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A STUDY ON CUSTOMER PREFERENCE TOWARDS USING SOLAR PRODUCTS AND ITS ENERGY IN NAMAKKAL CITY

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ABSTRACT

This study primary focuses on understanding customer preference and attitude towards the usage of solar products and solar energy in Namakkal City. Solar energy one of the most promising forms of renewable energy, can be harnessed in two principal ways: First, through the direct conversion of sunlight into electricity using photo voltaic (PV) technology, and second by utilizing solar thermal system to generate power. Both approaches contribute significantly to clean energy production, offering an environmentally friendly alternative to energy is entirely renewable, abundantly available, and does not produce air pollution or toxic waste during its generation process. Furthermore, solar power system operates silently, ensuring that no noise pollution is created while capturing or converting or converting sunlight into useful energy. The global demand for solar electricity has been increasing rapidly, rising at an estimated rate of 40% annually. This growth is largely driven by consistent technological advancements, declining manufacturing costs, and the overall reduction in market prices for solar equipment over the past two decades. As a result, solar energy has become more accessible and cost-effective for both residential and commercial consumers. Solar technologies can generally be categorized into positive and negative systems based on how they capture, store and distribute solar energy. Passive systems rely on architecture design and materials to naturally absorb and utilize sunlight, while active systems employ mechanical or electrical devices to enhance the collection and conversion of solar power.

KEYWORDS: Solar Energy, Customer Preference, Photo Voltaic (PV) technology, Energy Production, Electrical Devices.

1. INTRODUCTION

1.1. Growth of Solar Panel

Solar Energy powered panel and related products have gained remarkable popularity in recent years

due to their simplicity of installation, affordability and long-term economic benefits. The ease with which these systems can be integrated into homes, businesses and public infrastructures has enabled widespread adoption across diverse regions and user groups. Unlike many traditional energy systems can be installed with relatively minimal technical expertise. This accessibility has made solar power appealing to consumers from various socio-economic backgrounds, including rural household, urban residents, business owners and industrial developers. As global awareness of renewable energy grows, the reliance on solar-powered products continues to rise steadily.

In the present era, solar energy is no longer viewed merely as an optional or alternative source of electricity. Instead, it is increasingly recognized as a necessity for modern life, particularly in region where energy demands are rapidly growing. The dependence on electricity for daily activities from lighting and communication to heating, cooling and operating machinery has made it crucial to identify sustainable, reliable and abundant energy sources. Solar energy fulfills these expectations by providing a constant, renewable supply of electricity as long as sunlight is available. Its clean, silent, and non-polluting nature further strengthens its appeal among environmentally conscious consumers, policymakers and industries committed to reducing carbon emissions and mitigating the effects of climate change. Moreover, the global shift towards greener energy alternatives has elevated solar energy from a niche sector to a mainstream solution for future energy planning.



Figure No 01: Solar Energy

1.2. Challenges

Despite advancements in the global power sector many developing countries continue to struggle with inadequate and unreliable electricity supply. Frequent power sector outages, insufficient transmission infrastructure and rapidly increasing energy demands create significant economic and social challenges. In residential areas power cuts disrupt daily routines, hinder the use of electronic devices

and reduce the quality of life.

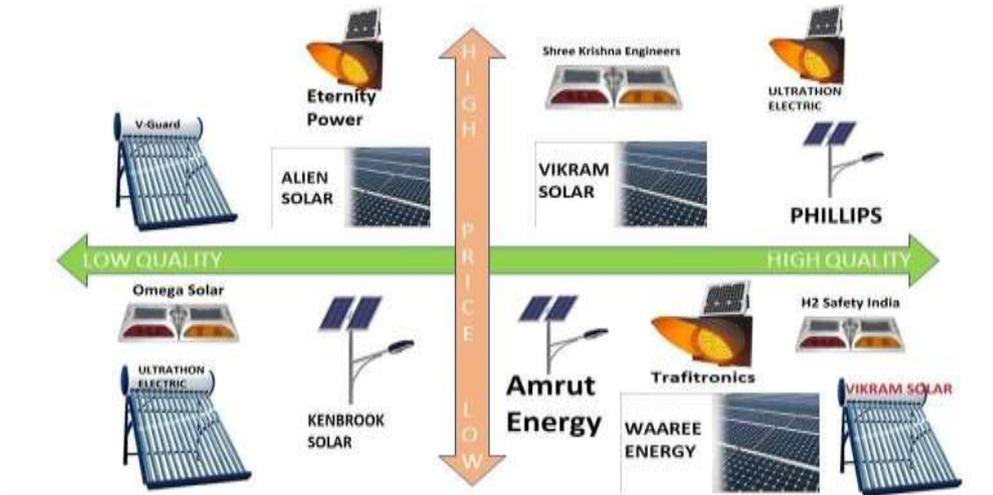


Figure No: 02. Quality of Solar

Schools and educational institutions face obstacles in conducting classes and operating digital tools, hampering student academic progress. Healthcare facilities, which rely heavily on uninterrupted electricity to run lifesaving equipment often struggle during power shortages, putting patient safety at risk.

Industries are among the worst affected sectors when power supply is unreliable. Frequent interruptions force factories to shut down temporarily or rely on expensive diesel generators, increasing production costs and reducing overall efficiency. This irregularity affects not only output but also labor productivity, supply chain timelines and business profitability.

1.3. Important of Solar

One of the key reasons behind the mass acceptance of solar power is its scalability and adaptability. Solar panels can be installed in small homes, medium – sized commercial buildings, and even large industrial complexes. Their modular nature allows users to begin with a basic system and gradually upgrade it based on increasing energy requirements. This flexibility is especially beneficial for developing economies, where initial investments may be limited but energy needs continue to grow. Solar power installations can also be customized to suit various geographical and climatic conditions, making them suitable for deserts, coastal areas, agricultural fields and urban rooftops. Government policies have played an instrumental role in accelerating the adoption of solar energy. Subsidies, tax benefits, low-interest loans and net-metering systems have reduced the financial burden on consumers. Awareness programs training initiative and energy literacy campaigns have encouraged more people to switch to renewable sources.



Many countries have introduced long-term renewable energy targets, promoting large-scale solar parks rooftop solar schemes and public-private partnerships. As a results of these efforts, solar energy has become one of the fastest – growing segments of the global energy market. Technological advancements have further improved the efficiency, reliability and affordability of solar energy system. High-efficiency photovoltaic (PV) modules have drastically increased the amount of electricity generated from sunlight, even in areas with moderate radiation levels. Innovations in battery storage such as lithium-ion, sodium-ion and solid-state batteries allow consumers to store excess energy for nighttime use or during periods of cloudy weather. Smart inverters and energy monitoring systems enable users to optimize consumption reduce wastage and integrate solar energy seamlessly with other power sources.

1.4. Customer Preference towards using Solar Products

Customer preference towards using solar products has grown significantly in recent years due to rising awareness about environmental sustainability and increasing energy costs. Many consumers are motivated by the desire to reduce their carbon footprint and rely less on traditional electricity sources. Solar products such as Solar panels, solar lights, and solar water heaters are viewed as long-term investments that offer both financial savings and energy independence. Government incentives and improved technology have also boosted confidence in solar solutions, making them more accessible and reliable.

Additionally, customers appreciate that solar products require minimal maintenance and can operate efficiently in diverse conditions. The growing availability of affordable, high quality solar brands has further encouraged adoption. Overall modern consumers prefer solar products because they combine economic benefits with environmental responsibility, making them a practical and sustainable choice for households and Businesses alike.

II. REVIEW OF LITERATURE

Welsch (2024). They took a look at the topic of “role of reference groups and consistent behaviors in the determinants of pro-environmental phenomena”. And the title of manufacture and consumer perspectives on adoption of reflexive solar homes in the united sates the rationale of this investigations study was to develop technologies to solve energy and pollution problems and to investigate when low-or non-cost industrial passive solar home devise could be implemented.

Heniz KuhlinG (2024) They conducted the study research has found that in one place a person buys a house not because of be deficient in of concentration but because of accessibility when buying a house. Usually, the house owners are not well-known with the solar prototype and so they smuggled to prove it.

Ehsanl Kabir (2022) their research has been conducted under the title of “solar energy and opportunity prospects. This manuscript discussed both the compensation and disadvantages of solar



energy technologies. Several technical signals influencing renewable energy make inquires and the positive interaction between regularly policy and legislative work and their future projection are decorated. It also provides a global background for solar energy technologies”.

Mohd rizwand (2022) “A study on electricity invention from solar energy is generated from daylight and describe its future trend and features. They try to thrash out the types of solar panels that work and prominence various applications and methods to progress the reimbursement of solar energy. They bring to a close that it has much recompense compared”.

Murenzi and Lee (2021) explain that global solar adoption has increased due to falling installation costs and improved accessibility. Their study highlights that simplified solar technologies have encouraged participation from both rural and urban consumers. They note that minimal technical knowledge is required to install small-scale solar systems. This ease of deployment has made solar one of the fastest growing renewable energy sources. Growing environmental awareness further accelerates the shift toward solar energy. Overall, the study conclude that solar energy is moving from an alternative option to a mainstream electricity source.

Rahman and Al-Zahrani (2020) argue that solar energy has become essential in regions with increasing population and electricity demand. Their finding show that modern lifestyle depends heavily on continuous electricity for communication, appliance, and industrial functions. Solar power provides a clean, abundant and reliable alternative to strained national grids. The authors emphasize the influence of climate – change awareness on renewable energy adoption. They also note strong government interest in solar due to its non-polluting characteristics. Thus, the study positions solar energy as central to future global energy planning.

Pandy and Chattopadhyay (2022) highlight the scalability of solar power as a major factor in its global acceptance. They explain that solar systems can be expanded gradually, fitting the financial constraints of developing economies. Their findings show that solar installations adapt well to various geographical and climatic conditions. Government incentives such as subsidies and tax benefits significantly support solar adoption. Awareness and Energy –literacy programs further motivate households and businesses to shifts to renewable sources. The study concludes that solar energy is vital for long-term national energy security.

Li and Fernandez (2023) report that recent advancement in photovoltaic technology have increased the efficiency of solar modules. Their research highlights improved performance even in areas with moderate sunlight. They also emphasize the role of advanced storage solutions like lithium – ion and solid – state batteries in ensuring reliable power supply. Smart inverters and digital monitoring systems enhance user control and reduce energy waste. According to the authors, these innovations lower overall system costs and increase reliability. They conclude that ongoing technologies progress strengthens the viability of solar energy worldwide.



Srinivasan and Thomas (2021) found that environmental awareness and rising electricity cost strongly influence consumer demand for solar products. Their study shows that users appreciate long-term saving and the energy independence provided by solar systems. Government incentives boost customer confidence by lowering initial investment barriers. The authors note that low maintenance requirements make solar solutions practical for homes and businesses. Increased availability of affordable and durable solar brands also encourages adoption. They conclude that both economic and environmental motivations shape modern customer preferences.

III. OBJECTIVES O THE STUDY

- To generate consumer attentiveness about different brands of solar energy harvest.
- To examine the level of awareness and knowledge among consumers regarding different types of solar products available in the market.
- To study and know the existing practice for consumer which are the core factors that influence the purchase of solar energy products prominence ideas, opinions and preference on various brands of solar energy products.
- To identify the key factors influencing consumer' decisions to adopt solar product, such as cost, environmental benefits, government subsidies and product durability.
- To measure the satisfaction level of existing users of solar products in Namakkal city.
- To access the challenges and barriers faced by consumers in adopting solar energy solutions.
- To study the impact of demographic variables on consumer preference for solar products.
- To provide suggestion to increase the adoption rate of solar products among households and businesses in Namakkal City.

III. STATEMENT OF THE PROBLEM

Despite the rapid global progress in solar technology and increasing awareness about renewable energy, the adoption of solar products in many Indian cities, including Namakkal, remains comparatively low. Although solar energy offers long-term financial savings, environmental benefits and energy independence, many potential consumers still hesitate due to high initial investment costs, limited product knowledge and concerns about efficiency and maintance. Electricity shortages and rising energy cost continue to affect households and businesses in Namakkak, yet the shift toward solar solutions has not reached its full potential. Consumer attitudes, preferences and behavioral intentions toward solar energy in this region are not clearly understood. Therefore, it becomes essential to study what motivates or discourages customer from choosing solar products, what factors influence their purchasing decisions and how solar energy adoption can be improved in Namakkal City.

IV.METHODOLOGY

This research opinion poll was given to only the solar power users. Random sampling method is used

for this data compilation 100 questionnaire was prearranged to the respondents.

Study Area: Urban wards in Namakkal city and rural area like Paramathi, Velur, Jedarpalayam, Thirucencode.

Data Collection Tools: Structure Questionnaires

TABLE No: 01
Analysis and Interpretation

PERSONAL FACTORS OF THE RESPONDENT		NO. OF RESPONDENTS	PERCENTAGE
SEXUAL CATEGORY	Male	40	40
	Female	60	60
MARITAL STATUS	Married	57	57
	Unmarried	43	43
AGE	Up To 20 Years	3	3
	20 To 40	63	63
	40 To 60	27	27
	Above 60	7	7
EDUCATIONAL LEVEL	Uneducated	11	17
	Up To HSC	27	27
	Degree Holder	43	43
	Professional	13	13
OCCUPATIONAL STATUS	Private Employee	8	8
	Government Employee	36	36
	Business/Profession	17	17
	Farmer	22	22
	Student	17	17
LEVEL OF INCOME	Below rs.20,000	26	26
	Rs.20000-40000	53	53
	Rs.40000-60000	16	16
	Above rs.60000	5	5

The private details of the respondents are given in a table above, out of which 60% of the respondents were female connecting the ages of 20 and 40,64% were those with a bachelor degree or diploma,42% were employed in the private sector,36% were homemakers.

TABLE No: 02

Comparisons between personal factors with source of attentiveness of solar products by the respondents.

Hypothesis: Here, there is no major dissimilarity between personal factors and awareness of solar products.

Personal Factor	Chi-Square Value	Significant Value	S/NS
GENDER	8.588	0.125	NS
AGE	17.488	0.296	NS
EDUCATIONAL LEVEL	42.733	0.006	NS
OCCUPATIONAL STATUS	31.032	0.893	NS
LEVEL OF INCOME	12.366	0.641	NS

NOTE: S-Significant (P-Value<0.05) : NS: No Significant(P-Value>0.05)

Tables No: 02 indicates the Hypothesis between personal factors and awareness about solar products is accepted. It is accomplished that there is no major difference within the awareness about solar products used by the respondents and personal factors

TABLE No: 03

Comparisons between personal factors and frequency of purchase of solar products

Hypothesis: Here, there is no major differentiation between personal factors and occurrence of purchase of solar products.

Personal Factor	Chi-Square Value	Significant Value	S/NS
GENDER	1.234	0.733	NS
AGE	11.072	0.266	NS
EDUCATIONAL LEVEL	16.531	0.349	NS
OCCUPATIONAL STATUS	24.386	0.386	NS

LEVEL OF INCOME	12.59	0.019	S
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NOTE: S-Significant (P-Value<0.05): NS: No Significant (P-Value>0.05)

Table No:03 shows the subsequent details; the hypothesis connecting gender, age, educational level, profession and frequency of purchasing solar products is conventional and not significant. Furthermore, let us consider a case connecting income and occurrence of purchasing solar products. It is concluded that there is a significant difference between income and regularity of purchasing solar products.

TABLE No: 04

Comparisons between personal factors and no of products purchased

Hypothesis: Here, there is no major dissimilarity between personal factors and no of products purchased.

Personal Factor	Chi-Square Value	Significant Value	S/NS
GENDER	0.926	0.819	NS
AGE	9.782	0.366	NS
EDUCATIONAL LEVEL	9.229	0.865	NS
OCCUPATIONAL STATUS	28.572	0.456	S
LEVEL OF INCOME	29.422	0.038	S

NOTE: S-Significant (P-Value<0.05): NS: No Significant (P-Value>0.05)

As per the table No:04 indicates, the relationship between gender, age, education level and number of items purchased is not importance and it also shows that the relationship between unemployed income and number of items purchased is rejected in both cases. it is finally concluded that there is a major influence of unwaged income and number of items purchased.

TABLE No :05
AVERAGE SCORE METHOD

Comparisons between Income and price of solar products opinion by the respondents

PRICE/INCOME	VERY COSTLY	COSTLY	MODERATE	LOW	VERY LOW	SCORE
Below rs.20,000	15	53	14	6	2	6
Rs.20000-rs.40000	30	16	51	4	0	13.4
Rs.40000-rs.60000	15	27	13	4	0	3.93
Above rs.rs.60000	0	7	4	2	0	0.86

According to the Table No:5, most customers earning between Rs 20,000 and Rs 40,000 think about the price of solar products to be very expensive.

TABLE No:06
RANKING ANALYSIS

S.NO	FACTORS	RANK I	RANK II	RANK III	RANK IV	RANK V	TOTAL	RANK
	VALUE	5	4	3	2	1		
1	Environmental production	112	224	120	80	16	616	I
2	Free maintenance	16	70	96	30	72	284	III
3	Safety	304	154	12	50	24	542	II
4	Availability	32	42	70	60	56	250	IV



5	Affordable price	16	76	90	30	32	244	V
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So, we can accomplish that the most imperative cause why customers prefer solar products is that they think about them to be very secure...One central thing we have learned from the above data is that the average ranking scores of the factors influencing the respondents in choosing exact solar products have been premeditated. Safety is the first priority followed by the environmental protection, affordability, cost, quality, low effort in continuation, diversity of brands and finally eases of availability.

V. FINDINGS

Percentage Analysis:

- Most of the respondents were female between the age groups of 20 years to 40 years with a UG degree or diploma, and working in both the private and public sector.

Weighted average:

- In this study was most respondents earning between 20,000 to 40,000 rupees considered the cost of solar power is to be very costly for their budget.

Chi-square Test:

- These research articles found there was no major relationship between the respondents for their personal factors and their awareness of solar energy products used.
- These researches found there is a major relationship between income and enthusiasm to purchase solar products
- It is also found that occupational status has a considerable influence on income and the number of purchases.

Ranking Analysis:

The most of the respondents to this study said the most important reason for purchasing solar products was the safety.

VI. SUGGESTION

Improving the quality of Promotion:

Advertising on the internet and other effective sources like TV, social media and Newspaper will make solar energy products more accessible to all the customers.

Value can be enhanced:

Quality of the solar energy products should be very high, then only all the types of customers can like



them more. This allows informed the customers to buy the products.

The price should be reduced:

Many consumers were feeling that the costs of these products are too high and therefore poor people cannot afford them, if the price can afford to all everyone can buy the products

Research and development:

Many new researchers should be conducted to find new products using solar. Only then can get acquaintance about this be taken to the people because now solar energy is very popular among the people.

VII. CONCLUSION

The future demand for solar products may appear uncertain, yet the rapid advancements made in recent years suggest strong potential for continued growth. Significant progress has been achieved in solar energy collection, storage and system efficiency. New technologies are being researched and developed every day, improving the performance and durability of solar panels. Although support for solar energy is increasing globally, it is true that solar power will not fully replace conventional fossil fuels until solar panels can be manufactured and engineered at even higher efficiency and lower cost. Despite these challenges, the adoption of solar energy brings numerous positive environmental benefits. These include major reductions in harmful greenhouse gas emissions and significant decreases in both air and water pollution.

With an average lifespan of 25 to 30 years, solar panels generate very little waste during operation, making them one of the cleanest energy options available. As awareness of environmental issues grows, more people around the world are choosing solar energy for homes, businesses and industries. Furthermore, government policies and subsidies in many countries are helping reduce installation expenses and making solar investments more profitable. As technology improves and costs continue to fall, solar energy is expected to play an increasingly important role in the global shift toward sustainable power.

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