



## AN EMPIRICAL STUDY ON CONSUMER SATISFACTION TOWARDS SOLAR ENERGY PRODUCTS IN CHENNAI CITY

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**ABSTRACT** Solar energy is the most readily available source of energy. It is a significant sustainable clean and green source of energy, which can help in reducing greenhouse gas emission leading to sustainable development. Solar energy devices are launched mainly with the objective to create environmental awareness of mass power consumption and the need to conserve power using solar energy devices like Solar Photovoltaic systems and other devices such as street lights, garden lights, corridor lights, bill boards, rooftop systems etc. There is significant scope for direct energy saving as well as energy generation through the installation of solar water heating and other renewable energy technologies. The major drawback of solar products is high price. The main aim of this study is to identify the consumer satisfaction towards using Solar Energy Product in Chennai. For this 100 consumers were selected and collect their satisfaction level about the usage of solar energy products by using random sampling method. This research found that male respondents have perceived high level of satisfaction and they faced only the problem of high purchase cost of the solar energy products.

**KEYWORDS :** Solar Energy Product, Consumer Satisfaction, Solar Photovoltaic System, Solar Water Heater.

### 1. INTRODUCTION

India is endowed with abundant of solar radiation. The country receives solar radiation equivalent to more than 5,000 trillion kWh/year, which is far more than its total annual energy requirement. The radiation available could be utilized for thermal as well as for photovoltaic applications. Solar thermal technologies have already found ready acceptance for a variety of decentralized applications in domestic, industrial and commercial sectors of the country. The most widely acceptable application is the solar water heating technology. However, solar steam generating and air heating technologies and energy efficient solar buildings are also attracting attention in urban and industrial areas. Among solar photovoltaic technologies, there are some devices/ systems such as solar lanterns, solar home systems, solar street lights, solar pumps, solar power packs, roof top SPV systems etc which could be useful both in rural and urban areas for the purpose of reducing burden on conventional fuels.

Solar energy is the instant source of energy. Three of the fastest growing sun based technologies are solar thermal, concentrating solar power (CSP) and photovoltaic. This solar energy can be used in many ways, such as domestic lighting / heating / cooking, street light, electricity / power generation, water pumping, powering of remote telecommunication etc. Solar products are available in the market for using both domestically and industrially.

### 2. REVIEW OF LITERATURE

According to Graham Morrison (1997), it is discussed in the research that the International and Australian solar water heater markets were outlined. Factors effecting adoption of solar water heaters were presented with a discussion of the impact of market promotion programs. A range of new products being developed in Australia and as part of an International Energy Agency program were described. Van Campen, et al., (2000) evaluated in their research that the solar photovoltaic (PV) systems had shown their potential in rural electrification project around the world, especially concerning Solar Home Systems. With continuing price decreases of PV systems, other applications were becoming economically attractive and growing experience was gained with the use of PV in such areas as social and communal services, agriculture and other productive activities, which can had a significant impact on rural development. There was still a lack of information, however, on the potential and limitations of such PV applications. The main aim of this study is, therefore, to contribute to a better understanding of the potential impact and of the limitations of PV systems on sustainable agriculture and rural development (SARD), especially concerning income-generating activities. It is, in fact, of paramount importance to identify the potential contribution of PV to rural development in order to gain further financial and political commitment for PV projects and programmes and to design appropriate PV projects. One of the main lessons learnt through this study was that success of PV programmes was significantly enhanced

when an integrated strategy was followed. Solar photovoltaic systems, through their flexibility in use, offer unique chances for the energy sector to provide "packages" of energy services to remote rural areas such as for rural health care, education, communication, agriculture, lighting and water supply. It was hoped that this document contributes to the generation of ideas and discussions among the different institutions involved in providing these services to rural areas and thereby to an "informed" decision on the PV technology option.

M. Venkatraman and U. Sheeba (2014) in their study on "Customer's Attitude towards Solar Energy Devices" have studied the awareness of the solar energy devices and the ideas, preferences and attitude among respondents. They also examined customer's satisfaction and customer opinion regarding CRM practices of Manufacturers of solar energy devices. Customer's attitude towards solar energy devices is definitely changing and there has been a significant increase in the awareness and benefits of using solar energized devices over electrical devices and also increases the consumer's responsibility towards the environment and eco-friendliness.

### 3. STATEMENT OF THE PROBLEM

In the present scenario, the world is dominated by the Electrical Energy and the Electronic devices. The technological improvement in this field is vast and it plays a vital role in day to day lives of people. Solar energy being a renewable energy available in abundance as the natural source sun emits Photovoltaic energy in the sun rays. Solar cells / panels used to grasp solar energy and converts into electrical energy for usage. Many companies have come in to the market in the commercial sales of solar energy based devices. In this view the study has been undertaken to find the satisfaction of the consumers towards solar energy products in Chennai city.

### 4. OBJECTIVES OF THE STUDY

To evaluate the satisfaction level of consumers towards using solar energy products with special reference to solar photovoltaic system and solar water heater in Chennai City.

### 5. RESEARCH DESIGN

This research used random sampling method for collecting the data, because solar photovoltaic system and solar water heater users list collected from the V-Guard dealer. From the list 100 samples were selected randomly and collect their satisfaction level towards using solar energy products from the various areas of Chennai City. Simple statistical tools like Percentage analysis and Chi-Square Test have been used in this research.

### 6. RESULTS AND DISCUSSION

The following table is discussed about the demographic details of the selected sample respondents.

**Table No. 1 : Gender of the Respondents**

No.	Gender	No. of Respondents	Percentage
1	Male	84	84.0
2	Female	16	16.0
	Total	100	100.0

From the above table it is noted that majority (84.0%) of the respondents are male.

**Table No. 2 : Age of the Respondents**

No.	Age	No. of Respondents	Percentage
1	Upto 30 years	18	18.0
2	31-45 years	52	52.0
3	Above 45 years	30	30.0
	Total	100	100.0

Majority of the respondents belongs to 31-45 years aged.

**Table No. 3 : Educational Qualification of the Respondents**

No.	Educational Qualification	No. of Respondents	Percentage
1	No formal Education	12	12.0
2	School Level	18	18.0
3	College Level	44	44.0
4	Professional	26	26.0
	Total	100	100.0

Majority of the respondents are educated till college level.

**Table No. 4 : Monthly Income Level of the Respondents**

No.	Monthly Income Level	No. of Respondents	Percentage
1	Upto Rs. 25,000	13	13.0
2	Rs. 25,000 – 40,000	35	35.0
3	Above Rs.40,000	52	52.0
	Total	100	100.0

Majority (52.0%) of the respondents are earning above Rs.40000 in a month.

**Table No. 5 : Occupational Status of the Respondents**

No.	Occupational Status	No. of Respondents	Percentage
	Govt. Employee	23	23.0
	Private Employee	19	19.0
	Business	48	48.0
	Others	10	10.0
	Total	100	100.0

Majority (48.0%) of the respondents are doing business.

**Table No. 6 : Marital Status of the Respondents**

No.	Marital Status	No. of Respondents	Percentage
1	Married	74	74.0
2	Unmarried	26	26.0
	Total	100	100.0

Majority (74.0%) of the respondents are married.

**Table No. 7: Sources of Awareness about the Solar Energy Products**

No.	Sources	No. of Respondents	Percentage
1	Advertisement	21	21.0
2	Old Users	49	49.0
3	Dealers / Sales Person	30	30.0
	Total	100	100.0

Majority (49.0%) of the respondents are getting awareness about the Solar Energy products through old users.

**Table No. 8 : Solar Energy Products**

No.	Solar Energy Products	No. of Respondents	Percentage
1	Solar Water Heater	32	32.0
2	Solar Photovoltaic System	43	43.0

3	Both	25	25.0
	Total	100	100.0

Majority (43.0%) of the respondents are having solar photovoltaic system followed by Solar Water Heater (32.0%).

**Table No. 9 : Capacity of Solar Water Heater**

No.	Capacity	No. of Respondents	Percentage
1	Upto 100 Litres	29	50.9
2	101 to 300 litres	21	36.8
3	Above 300 litres	7	12.3
	Total	57	100.0

Majority (50.9%) of the respondents are using 100 litres tank solar water heater.

**Table No. 10 : Capacity of Solar Photovoltaic System**

No.	Capacity	No. of Respondents	Percentage
1	Upto 600 Watts	12	17.6
2	601 Watts to 1 KVA	33	48.6
3	Above 1 KVA	23	33.8
	Total	68	100.0

Majority (48.6%) of the respondents are using 601 watts to 1 KVA Solar Photovoltaic System.

**Table No. 11 : Period of using Solar Energy Products**

No.	Capacity	No. of Respondents	Percentage
1	Below 3 Years	29	29.0
2	4 to 5 Years	46	46.0
3	Above 5 Years	25	25.0
	Total	100	100.0

Majority (46.0%) of the respondents are using the solar energy products for 4 to 5 years.

**Table No. 12 : Overall Satisfaction of the Respondents**

No.	Opinion	No. of Respondents	Percentage
1	Highly Satisfied	42	42.0
2	Satisfied	36	36.0
3	Neutral	10	10.0
4	Dissatisfied	8	8.0
5	Highly Dissatisfied	4	4.0
	Total	100	100.0

Majority (42.0%) of the respondents are highly satisfied in using solar energy products in the study area.

**Table No. 13 : Relationship between selected independent variables and level of satisfaction towards solar energy products**

Null Hypothesis ( $H_0$ ): There is no significant relationship between selected independent variables and level of satisfaction towards solar energy products.

No.	Factors	$\chi^2$ Value	'p' Value
1	Gender	18.652	0.001
2	Age	26.531	0.000
3	Educational Qualification	23.520	0.035
4	Monthly Income level	23.051	0.000
5	Occupational Status	24.611	0.033
6	Solar Energy Products	17.652	0.041
7	Period of Using	21.931	0.002

From the above table, it is identified that the null hypothesis is rejected for all the selected variables. Hence, it is found that all the variables are having close association with the level of satisfaction towards solar energy products.

## 7. Findings

- From the analysis of the research it is found that majority of the respondents are male, 31-45 years aged, qualified with college level, earning above Rs.40000 in a month, engaged in their business, married, getting awareness through old users, using solar

photovoltaic system, using upto 100 litres tank capacity solar water heater, using 601 watts to 1 KVA solar photovoltaic system, using around 4-5 years and getting high level of satisfaction.

- It is found from the chi-square analysis that all the selected variables like gender, age, educational qualification, monthly income level, occupational status, solar energy products, period of using are having close association with level of satisfaction towards using solar energy products in Chennai City.

## 8. SUGGESTIONS AND CONCLUSION

This study mainly focused on consumer satisfaction towards solar energy products in Chennai city. This study mainly helped in identifying their knowledge about solar products, the source of information about solar energy products and their opinion about solar energy products. Most of the consumers are satisfied about solar energy products. Solar products ensure the green quality of products. There is a significant scope in future for direct energy through the installation of solar energy products. Today the respondents are well aware and satisfaction regarding the adoption and implementation of solar energy products in their production process, products and the alike.

## 9. REFERENCES

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