



The Rationale behind Acceptance of Solar Device by the Residents of Coimbatore

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Abstract

Energy is essential to humankind. The increase in demand for energy has raised concern over the past few decades. Solar energy is an alternative source to meet the energy demand. Solar energy has diverse applications of use for residential, commercial, and industrial purposes. Acceptance of solar energy by consumers is significant as it determines the failure and success of the technology. The present study explores the rationale behind the acceptance of solar devices by the selected households of Coimbatore city. The survey results show that households are willing to adopt solar energy devices. Still, due to limitations such as exorbitant price and unawareness of the available devices in the market, they could not be adopted as an alternate energy source and still are using the conventional source of energy. Realizing the importance of exploiting solar energy, researches is carried out all over the world and many devices from minor to major devices are available in the market. Only very few devices have become popular and people are aware of only these devices widely available in the market, lack of awareness is the major reason for not being purchased by the households.

1. Introduction

The level of knowledge of consumers is a significant factor in the success of solar energy technology (Kannan and Vakeesan). It is crucial to analyze consumer attitudes against solar energy systems, knowledge regarding awareness on the availability of solar devices in the market, electricity production using solar energy, benefits of solar energy compared to fossil fuels, motivation, subsidies, and incentives offered by the government (Devabhaktuni et al.). The lack of consumer awareness and knowledge of solar power is a significant barrier to gain the largest proportion of the energy market for

solar energy in the generation to follow. As solar power technologies are relatively new, consumers have inadequate knowledge about photovoltaic systems (Guangul and Chala).

Most of the consumer will assume that solar systems are inefficient because they are only accessible during sunshine. When paired with other solutions, including the hybrid photovoltaic thermal system, they are questionable that these transient technologies can be completely accurate. Also, local electricity providers can be unaware of solar power systems and incorporate them into their networks (Mekhilef, Saidur, and Safari).

According to International Energy Agency 2011, the development and adoption of solar energy technology will increase the country's energy security, reduce pollution, lower global warming and sustainability, and more importantly, reduce the price of fossil fuels. The benefits of solar energy include environmental to money-saving. The costs of installing solar panels are high, but they can save money in the long run (Bahadori and Nwaoha Kabir et al. Mikhailov et al.).

With government assistance, many pieces of research are carried out, and many industries have started manufacturing different solar devices to conserve electricity which also makes the environment eco-friendly. Manufacturers such as Tata, Supreme, Goodsun, and many other leading companies make excellent quality solar devices for residential and industrial purpose.

2. Objectives of the Study

- To identify the solar devices used by selected households
- To create awareness on solar devices that are available in the market
- To know the rationale behind accepting the solar devices by the selected households

3. Hypothesis

- The mean acceptance score does not differ significantly between males and females.
- The mean acceptance score does not differ significantly among urban and semi-urban locale respondents.

4. Methodology

In this section, the overall plan is to explain how the research was carried out carefully. The methodology notifies the methods to be pursued in research activities starting from exploration to a presentation. This study was based on primary data collected by the investigator from the Coimbatore district of Tamil Nadu (Rabah).

The methods followed in the present study are briefly discussed below.

4.1. Selecting the Area of Study

Coimbatore is also acknowledged as Kovai. It is considered the second-largest city in the Indian state

of Tamil Nadu. As per the 2011 census, Coimbatore is the 16th largest urban agglomeration in India. The Coimbatore city is fortunate to get abundant solar energy, and the acquaintanceship of the investigator with the city was the reason for choosing the study area as Coimbatore.

4.2. Selecting the Sampling Procedure

Sampling is learning about a sub-group of the larger population in which the investigator is interested. The investigator selected families using at least one solar device as samples from Coimbatore because only these samples can share their experience regarding solar devices. The researcher adopted the purposive sampling method in picking up the samples. Purposive sampling is the method based on convinces, budget, and time constraints of the researcher. The samples are selected using purposive sampling as they possess the characteristics necessary for the research work.

The information on the households using at least one solar device was collected from the website of the TEDA. It was set up in 1985 by the Government of Tamil Nadu to promote renewable energy sources, encourage activities related to energy conservation, and encourage R and D on renewable energy. A thousand solar device users were listed on the website of the TEDA, out of which only four hundred solar device users were interviewed based on the convenience of both investigators and households. It took a period of three months to collect data from the households.

4.3. Research Tool Applied

The Interview schedule was found appropriate by the researcher to gather the information from the households. The interview schedule is comprised of questions in sequences that are relevant to the objectives of the study. It is considered interpersonal communication because it involves face-to-face communication. The interviewer asks the questions with the interviewee and notes the responses simultaneously. An interview schedule is considered a list of questions that can be close-ended or open-ended put together in order by the investigator to collect data. The advantage of the interview schedule is that it leads to uniform information ensuring comparability.

4.4. Pre-testing and Conducting the Study

Before conducting the main study a pilot study was conducted among 50 households to check the applicability of the interview schedule, and required modifications were done based on the feedback of the samples. A pilot study enhances the program and testes the validity and reliability of the tool adopted. An interview schedule was validated by Mr. Marudhachalam, a statistician by profession since 1990. Mugil Data Analysis, Coimbatore Before conducting the main study interview schedule was pre-tested among 50 samples which were selected randomly and modifications were made accordingly. The researcher conducted a pilot study to make the schedule clear, comprehensive, and, more importantly, unambiguous. It took a period of one month to complete the pilot study i.e., July. The interview was conducted at a time suitable for households through personal contact method one at a time for which the investigator took the leadership in gathering data using the schedule. The purpose of the study was explained to the households, and actively engaged them in answering the questions posed on them. For each household, it took 40-45 minutes to complete the interview schedule.

5. Result and Discussion

In this section, collected data was analyzed and interpreted in tables by employing statistical methods to get the meaningful output, and tables are discussed briefly by the researcher. SPSS statistical software was used to analyze the data. The results were classified, tabulated, and an analysis was done in line with the study's objectives.

5.1. Sociodemographic P profile

In social surveys, socio-demographic profile variables are required. According to the United Nations Multilingual Demographic Dictionary, the scientific study of the population concerning their size, structure, and development is known as a demographic profile. The investigator collected data on gender, type of house and, locality. The results are depicted in Figure 1.

Figure 1 social demographic profiles of the respondents interprets that 47 percent of respondents were male and 53 percent were female. Fifty-seven percent of respondents live in urban areas, and the remaining 43 percent live in semi-urban areas. It is also depicted that thirty-four percent

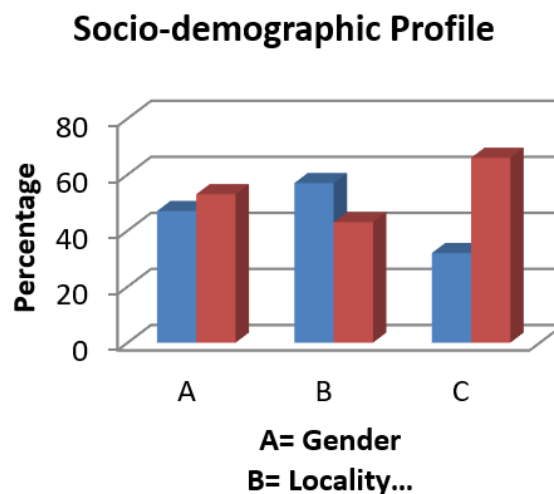


FIGURE 1. Scio-demographic Profiles of the Respondents

of respondent's family type was a joint family and sixty-six percent respondent's family type was the nuclear family (Sivarasu, Sekaran, and Karthik Bogaraj, Kanakaraj, and Kumar).

5.2. Solar Device used by the Households

Due to technological advancement, many solar devices are available in the market, to which households may not be aware of all the available devices in the market. In order to know the solar devices used by families, an attempt was made by the investigator to conduct a survey.

Table 1. The Solar devices used by the households interprets that a majority of, seventy-one percent of the respondents were aware of solar home lighting and were also using the same and the percent increases due to multiple responses selected by households. Solar water heater was used by forty-nine percent of respondents. Though solar devices such as solar UPS, chargers, pumps, and AC were available in the market these devices were not popular among the consumers because these solar devices were highly-priced.

5.3. Acceptance of Solar Devices by the Households

Solar energy can supply the present and future energy needs. Hence accepting solar devices becomes essential. The respondents were given a 5 point rating scale of options varying from 'Strongly agree' to 'Strongly disagree', and respondents were asked to mark their opinion. Percentage analyses are

TABLE 1. The Solar Devices used by the Households

Devices	N=400	%
Solar home lighting	282	71
Solar water heater	194	49
Solar UPS	2	0.5
Solar chargers	3	0.8
Solar pumps	8	2
Solar AC	4	1

presented in Table 2

Table 2. Acceptance of solar devices by the households elucidates that while 31 percent of households strongly agreed to accept solar devices because they are eco-friendly, 45.3 percent of the households agreed to it, this indicates the existing awareness among the samples on the use of solar devices.

Because solar devices can reduce electricity bills, 49.8 percent of respondents agreed to accept solar devices and 34.8 strongly agreed to the same. In the case of extended benefits provided by solar devices, only 8.5 percent of respondents agreed, whereas 40.5 percent strongly disagreed. This shows that people were aware of only a few solar devices available in the market. Hence it is imperative that awareness of other benefits and working principles of the devices should be created among the people (Yadagani Krey and Volker Ying and Hu).

Only 8.5 percent of respondents strongly agreed that they use solar devices to use government subsidy, whereas 32.3 strongly disagreed. From this, we can understand that though government takes various initiatives to promote the use of solar devices people do not use solar devices unless they are convinced. So, measures should be taken to make them understand the various benefits of solar devices so that they will come forward to opt to install the devices in their house (Bailey). When it comes to various applications offered by solar energy, only 4.8 percent of respondents strongly agree, and 38 percent agreed. This information also reiterates the need for creating awareness among people and measures should be undertaken to promote the use of solar devices (Halabi, Al-Qattan, and Al-Otaibi).

To understand the relationship between gender and the acceptance of solar devices the data was subjected to statistical analysis. The mean acceptance score was calculated gender-wise and the results are given in Table 3. Acceptance of Solar Devices by

Gender.

The mean acceptance score for males is 16.83, which is marginally higher than for females at 16.20. The difference between the acceptances score of males and females was statistically tested using the following hypothesis, and the results are given in Table 4. H_0 the mean acceptance score does not differ significantly between males and females.

In Table 4. t-test for Equality of Means & Critical value: 1.966

Result: The t-test for equality of means was conducted to test the hypothesis. The calculated t-value is 2.381, which is higher than the critical value of 1.966 at the 5 percent level. Hence, it is inferred that there is a significant difference in the mean acceptance scores between male and female respondents. As the t-test gives, the 'significant' results hypothesis is rejected.

Similarly, the mean acceptance score was calculated based on the locality in which the samples reside, and the results are given in Table 5 Acceptance of solar devices by locality.

The mean acceptance score of urban is 16.23, which is higher than semi-urban. The difference between the acceptances score of urban and semi-urban locale was statistically tested by using the following hypothesis, and the results are given in Table 6. H_0 the mean acceptance score does not differ significantly among urban and semi-urban respondents.

In Table 6. t-test for Equality of Means & Critical value: 1.966

Result: The t-test for equality of means was conducted to test the hypothesis. The calculated t-value is 2.403, which is higher than the critical value of 1.966 at the 5 percent level. Hence, it is inferred that there is a significant difference in the mean acceptance scores among urban and semi-urban locale respondents. As the t-test gives, the 'significant' results hypothesis is rejected.

TABLE 2. Acceptance of Solar Devices by the Households

Responses		Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree	Total
Eco-friendly solar devices	N	1	-	94	181	124	400
	%	0.3	-	23.5	45.3	31	100
For reducing electric bills by the use of solar devices	N	9	3	50	199	139	400
	%	2.3	0.8	12.5	49.8	34.8	100
For extended benefits provided by the solar devices	N	162	157	42	34	5	400
	%	40.5	39.3	10.5	8.5	1.3	100
To make use of govt. subsidy	N	129	65	101	71	34	400
	%	32.3	16.3	25.3	17.8	8.5	100
To get benefited from various applications	N	19	20	87	152	122	400
	%	4.8	5.0	21.8	38.0	30.5	100

TABLE 3. Acceptance of Solar Devices by Gender

		Acceptance of solar devices by gender		
		Mean	S.D	N
Gender	Male	16.83	2.70	189
	Female	16.20	2.56	211
Total		16.50	2.64	400

TABLE 4. The difference between the Acceptances scores of Males and Females

T	Df	Sig.
2.381	398	*

TABLE 5. Acceptance of Solar Devices by Locality

		Acceptance of solar devices		
		Mean	S.D	No.
Locality	Urban	16.23	2.36	229
	Semi-urban	16.87	2.95	171
Total		16.50	2.64	400

TABLE 6. The difference between the Acceptances scores of Urban and Semi-Urban locale

T	Df	Sig.
2.403	398	*

6. Conclusion

Solar energy is renewable energy that is clean, green, abundant, and safe. Solar technology enables everyone to access electricity in a sustainable way which can lower the carbon emission of the nation. Hence government and other organizations should take enough steps to popularize solar energy technology. The acceptability of solar technology by consumers plays a vital role in the success of solar technology. The survey conducted by the investigator shows that there is a lack of awareness on the

availability of solar devices in the market and the high cost of the installation of solar devices drags the consumers down in accepting the solar devices. Hence consumers should be made aware by manufacturers and dealers by giving education and awareness on solar technology benefits. Knowledge and awareness are two important variables that affect the social acceptability of solar technology. There was a significant difference in the mean acceptance scores between male and female respondents and there was a significant difference in the mean accep-

tance scores among urban and semi-urban locale respondents.

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