	18	23	12	13	15	200	V
Easy Installation	11	14	24	28	14	37	22	13	13	14	10	200	VI
Renewable	9	15	19	21	24	16	20	32	11	20	13	200	VIII
Durable	7	16	24	25	25	24	21	24	7	7	20	200	VII
Low Voltage	15	11	21	17	8	14	13	14	30	29	28	200	IX
Battery Backup	3	11	7	11	27	16	17	7	39	37	25	200	X
Tax Credits / Grants	3	3	15	8	12	16	8	16	24	32	63	200	XI

From the above table, it is observed that among the various reasons, for using solar water heater the customers have ranked save money as 1st rank, followed by 'Reducing the usage of Gas and Electricity', 'Eco-Friendly', 'Tax benefits', 'More hot water capacity', 'Easy Installation', 'Renewable', 'Durable', 'Low Voltage', 'Battery Backup' and 'Tax Credits / Grants'.

#### **Level of Satisfaction on Solar Products:**

The chi square test is an important test among the several tests of signification developed by satisfaction. Chi-square, symbolically written  $\chi^2$  is a statistical measure used in the contexts of sampling analysis for comparing a variance to a theoretical variance. It can also be used to make comparison between theoretical population and actual data when categories as used.

Table 3: Demographic Profile and Level of Satisfaction on Solar Products

S.No	Variables	D.f	Calculated $\chi^2$ Value	Table Value	Result
1	Age	4	10.774	9.488	Significant
2	Area of Residence	4	10.849	9.488	Significant
3	Gender	2	2.041	5.991	No Significant
4	Marital Status	2	12.921	5.991	Significant
5	Educational Qualification	10	11.478	18.307	Significant
6	Occupation	12	39.978	21.026	Significant
7	Type of Family	2	1.096	5.991	No Significant
8	Number of Earning Members in the Family	4	16.997	9.488	Significant
9	Number of Non-earning Members in the Family	4	7.360	9.488	No significant
10	Size of the Family	4	4.742	9.488	No significant
11	Monthly Income	4	5.020	9.488	No Significant
12	Family Income Per Month	4	12.088	9.488	Significant
13	Type of Solar Water Heater Preferred	2	7.028	5.991	Significant

14	Level of Awareness	4	13.847	9.488	Significant
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From the above analysis, it is said that the sample respondents are varying in their socio- economic profile and details of customer satisfaction on solar water heater products. The result of Chi-Square test reveals that, of the eight variables selected the following variables namely, age, area of residence, marital status , Educational Qualification , occupation, earning members in the family , family income , type of solar water of the respondents are found to be associated with the level of satisfaction on solar water heater products.

#### **Socio Economic Profile of the Respondents:**

- ✓ Majority of the respondents belong to the age group up to 25 years.
- ✓ Majority of the respondents belong to rural area.
- ✓ Majority of the respondents are female.
- ✓ The majority 102 (51%) of the respondents are married.
- ✓ Most of the respondents are Post graduates.
- ✓ Majority 52 (26%) of the respondents are job in private sector.
- ✓ Majority of the respondents belong to nuclear family.
- ✓ Majority of the respondents in the family belong to earning category.
- ✓ Majority of the respondents in the family belong to two members are non- earning category.
- ✓ The majority 70 (35.00%) of the respondents have four members in their family.
- ✓ Most of the respondents earning per month is up to Rs.15,000.
- ✓ Most of the respondents family income is up to Rs.25,001 to Rs.50,000.

#### **Purpose of Using the Solar Water Heater:**

It is observed that among the various reasons, for using solar water heater the customers have ranked save money as 1st rank, followed by 'Reducing the usage of Gas and Electricity', 'Eco-Friendly', 'Tax benefits', 'More hot water capacity', 'Easy Installation', 'Renewable', 'Durable', 'Low Voltage', 'Battery Backup' and 'Tax Credits / Grants'.

#### **Variables Influencing Level of Satisfaction on Solar Water Heater Products:**

- 1. Age:** There is a significant association between age of the respondents and their level of satisfaction towards solar water heater products
- 2. Area of Residence:** There is a significant association between area of residence of the respondents and their level of satisfaction with solar water heater products.
- 3. Gender:** There is no significant association between gender of the respondents and their level of satisfaction with solar water heater products.
- 4. Marital Status:** There is a significant association between marital status of the respondents and their level of satisfaction towards solar water heater products.
- 5. Educational Qualification:** There is a significant association between Educational Qualification of the respondents and their level of satisfaction towards solar water heater products.
- 6. Occupation:** There is a significant association between occupation of the respondents and their level of satisfaction with solar water heater products.
- 7. Type of Family:** There is no significant association between type of family of the respondents and their level of satisfaction towards solar water heater products.
- 8. Earning Members in the Family:** There is a significant association between number of earning members in the family and their level of satisfaction towards solar water heater products.
- 9. Number of Non-Earning Members in the Family:** There is a no significant association between number of non-earning members in the family of the respondents and their level of satisfaction with solar water heater products.
- 10. Size of the Family:** There is a no significant association between number of members in the family and their level of satisfaction with solar water heater products.
- 11. Monthly Income:** There is no significant association between monthly income of the respondents and their level of satisfaction towards solar water heater products.
- 12. Family Income per Month:** There is a significant association between family income of the respondents and their level of satisfaction towards solar water heater products.
- 13. Type of Solar Water Heater Preferred:** There is a significant association between type of solar water preferred and their level of satisfaction towards solar water heater products.

#### **Suggestions:**

- ✓ Most of the people are not much aware of the Solar water heater. Hence, manufactures should create awareness about water purifier through more colorful advertisements and free gifts.
- ✓ These advertisement measures attract more number of people to buy the water heater and this in turn would boost up volume of sales.
- ✓ Better advertisement and awareness about the quality of water has to be created among the people residing in rural areas.
- ✓ Cost of the service has to be reduced. Quality and warranty period should be increased.



- ✓ There is more wastage of water in the purification process. So the wastage should be reduced.

**Conclusion:**

In today's world of rapidly changing technology consumer's preference are frequently changing. The various competitors in this market are adopting new marketing strategies to retain their market share. Majority of the consumers have locality for their own brand and for meeting the changing environment the firm has to be constantly innovative and understand the consumer's needs and wants. The study on "Customer Satisfaction on Solar water heater products" in Coimbatore helped in identifying their knowledge about solar products, the source of information about solar products and their opinion about solar products. Most of the consumers are aware about solar products through their friends and most of them using solar products. Solar products ensure the green quality of products. There is significant scope in future for direct energy through the installation of solar products. Today the firms are aware regarding the adoption and implementation of solar products in their production process, products and the alike.

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