

A STUDY ON CONSUMER PURCHASE INTENTION FOR SOLAR ENERGY PRODUCTS IN AHMEDABAD.

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Abstract

As the solar power industry surges, understanding consumer behavior becomes crucial. This research delves into the factors driving purchase decisions for solar energy products in Ahmedabad, India. We explore both pre-purchase motivations and post-purchase experiences.

Focusing on 200 respondents through convenience sampling, we employed descriptive research and standardized questionnaires to assess the importance of twelve key factors. The response of common people will be collected. They will be asked to rate the factors on a Likert Five Point scale in agreement with the statements and the scale range from 1=strongly disagree to 5=strongly agree.

Our findings revealed that environmental factors reigned supreme, with eco-friendliness being the most influential factor, followed by performance, environmental concern, and cost. Additionally, perceived usefulness and value emerged as significant motivators. Interestingly, size, company information, government initiatives, and perceived ease of use also played a role in consumer decisions.

*These insights can empower solar energy product sellers of Ahmedabad to craft targeted strategies resonating with consumer preferences. Moreover, this study lays the groundwork for further research **on** consumer purchase intention and buying behavior towards solar energy in diverse contexts.*

Keywords: - Solar energy products, Consumer Purchase Intention, Government initiatives, Cost.

1. Introduction:-

Renewable energy has started playing an increasingly important role in the augmentation of grid power, providing energy access, reducing consumption of fossil fuels and helping India pursue its low-carbon development path.

Solar energy accounts for around 6310 MW of Gujarat's total renewable energy production of 17,041 MW. The state has set a target of raising its renewable energy capacity to 68,000 MW by 2030.

Energy is an important factor and an inevitable component of economic development. It is also significant for improving and maintaining the quality of life.

Consumer purchase intention for solar energy products refers to their psychological state in terms of making purchases of solar energy products. Before making a final purchase of solar energy products, consumers are bombarded by several factors which limit or influence consumers for the final decision.

The main purpose of the study is to know the factors that affect consumer purchase intention for solar energy products. We focus on how consumers form such purchase intention with the help of models.

Our problem area which is Consumer behaviour toward solar energy products will determine the attractive factors that affect consumers to make purchase intention to buy solar energy products and those factors will help marketers to formulate their strategies for selling solar energy products. As our area of research is Ahmedabad state so our research thesis will not only be helpful for marketers in general but specifically will be helpful for the marketers in Ahmedabad.

2. Review of Literature

Kumar, Vikas & Hundal, Bikramjit & Kaur, Kulwinder. (2019). This study investigated the factors driving farmers' decisions to adopt solar water pumping systems. Interestingly, cost emerged as the most significant influence, highlighting its crucial role in shaping purchasing behavior. Farmers prioritized affordability over other aspects, making price a key consideration for potential buyers. Following cost, system performance and government initiatives played crucial roles. Farmers valued reliable and efficient pumping systems, while supportive government policies (e.g., subsidies, incentives) significantly impacted their choice..Surprisingly, factors like environmental friendliness, product information, environmental concern, and social influence had less influence. This suggests that while farmers may appreciate these aspects, they prioritize practical considerations like cost, performance, and government support when making purchase decisions.

Kumar, V., Hundal, B. S., & Kaur, K. (2019). The study validated that five factors namely reliability, responsiveness, assurance, empathy, and tangibility influence the service quality of solar product dealers and there is no significant difference between perceptions and expectations of solar product users except for the responsiveness dimension. As far as gap analysis is

concerned, the dimension 'responsiveness' was responsible for the highest gap score. So, the perceptions of solar product users are not fully met with their expectations.

Ayoub, Sohail & Dastgir, Ghulam & Waqas, Muhammad. (2019). In this study, it was found that there are four factors Perceived Usefulness, Perceived ease of use, Attitude towards solar energy, and Cost of using solar energy that impact the consumer purchase intentions regarding solar energy application at the domestic level. All four independent variables were analyzed with the dependent variable of consumer purchase intentions and it was found that all four factors significantly impact consumer purchase intentions.

Adam Faiers, Charles Neame(2006). The study found that the barriers to the adoption of domestic solar systems lie primarily with the financial aspects of the systems. However, with product development, the economic, operational and aesthetic aspects could be improved and by utilising sensible marketing strategies that spread awareness of the innovation and improve its visibility, the potential for solar power is greatly enhanced.

Kumar, Vikas & Hundal, Bikramjit & Syan, Amanjot. (2020). The study shows that customer attitude towards solar products is significantly determined by green purchase behaviour and government initiatives. However, dimensions such as environmental knowledge, promotion and advertisement, environmental concern, and peer influence were not found significant to the customer attitude towards solar energy products.

Prakash, G. and Pathak, P. (2017). The study revealed that purchase intention towards eco-friendly packaging is significantly influenced by personal norms, attitude, environmental concern and willingness to pay. This study also provides interesting insights about young consumers towards eco-designed packaging. These useful insights will help to marketers in developing focused strategies towards young consumers and encourage them to reduce the global ecological footprint of packaging.

Jaiswal, D. and Singh, B. (2018) The study revealed that the measure of variables "environmental concern" and "perceived consumer effectiveness" were found to be a positive and significant predictor of attitude towards green products, however, "perceived environmental knowledge" was not significantly related to attitude towards green products and perceived consumer effectiveness in the model. The discussion and implications are manifested towards sustainable consumption in the context of emerging target markets.

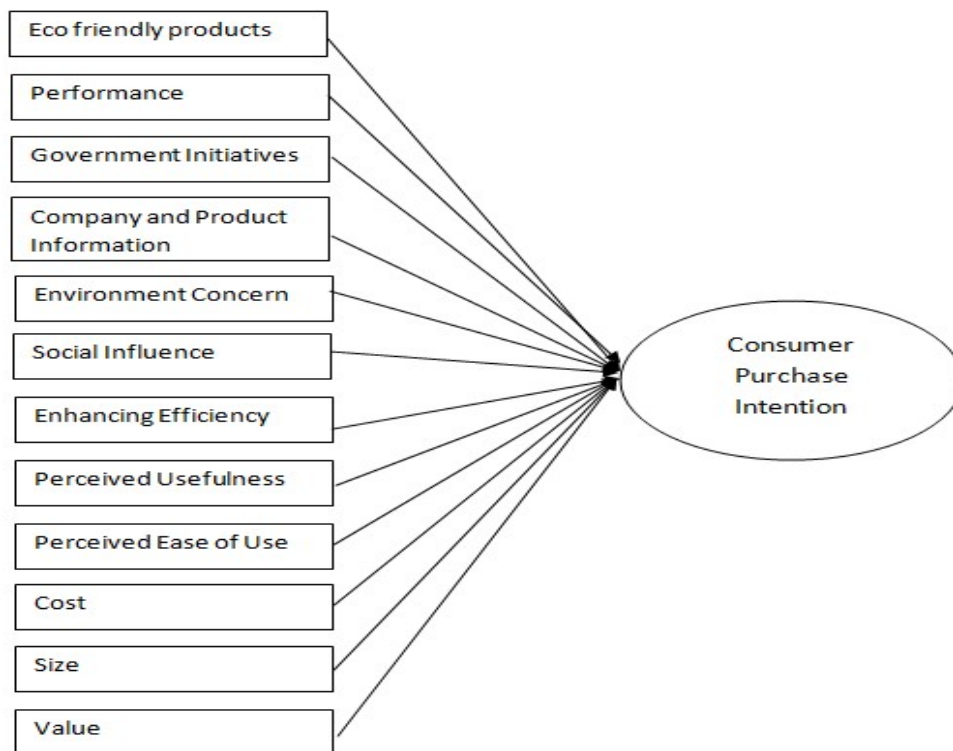
3. Objectives of Study

1. To study the consumer purchase intention for solar energy products.
2. To identify and analyze the factors affecting consumer purchase intention for solar energy products.
3. To examine the relationship between underlying factors and consumer purchase intention for solar energy products.

4. Research Methodology

This study aimed to understand consumer purchase intention for solar energy products. It includes the factors that make consumers buy particular solar energy products. Respondents were selected from Ahmedabad because it had convenient for the researcher. The sample selected had at least an awareness of solar energy products. The size of the sample selected was 200. A descriptive research design has been used for the study. Descriptive research studies are those that are concerned with describing the characteristics of a particular individual or group. The respondents were selected based on the convenient sampling technique. The primary data were collected from surveys with the help of self-administered questionnaires. The close-ended questionnaire was used for data collection to reduce the non-response rate and errors. The questionnaire consists of two different sections, in which the first section consists of introductory questions that give the details of the demographic profile of the consumers as well as their awareness of solar energy products and the second section consists of questions related to the research. To study the factors affecting consumer purchase intention for solar energy products, a five-point Likert scale with responses ranging from "Strongly agree" to "Strongly disagree", with the following equivalencies, "strongly disagree" = 1, "disagree" = 2, "neutral" = 3, "agree" = 4 and "strongly agree" = 5 was used in the questionnaire with a total of 12 items. Data was collected through Google Forms. After collecting the data, a reliability test based on Cronbach's Alpha value was measured, for analysis of demographic profile descriptive statistics were used, and factors analysis was performed on SPSS using a correlation regression test to find the impact of various dimensions on consumer purchase intention for solar energy products.

Figure 1: Conceptual framework of the study.



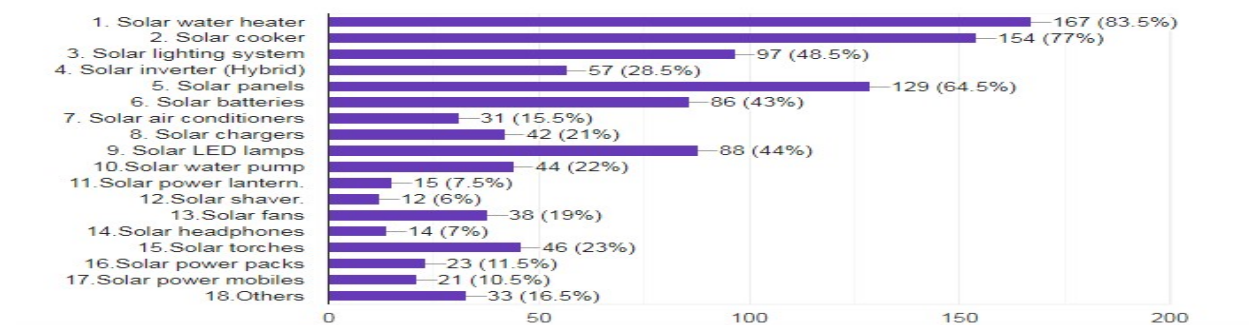
5. Data Analysis and Discussion

Table 1: Frequency distribution of demographic variables

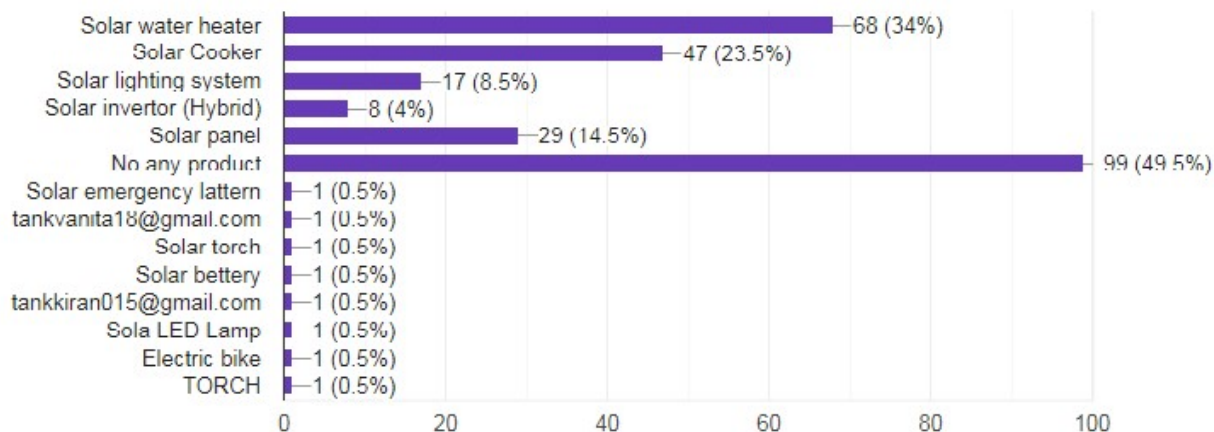
Table1: Demographic Profile of Respondents			
Respondents		Frequency	Percentage
Gender	Male	104	52.0
	Female	96	48.0
Age	15-25	173	86.5
	26-35	16	8.0
	36-45	8	4.0
	Above 45	3	1.5
Income	< 200000	122	61.0
	200001-400000	40	20.0
	400001-600000	24	6.0
	>600000	14	3.5
Education	Above Master Degree	12	6.0
	Post Graduate	59	29.5
	Graduate	70	35.0
	Undergraduate	59	29.5
Marital Status	Married	20	10.0
	Single	180	90.0
Occupation	Salaried Employee	96	48.0
	Business	65	34.5
	Professional	39	19.5
Total		200	100.0

Table 1 was drawn to understand the socioeconomic background of the respondents and it was found that out of the total sample (n=200)

Figure 2: Number of respondents who know about different solar energy products.



From the above figure we come to know that out of 200 respondents, 167(83.5%) respondents know about the solar water heater, 154(77%) respondents know about solar cookers, 129(64.5%) respondents know about solar panels and about 97(48.9%) respondents know about solar lighting system.

Figure 3: Number of respondents who have different types of solar energy products.

From the above figure, we come to know that out of 200 respondents 101 (50.5%) respondents have solar energy products.

Table 2: Factor loading: Consumer Purchase Intention.

Sr. No.	Factors	Factor loading
1	Eco-friendly products	.703
2	Performance	.848
3	Government initiatives	.793
4	Company and product information	.791
5	Environmental concern	.839
6	Social influence	.743
7	Enhancing efficiency	.796
8	Perceived usefulness	.856
9	Perceived ease of use	.823
10	Cost	.692
11	Size	.703
12	Value	.762

All the factors shown in the above table are related to the consumer purchase intention for solar energy products. The respondents are impacted by perceived usefulness to buy solar energy products which is inferred from the highest factor loading of 0.856, followed by 0.848-factor loading for performance, environmental concern with the factor loading of 0.839, followed by perceived ease of use which has the factor loading of 0.823, enhancing efficiency with factor loading 0.796, government initiatives with the factor loading 0.793, company and product information with factor loading 0.791, value with factor loading 0.762, social influence with 0.743, eco-friendly products and size with factor loading 0.703 and cost with factor loading 0.692.

Measures: Reliability and validity assessment.

The Cronbach's Alpha statistic was used to check the reliability of the scale developed for evaluation statements used in the questionnaire. The alpha coefficient for the 12 factors affecting consumer purchase intention for solar power products of the questionnaire is 0.924 suggesting that the items have relatively consistent as indicated in table-2.

Table 3: Reliability Statistics.

Reliability Statistics	Cronbach's Alpha	Items
Overall	0.924	12

Table 4: Respondents' opinions about the different attributes of solar energy products.

Attributes of solar energy products	SA(F)	A(F)	N(F)	D(F)	SD(F)	Total(F)
Energy saving	117	39	24	8	12	200
Cost-effective	72	46	55	13	16	200
Life long	78	50	56	7	9	200
Safety while using	85	60	35	9	11	200

F = Frequency (N=200) SA = Strongly Agree, A= Agree, N= Neutral, D= Disagree, S.D. = Strongly Disagree.

Table 5: Frequency of respondents in respect of the level of agreeing with particular factors affecting their purchase intention for solar energy products.

Factor	SA (F)	A (F)	N (F)	D (F)	SD (F)	Total (F)
Eco-friendly products	84	45	35	7	29	200
Performance	61	67	47	6	19	200
Government initiatives	50	50	69	17	14	200
Company and product information	46	55	74	11	14	200
Environmental concern	57	65	48	8	22	200
Social influence	43	59	61	15	22	200
Enhancing efficiency	48	64	56	14	18	200
Perceived usefulness	46	62	68	10	14	200
Perceived ease of use	47	60	58	17	18	200
Cost	50	61	62	15	12	200
Size	45	64	59	19	13	200
Value	50	59	61	17	13	200

F = Frequency (N=200) SA = Strongly Agree, A= Agree, N= Neutral, D= Disagree, S.D. = Strongly Disagree.

To find the impact of different dimensions on consumer intention for solar energy products, the researcher used a regression analysis test using SPSS.

Factors affecting consumer purchase intention for solar energy products

Table 6: Squared correlation matrix of constructs
Descriptive statistics

Correlations													
	CPI	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
CPI	1.000												
F1	.654	1.000											
F2	.674	.610	1.000										
F3	.606	.548	.723	1.000									
F4	.602	.477	.680	.618	1.000								
F5	.934	.596	.708	.589	.646	1.000							
F6	.641	.544	.573	.489	.529	.639	1.000						
F7	.587	.479	.612	.591	.548	.588	.594	1.000					
F8	.653	.493	.666	.610	.582	.656	.575	.717	1.000				
F9	.615	.504	.606	.545	.558	.616	.572	.632	.731	1.000			
F10	.345	.235	.435	.460	.483	.395	.362	.467	.515	.379	1.000		
F11	.484	.404	.483	.439	.438	.473	.425	.503	.539	.581	.540	1.000	
F12	.569	.474	.540	.541	.592	.555	.424	.495	.624	.602	.558	.615	1.000

F1=Eco-friendly products, F2=Performance, F3=Government initiatives, F4=Company and product information, F5=Environmental concern, F6=Social influence, F7=Enhancing efficiency, F8=Perceived usefulness, F9=Perceived ease of use, F10=Cost, F11=Size and F12=value

Correlation coefficients of variables

To examine the relationship between different variables we conducted the correlation test. The following table shows the relationship of different variables with consumer purchase intention for solar energy products.

Table 7: Correlation coefficient of independent variables with the dependent variable.

Independent variable names	Correlation coefficient with dependent variable i.e consumer purchase intention for solar energy products
Eco-friendly products	A strong positive correlation (0.654)
Performance	Strong positive correlation(0.674)
Government initiatives	Strong positive correlation(0.606)
Company and product information	Strong positive correlation(0.602)
Environmental concern	Very Strong positive correlation(0.934)
Social influence	Strong positive correlation(0.641)
Enhancing efficiency	Moderate positive correlation(0.587)
Perceived usefulness	Strong positive correlation(0.653)
Perceived ease of use	Strong positive correlation(0.615)
Cost	Weak positive correlation(0.345)
Size	Moderate positive correlation(0.484)
Value	Moderate positive correlation(0.569)

Table 8: Model Summary

Model Summary										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.947 ^a	.897	.890	.414	.897	135.100	12	187	.000	1.521
a. Predictors: (Constant), F12, F6, F10, F1, F3, F11, F7, F4, F9, F5, F2, F8										
b. Dependent Variable: Consumer Purchase Intention										

F1=Eco-friendly products, F2=Performance, F3=Government initiatives, F4=Company and product information, F5=Environmental concern, F6=Social influence, F7=Enhancing efficiency, F8=Perceived usefulness, F9=Perceived ease of use, F10=Cost, F11=Size and F12=value

The above table presents the summary of regression analysis results.

Firstly, R² accounted for 0.897 in the present study showing that 89.7% of the variation of the dependent variable (customer purchase intention for solar energy products) was explained by twelve independent variables.

Secondly, an adjusted R² value which is the most useful measure of the success of a model shows the value of 0.890, i.e., which accounted for 89% of the variance in the dependent variable.

Apart from it, the value of R 0.947 shows a significant relationship exists between the dependent variable and independent variables.

Table 9: Summarised findings

Hypotheses	Std.(b)	Sign.	Results
H01 There is no significant impact of the dimension 'Eco-friendly products' on consumer purchase intention for solar energy products.	.118	.000*	Rejected
H02 There is no significant impact of the dimension 'Performance' on consumer purchase intention for solar energy products	-.077	.073*	Accepted
H03 There is no significant impact of the dimension 'Government initiatives' on consumer purchase intention for solar energy products	.080	.032*	Rejected
H04 There is no significant impact of the dimension 'Company and product information' on consumer purchase intention for solar energy products	-.042	.248*	Accepted
H05 There is no significant impact of the dimension 'Environmental concern' on consumer purchase intention for solar energy products	.829	.000*	Rejected
H06 There is no significant impact of the dimension 'Social influence' on consumer purchase intention for solar energy products.	.042	.224*	Accepted

H07 There is no significant impact of the dimension 'Enhancing efficiency' on consumer purchase intention for solar energy products	.014	.718*	Accepted
H08 There is no significant impact of the dimension 'Perceived usefulness' on consumer purchase intention for solar energy products.	.041	.343*	Accepted
H09 There is no significant impact of the dimension 'Perceived ease of use' on consumer purchase intention for solar energy products	-.015	.696*	Accepted
H010 There is no significant impact of the dimension 'cost' on consumer purchase intention for solar energy products	-.081	.013*	Rejected
H011 There is no impact of the dimension 'size' on consumer purchase intention for solar energy products	.034	.312*	Accepted
H012 There is no significant impact of the dimension 'value' on consumer purchase intention for solar energy products	.060	.107*	Accepted

Note: *Indicates significance at 5% level.

Discussions of the results: -

The result of regression analysis represents that Null hypotheses for four dimensions eco-friendly product, government initiatives, environmental concern and cost were rejected at a 5% level of significance which described that these four dimensions have a significant impact on customer purchase intention for solar energy products.

Apart from these four dimensions, Null hypotheses for another eight dimensions were accepted at a 5% level of significance confirming that these eight dimensions namely performance, Company and product information, social influence, Enhancing efficiency, Perceived usefulness, Perceived ease of use, size and value have less impact on consumer purchase intention for solar energy products.

6. Findings:

1. The percentage of males is 52 (104 respondents) which is higher than the percentage of females i.e. 48(96 respondents).
2. A higher percentage of respondents (86.5%) are from the age group 15 to 25 years and a lower percentage of respondents (8%, 8% and 1.5%) are from the age groups 26 to 35 years, 36 to 45 years and above 45 years of age respectively.
3. A higher percentage of respondents (35%) are Graduates followed by 29.5% of respondents who are Postgraduates, 29.5 % of respondents who are undergraduates and only 6% of respondents are having above Master's degree.
4. A higher percentage of respondents (61%) are from income levels less than Rs. 200000 annually and a lower percentage of respondents (7%) are from income levels above Rs. 600000 annually.
5. A higher percentage of respondents (90%) are single and a lower percentage of respondents (10%) are married.
6. Out of a total of 200 respondents, (48%) of respondents are salaried employees, (32.5%) of respondents are having business and (19.5%) of respondents are professional.

7. Limitations of the Study: -

- The study is confined to Ahmedabad city only.
- The data collected for the research is fully on primary data given by the respondents. There is a chance for personal bias. So the accuracy is not true.
- The limitation of this study also lies in the sample size and the age distribution of the sample used in this study. A sample size of 200 is small and approximately 86.5 per cent of the sample was in the age group of fewer than 35 years, thus, the results may not be generalized for consumers over the age of 35.

8. Conclusions: -

This empirical research aimed to capture the phenomenon of customer purchase intention for solar energy products in Ahmedabad city, The proposed model of the research measures the customer purchase intention which is further driven by Eco-friendly products, Performance, Government initiatives, Company and product information, Environmental concern, Social influence, Enhancing efficiency, Perceived usefulness, Perceived ease of use, Cost, Size and value.

Based on the finding it is concluded that among the twelve factors selected for this research the most attractive and influencing factors for consumer purchase intention for solar energy products are eco-friendly products, Government initiatives, Environmental concerns and Cost.

Therefore, this study in the context of Ahmedabad city so far connotes that the consumers from Ahmedabad perceive that their efforts positively influence ecological benevolence and surely they would buy solar products. To promote solar energy products, the government should focus on advertisements, subsidies and incentives.

Consumers must adopt solar energy products to make the environment more sustainable. However, consumers should also have a high degree of environmental knowledge and concern about the adoption of solar products. Environmental buying behaviour can form a favourable attitude towards solar products, and therefore, these provide a base for the implementation of various promotional schemes sustainable for the masses in general. On the other hand, a government is required to promote the effectiveness of solar energy products with concrete information and such deliberate movements would uplift the adoption of solar energy products among consumers in emerging markets including India.

Our research is an empirical study which is most appropriate to the stated objectives of the research. The results of the research are valid and reliable because data has been collected from primary sources. This research is expected to be useful to the solar manufacturer, regulators, customers, product and service providers, commercial banks and other environmental institutions.

9. Managerial Implications of the study.

The research has recognized various factors which affect consumer purchase intention for solar energy products, which can further help solar manufacturers to get an idea regarding the preferences of customers and they can try to match solar energy products accordingly. This

research may be useful for the regulators to frame guidelines and policies while introducing new solar technology in the industry to suit the needs of the customers at its best.

10. Future scope of the study.

Future research may be performed, taking into consideration the extra factors affecting consumer purchase intention for solar energy products. It may be contrasted to the results of this analysis study to identify any variations. Future analysis may be accomplished on an entirely different market, population area, and specific solar energy product or with a larger sample size.

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