



## CONSUMERS' ATTITUDES TOWARDS SOLAR-POWERED PRODUCTS IN ODISHA

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**Article History:** Received: 10.02.2023

Revised: 25.03.2023

Accepted: 10.05.2023

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### Abstract

To meet its new renewable purchasing commitments by 2029-30, India would need 21,700 MW of renewable energy generation, according to the Odisha Renewable Energy Policy (OREP) 2022. Research and development, demonstration, and marketing activities have all contributed to making solar energy a viable and attractive option in India. The fact that over 40% of Indian homes lack access to electricity means that solar photovoltaics (PV) is a crucial energy source. With the potential of 21,700 MW of renewable energy capacity to meet future renewable purchasing commitments, Odisha has the potential to become a significant renewable energy state. This study focuses on customers' decision-making processes and the factors that encourage them to switch to renewable energy sources like home photovoltaic (PV) technology. Marketing agencies should develop promotional techniques to attract new clients, and it is believed that customers with strong ecological concerns are more inclined to purchase solar PV systems. Marketers in the green power industry are working to create a renewable energy sector that is driven by consumer demand. Consumers' intentions to use solar lighting systems are strongly influenced by environmental concerns but also by social factors, environmental knowledge, environmental attitude, environmental responsibility, and government effort. The expansion of PV in the residential sector depends heavily on inspiring and motivating individuals to use the technology. The goal of this study is to assess consumers' awareness of solar-powered products via the mediums of social media and television. The reform of the electricity industry has stoked the discussion about the best ways to encourage the use of renewable energy. Ninety-nine percent of respondents with postgraduate degrees responded that the environmentally beneficial and renewable aspect of solar power sources is what pulls them in.

**Keywords:** Photovoltaics(PV), OREP, Solar Energy, Consumer's Attitude, Renewable Energy, Environmental Responsibility.

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DOI: 10.31838/ecb/2023.12.1.285

## 1. Introduction

The World Bank has identified a critical scarcity of electricity in India, with almost 40% of households not having access to power. Energy management is an integral aspect of the operational activity of various economic sectors and is necessary to reduce energy consumption. Solar energy has been used primarily for water pumping and off-grid lighting, but India uses four to five million diesel-powered water pumps, each consuming roughly 3.5 kilowatts of energy. The Thar Desert has been designated for solar power projects, with proposals calling for generating 700 to 2,100 Gigawatts. To increase the manufacturing and use of solar energy systems, the Ministry of New and Renewable Energy (MNRE) has established schemes and incentives such as subsidies, soft loans, concessional tax on raw material imports, and excise duty exemption.

India is expanding the use of off-grid solar power for localized energy requirements and the massive grid-connected solar PV effort. In 2015, only 55% of homes in rural areas had access to electricity, while 85% of households used solid fuel as their primary source of cooking energy. Solar lanterns, 30,256 solar-powered water pumps, and 1.4 million solar cookers were given or sold in India. The Indian Ministry of Non-Conventional Energy Sources (MNRE), state energy development agencies, and the Indian Renewable Energy Development Agency Limited run the programme, which is massive even by developing country standards (IREDA). This programme is seen as a credible industry leader in wind and solar power, and India's National Environmental Action Plan has declared accelerating the development of the country's renewable energy resources a major thrust area to encourage ecologically responsible energy investments.

"In our opinion, Odisha's renewable energy potential is on par with Karnataka's." Odisha's solar potential, according to MNRE, is 25,000 MW. But, according to our research, the potential is 1.5 lakh MW. "That can be done with just 2% of the wasteland," Mr Bhushan said, adding that Odisha has the potential to become a major renewable energy state in the nation.

The Odisha Renewable Energy Policy (OREP), 2022 states that by 2029-30, the state would need 21,700 MW of renewable energy capacity to satisfy new renewable purchase obligations (RPO), with around 16,000 MW required by industry for captive usage and 5,700 MW needed by utilities.

Public opinion is a critical factor in determining whether or not energy policy goals can be achieved. Solar energy has become increasingly

popular in India, with R&D, demonstration, and marketing efforts leading to reliable and easy implementation. This technology has no harmful environmental effects and can be used in decentralized settings. India consumes 4% of the world's total energy supply, and its energy mix includes both traditional and alternative sources. The three most common energy sources are coal, petroleum, and conventional biomass. India can become a self-sustaining community if energy conservation, energy efficiency, and energy generation from renewable sources increase.

## 2. Literature Review

Researchers looked at the market potential for solar lighting in South Odisha. The study is divided into two parts: first, until produced in big quantities, pricing for all these solar goods should remain low or constant. Rural customers may save money by pooling their purchases with other potential users in a product share pricing approach. Another method for selling solar products in the countryside is the pay-as-you-go (PAYG) approach. Rural parts of South Odisha have implemented the Entrepreneurial-cum-SHG model for selling solar items. Look at the marketing strategies used in rural Odisha, namely in South Odisha, and compare the strategies used elsewhere in rural India. (Das, 2020)

This research in the Indian state of Telangana examined the obstacles and potential elements that may impact consumers' purchase choice for solar energy for home usage. The results indicate that consumers' concern for the Environment, their impression of solar energy's performance, and its simplicity of use are all significant factors in their overall opinion of solar power. Policymakers and academics might use the information gleaned from this study to better understand the motivations for and barriers to residential solar panel adoption. Consumers' purchasing decisions are formed despite the inherent dangers of investing in any given product, and environmental considerations play a role in selecting solar energy goods. Manufacturers and agencies working to increase the use of solar energy products have a further obstacle in raising public awareness. Customers' understanding of solar power's advantages must be bolstered, and homeowners must be given the necessary resources to make the switch. (Verma, 2021)

This research examines the factors influencing consumers' choice of home photovoltaic (PV) technology as an alternative to traditional energy sources. Several customer attributes, including environmental consciousness, are examined in this study because they influence consumers' decisions to invest in PV systems for their homes. According to the data, a direct positive relationship exists

between the customer's desire to use residential PV technology and environmental concern elements such as social influence, attitude, knowledge, responsibility, and government effort. However, there must be more correlation between environmental problem awareness and intention to adopt. Furthermore, the study's findings corroborate and extend those of prior studies (Muyingo, 2015; Palm & Tengvard, 2011; Salazar et al., 2013; Schelly, 2014; Singh, 2016) by showing that there is a positive correlation between environmental literacy and the likelihood of a consumer purchasing a residential PV system.

The research also finds that a customer's environmental consciousness significantly influences their decision to install a PV system in their home. This research looked at how homeowners who have installed PV systems in their homes feel about the Environment, how quickly new ideas spread, and how receptive people are to adopting solar energy. The study concluded that adopting residential PV systems instead of traditional sources might be attributed to the positive environmental attitude towards such systems. The study also found that customers' awareness of ecological issues influences their willingness to purchase greener products; however, most consumers are unconcerned about environmental issues and are unaware of the significance of residential PV systems and the best practices for using them once they do so. Based on the findings, the research recommends that the policy to provide provides incentives for the widespread adoption of solar photovoltaic (PV) systems for use in private homes.

The most critical information presented in this work is the correlation between consumer environmental awareness and the severity of environmental problems. Today's consumer is more likely to adopt a solar lighting system if the government strongly commits to a greener product. Hence government initiatives are more trustworthy for generating adoption intentions. Based on the findings of this research, businesses should focus their marketing efforts on resolving environmental issues to attract consumers that value sustainable renewable energy providers. Energy should increase consumers' awareness by teaching them about the practical advantages of becoming green and enhancing their promotional efforts. Sustainable development and widespread acceptance of residential PV systems rely heavily on attention to environmental concerns. (Kesari et al., 2021)

Government measures may sway the masses to use greener energy by appealing to their feeling of duty. It has been noted that consumers make purchases of solar energy due to peer pressure. Social influences, environmental awareness, environmental attitude, environmental

responsibility, and government effort are all significant, but it is clear that consumer care for the Environment is the key element in the adoption of solar lighting systems. Inspiring and encouraging people to embrace PV technology is seen as crucial to the growth of PV in the residential sector. Because they don't harm the planet and pique consumers' curiosity about greener goods, sustainable environmental products are superior to those that aren't. This was shown to be the case (Planken et al., 2010)

### Objective

The study has the following purposes-

- (i) To determine the awareness level of solar-powered products among consumers with the help of Social Media and TV.
- (ii) To identify influences on how consumers place value on the Environment.
- (iii) To identify consumer attitudes and attract consumers towards adopting solar power solutions.

### 3. Methodology

This paper aims to study the customer attitude and buying intention behaviour towards purchasing solar products. A questionnaire is prepared and submitted to customers unaware of these solar products. The research is descriptive and exploratory, with interviews conducted by convenience sampling of users, prospective buyers, industry experts, policymakers and implementers. The descriptive study involves administering structured questionnaires/interviews of the current and future users by way of strata random sampling for the selected districts of the state to study demographic profile level of awareness, green attitude and buying intentions. A sample of 200 respondents is chosen from the population, and a questionnaire is given to get the appropriate answers.

### 4. Results & Discussions

The data was first put into an Excel file and transferred into SPSS 24.0 version. Thus, using SPSS software, the present study results were analyzed. The analysis carried out was a percentage analysis to find out the demographical information of respondents. Descriptive statistics are used to summarize the data. Variables are expressed as the mean  $\pm$  standard deviation (mean  $\pm$  SD). The Chi-Square test is used to find the association between two categorical variables.

According to objective (i): To determine the awareness level of solar-powered products among consumers with the help of Social Media and TV, the results found as follows:

Table 1: Frequency of respondents aware of Solar Power Solutions

	Frequency (n)	Percentage (%)
Yes	188	94.0
No	8	4.0
Maybe	4	2.0
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 1 depicts that the respondents are aware of Solar Power Solutions. The majority, 94% of the respondents, stated that they were mindful of Solar Power Solutions, and 4% said they were unaware of Solar Power Solutions.

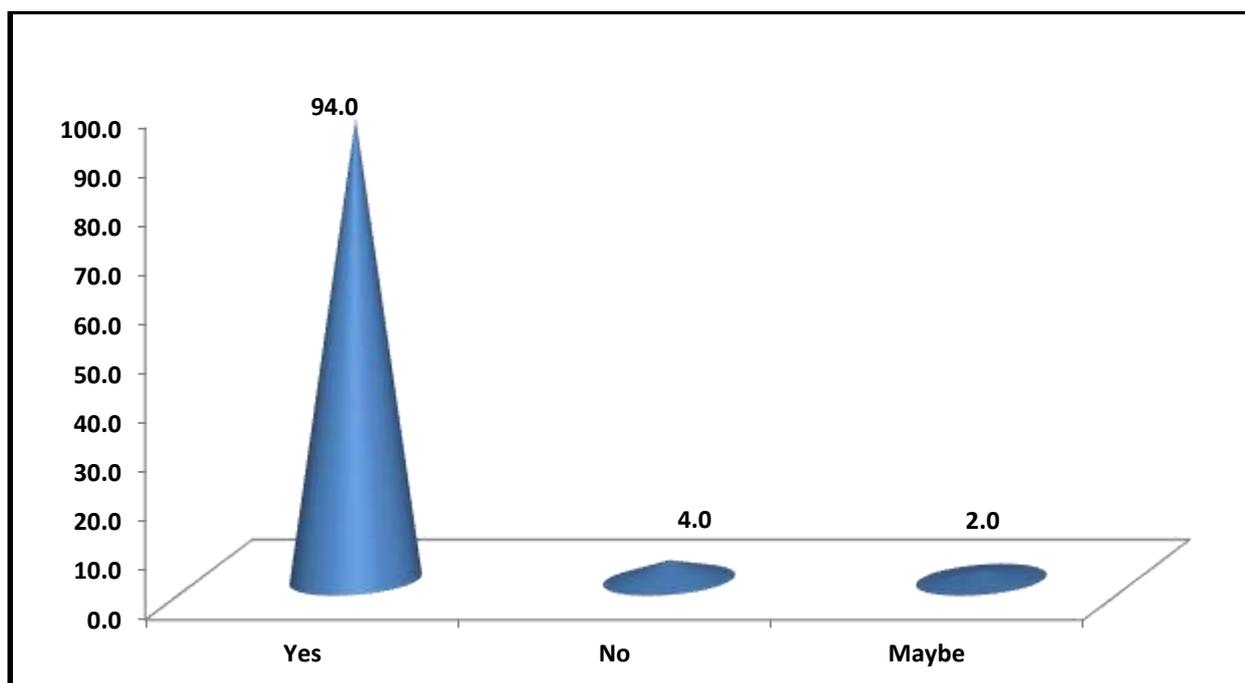


Table 2: Frequency of awareness that the above-selected company produces solar products

	Frequency (n)	Percentage (%)
Social Media	65	32.5
Newspaper /Television	75	37.5
Events/Promotions	8	4.0
Hoardings/billboards	8	4.0
Others	44	22.0
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 2 reveals that aware that the above-selected company produces solar products. The majority, 37.5% of the respondents, were aware through newspapers/Television, 32.5% of the respondents were aware through social media, and 22% were aware of others.

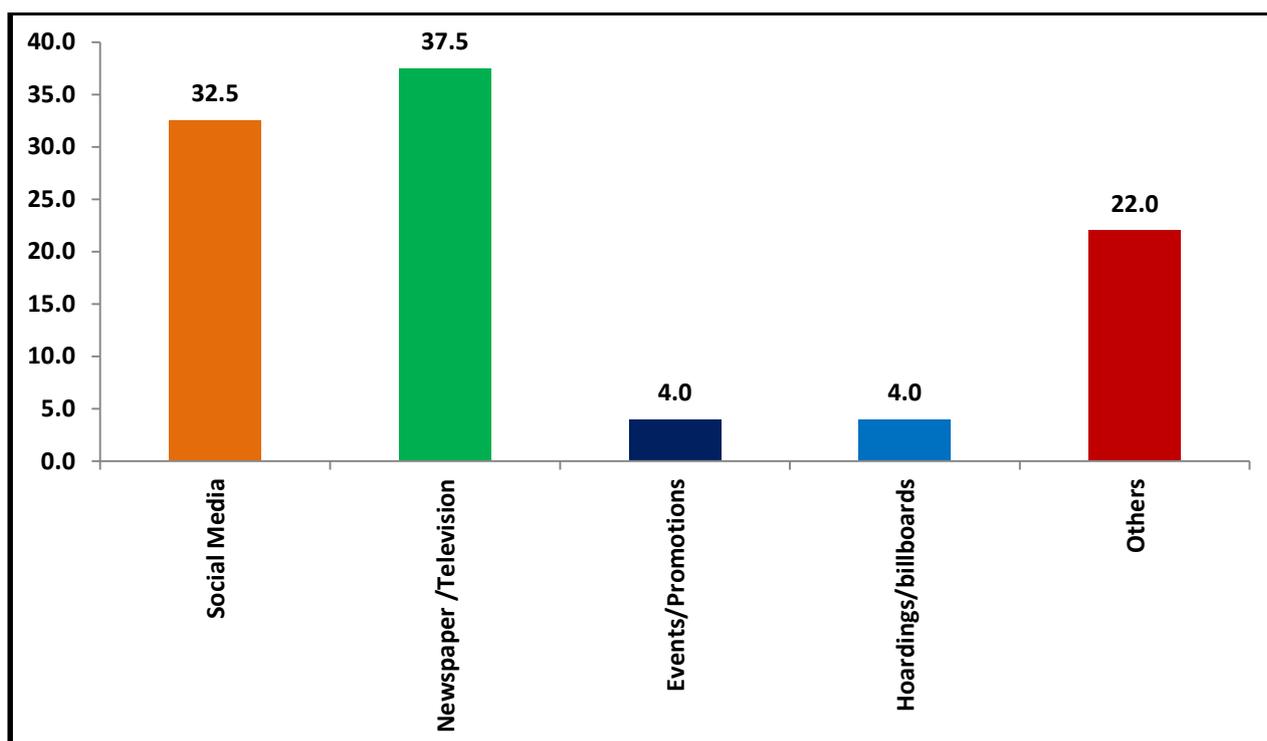


Table 3: Frequency of respondents who think Solar Power can overtake Electric power in future

	Frequency (n)	Percentage (%)
Yes	170	85.0
No	30	15.0
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 3 depicts that the respondents think Solar Power can overtake Electric power in future. The majority, 85% of the respondents, stated that they believe Solar Power can overtake Electric power in the future, and 15% said that they don't think so so that Solar Power can overtake Electric power in the future.

According to objective (ii): To identify influences on how consumer place value on the Environment, the results found as follows:

Table 4: Frequency of respondents who use solar equipment in their business or workplaces

	Frequency (n)	Percentage (%)
Yes	89	44.5
No	111	55.5
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 4 depicts that the respondents use solar equipment in their businesses or workplaces. The majority, 55.5% of the respondents, stated that they do not use solar equipment in their businesses or workplaces, and 44.5% said they use solar equipment in their companies or workplaces.

According to objectives(iii): To identify consumer attitudes and attracts consumer towards adopting solar power solutions., the results found as follows:

Table 1: Frequency of the factor(s) that attracts you towards adopting Solar Power Solutions

	Frequency (n)	Percentage (%)
Durable & Economical	44	22.0
Environment-friendly & Renewable	125	62.5
Requires low maintenance & High returns on investment	31	15.5
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 5 reveals that the factor(s) attracts you towards adopting Solar Power Solutions. Most (62.5%) of the respondents said that Environment-friendly & Renewable, followed by around 22% of the respondents saying Durable & Economical, and at least 15.5% of the respondents explored requires low maintenance & High returns on investment.

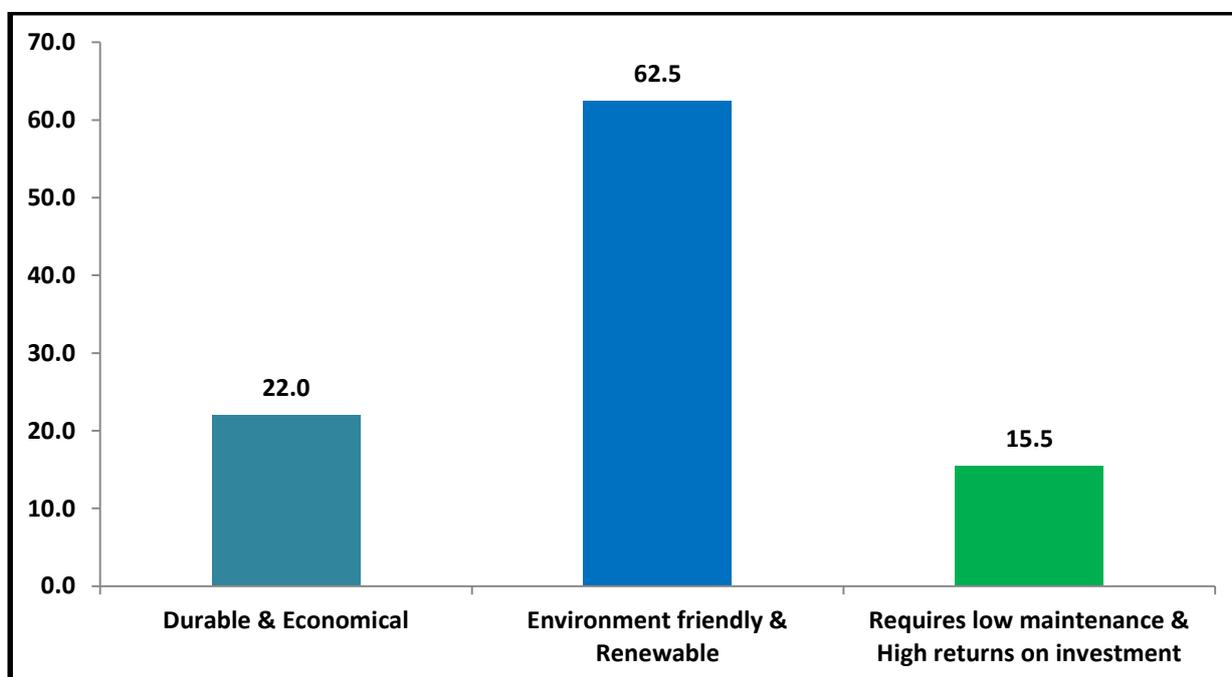


Table 6: Frequency of the type of Solar Power Solution(s) you would like to use

	Frequency (n)	Percentage (%)
Solar Home Lighting System	88	44.0
Solar Lanterns	25	12.5
Solar Water Heater	28	14.0
Solar Power Add-on to charge inventor battery	30	15.0
Others	29	14.5
<b>Total</b>	<b>200</b>	<b>100.0</b>

Table 6 reveals the type of Solar Power Solution(s) respondents would like to use. Most (44%) of the respondents want to use Solar Home Lighting Systems, followed by around 15% who want to use Solar Power Add-ons to charge inventor batteries and others, and at least 12.5% of the respondents like to use Solar Lanterns.

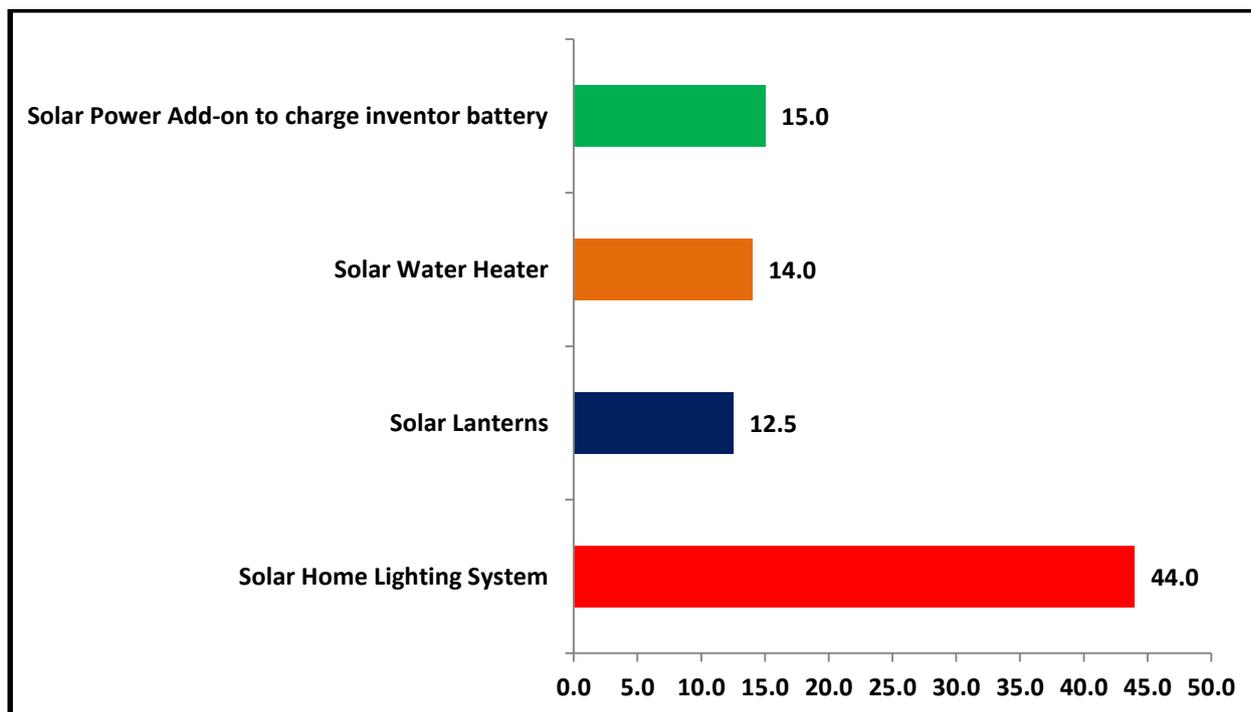


Table 2: Influence of demographic profile of the consumers on attitude

		Factor(s) attracts towards adopting Solar Power Solutions			Total	Chi-Square (p-value)
		Durable & Economical	Environment friendly & Renewable	Requires low maintenance & High returns on investment		
Age	Less than 25	1	13	5	19	14.732 (0.035)*
	25 to 35	12	40	11	63	
	36 to 45	19	28	4	51	
	46 to 55	11	38	11	60	
	More than 55	1	6	0	7	
Gender	Male	29	82	31	142	14.986 (0.00)**
	Female	15	43	0	58	
Educational Qualification	School Level	2	2	0	4	31.798 (0.000)**
	Higher Secondary	0	12	3	15	
	Under Graduate	17	12	13	42	
	Post Graduate	25	99	15	139	
Occupation	Government Sector	18	0	0	18	96.425 (0.000)**
	Private Sector	15	86	9	110	
	Self Employed	8	15	6	29	
	Business	1	10	9	20	
	Others	2	14	7	23	
Annual Income	Up To 1lakh	8	20	7	35	18.158 (0.006)**
	Rs. 1-3 lakh	7	21	3	31	
	Rs. 3-5 Lakh	0	34	6	40	
	Above 5Lakh	29	50	15	94	
	<b>Total</b>	<b>44</b>	<b>125</b>	<b>31</b>	<b>200</b>	

\*\* $p < 0.01$ , \* $p < 0.05$

Table 7 reveals the influence of the demographic profile of the consumers on attitude. It was found that the majority of 63 numbers of participants were aged between 25-35 years, followed by 142 respondents were male, 139 numbers of respondents had completed their postgraduate, majority 110 numbers of respondents were working in the private sector, and 94 respondent's annual income was above five lakhs. Further, the majority 99 numbers of postgraduate respondents stated that the Environment friendly & Renewable is the main factor attracts towards adopting Solar Power Solutions. From the chi-square values and p-value ( $p < 0.05$ ), it is evident that the demographic profile of the consumers on attitude is influenced.

The study's results corroborate the observations of earlier research, and it provides useful insights into the connection between environmental concerns and customers' intentions to acquire residential PV systems. The results show how customers behave from various points of view, according to what matters most to them. The research shows that consumers get their knowledge about eco-friendly products via their social networks, particularly those of their friends, family, and neighbours. Cultural curiosity and customer interest inspire confidence in the service provider and foster loyalty from the client, as shown in this research, demonstrating the significant societal impact on individual perceptions of value. According to a study (Palm & Tengvard, 2011; Schelly, 2014), customers' inclinations to install a residential PV system are positively influenced when they sense favourable emotions from neighbours, family, and friends. The symbolic offering and strategy to display an eco-friendly lifestyle contribute to the decision to invest in a home PV system. It's clear from the data that most consumers learn about the benefits of solar energy from the people closest to them, either via their own families or the communities in which they live. Thus, the obtained worth of social influence is supported by studies that have come before it and shown signs of potential solar product buyers and positive effects (Nelissen, 2014).

#### Research Gaps

- Solar renewable energy power technology is a clear alternative to the current power grid, and the researchers clearly adopted a multi-pronged strategy to study the aspects that impact consumers' readiness to embrace this technology.
- Eligibility limitations in several of these research have limited the kind of people who may take part in the surveys.

#### 5. Conclusion

The paper delves into the mindset and purchasing habits of potential solar product buyers in rural India. Consumers' interest in switching to solar-powered lights is driven mostly by environmental concerns, with other factors such as social influences, ecological awareness, environmental attitude, environmental responsibility, and government effort playing supporting roles. This research shows the correlation between eco-consciousness and the decision to install PV systems in homes. According to the findings, customers learn about eco-friendly items mostly from their friends, family, and neighbours. Customers are more likely to trust and remain loyal to a business that demonstrates cultural curiosity and an interest in them as individuals. Conclusions Social factors, environmental awareness, attitude, environmental responsibility, and government effort all play major roles in consumer intention to use solar lighting systems, but environmental concerns are the dominant determinant. Inspiring and encouraging people to embrace PV technology are seen as crucial to the growth of PV in the residential sector. According to the findings, customers learn about eco-friendly items mostly from their friends, family, and neighbours. This research aims to use social media and television to gauge customers' familiarity with solar-powered goods.

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