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FUTURE PROSPECTS OF ROOF TOP SOLAR SYSTEM IN KERALA

Jiju Varghese[1], Dr. P. Saritha Kumari[2], Dr. F. Cleedin[3]

[1]Research Scholar, Reg. No. 22213231011001, PG & Research Department of Commerce, St. Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India
[2]Assistant Professor, PG Department of Commerce, Sree Devi Kumari Women's College, Kuzhithurai, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India
[3]Assistant Professor, PG & Research Department of Commerce, St. Jude's College, Thoothoor, Affiliated to Manonmaniam Sundaranar University, Thirunelveli-627012, Tamil Nadu, India

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ABSTRACT

This study examines consumers' satisfaction with rooftop solar system across different income group, utilizing an Analysis of Variance (ANOVA) approach. Data was collected from 150 consumers residing in Kollam District. Six factors are used to identify the level of satisfaction are efficiency, environmental benefits, after service, aesthetic looks, government subsidies and promotional efforts. The analysis revealed income level have significant impact on satisfaction level. It indicates that higher income groups are more satisfied on the efficiency, environmental benefits, after service and aesthetic looks of rooftop solar system. Whereas two factors not affected by income level are government subsidies and promotional efforts. These findings suggest that income plays a crucial role in shaping consumer's satisfaction with rooftop solar. For analysis the statistical software SPSS is used. The study highlights the need for tailored strategies to enhance consumer satisfaction across all income groups, ensuring that the benefits of the Rooftop Solar System are equitably distributed.

Keywords: Rooftop Solar, Kerala, Soura Program, Renewable Energy, Solar Energy Adoption, Sustainable Energy, KSEB, Solar Capacity

1. INTRODUCTION

Kerala, known for its lush landscapes and high population density, faces unique challenges and opportunities in the adoption of renewable energy sources. Among these, rooftop solar systems have emerged as a viable solution to meet the state's growing energy demands while minimizing environmental impact. The Kerala State Electricity Board (KSEB) has been at the forefront of promoting solar energy through initiatives like the Soura program, which aims to increase the state's solar capacity significantly. Despite the geographical constraints and high land costs, the state's proactive policies and consumer-friendly programs have led to a substantial increase in rooftop solar installations. This article delves into the future prospects of rooftop solar in Kerala, examining the potential for expansion, economic benefits, and the challenges that need to be addressed. By analysing current trends, government policies, and technological advancements, this study aims to provide a comprehensive overview of how rooftop solar systems can contribute to Kerala's sustainable energy future.

2. GOVERNMENT INITIATIVES AND POLICIES

- Soura Program: Launched by KSEB, this initiative aims to install 1,000 MW of solar power by 2022. The program offers subsidies and incentives to encourage residential and commercial installations.
- Net Metering Policy: Allows consumers to sell excess electricity generated by their rooftop solar systems back to the grid, providing financial benefits and encouraging more installations.
- Renewable Purchase Obligation (RPO): Mandates that a certain percentage of electricity consumed by distribution companies must come from renewable sources, including solar.

ECONOMIC BENEFITS

- Cost Savings: Rooftop solar systems can significantly reduce electricity bills for households and businesses by generating their own power.
- Job Creation: The growth of the solar industry can create numerous jobs in installation, maintenance, and manufacturing sectors.
- Investment Opportunities: Attracts investments from both domestic and international players looking to capitalize on the growing renewable energy market.

TECHNOLOGICAL ADVANCEMENTS

- Improved Efficiency: Advances in solar panel technology have led to higher efficiency rates, making solar power more viable even in areas with less sunlight.
- Energy Storage Solutions: Development of affordable and efficient battery storage systems can help in managing the intermittent nature of solar power, ensuring a stable energy supply.
- Smart Grids: Integration of smart grid technology can enhance the management and distribution of solar energy, improving overall grid stability and efficiency.

CHALLENGES AND BARRIERS

- Financial Constraints: High initial costs of installation can be a barrier for many consumers, despite the long-term savings.
- Awareness and Education: Lack of awareness about the benefits and potential of rooftop solar systems can hinder adoption rates.
- Technical Challenges: Issues such as grid integration, maintenance, and the need for skilled labour can pose challenges to widespread adoption.

FUTURE PROSPECTS

- Increased Adoption: With continued government support and falling costs of solar technology, the adoption of rooftop solar systems is expected to rise significantly.
- Sustainable Development: Rooftop solar can play a crucial role in Kerala's sustainable development goals, reducing reliance on fossil fuels and lowering carbon emissions.
- Community Solar Projects: Initiatives that allow multiple households to share the benefits of a single solar installation can make solar power more accessible to low-income communities.

3. REVIEW OF LITERATURE

P. Nagalakshmi et al. (2013) "Efficient Energy Management System with Solar Energy." This paper introduces a system for the efficient allocation of energy harnessed from renewable sources. To tackle current challenges, energy from these sources must be consistently managed. The system includes a connection to an inverter and a battery. These concepts were refined using a prototype system, and preliminary experiments indicate that the method has the potential for practical application. Gupta et al. (2013) Hydro, wind, solar, tidal, and geothermal are among the renewable energy sources used for power generation. Solar power is considered the most eco-friendly and viable option. Although initially used to power satellites due to its high production cost, solar energy is now seen as one of the most appropriate choices for worldwide electrification. Regions such as Rajasthan, Gujarat, and certain areas of Maharashtra, Madhya Pradesh, Karnataka, and Tamil Nadu in India are exposed to high solar radiation throughout the year, indicating a substantial potential for solar energy systems within the nation. Jaymin Gajjar et al. (2015) "Map of solar photovoltaic energy generation in Karnataka, India." The potential for solar photovoltaic generation in the state of Karnataka is the focus of this investigation. Energy generation maps are generated on both an annual and monthly basis. The simulation results are in close agreement with the actual energy generation data of the existing power facilities. The study determined that most of Karnataka boasts significant potential for solar photovoltaic energy, except for a minor region in the Kodagu

district located in the state's south western part. This finding is advantageous for solar developers and policymakers, as it assists in the strategic selection of sites for solar power installations.

4. OBJECTIVES OF THE STUDY

- To identify the satisfaction levels of roof top solar system users in Kollam district in Kerala

Hypothesis

H0: There is no significant difference in satisfaction level among individuals with different income levels.

H1: There is a significant difference in satisfaction level among individuals with different income levels.

5. RESEARCH METHODOLOGY

This study employs a mixed-method approach, combining both qualitative and quantitative research methods to provide a comprehensive analysis of the satisfaction levels of public using rooftop solar systems in Kollam. Questionnaire is used to collect the primary data and secondary data collected from journals, books and published documents. For conducting Surveys Structured questionnaires were distributed to a representative sample of households in Kerala to gather quantitative data on their awareness, adoption, and satisfaction levels regarding rooftop solar systems. The questionnaire included demographic questions, income groups, and specific questions related to the satisfaction and understanding of the rooftop solar system. A stratified random sampling technique was used to select the sample. In Kollam District there are six taluks, they are Kollam, Kunnathur, Karunagappally, Kottarakkara, Pathanapuram, and Punalur. From each taluk 25 consumers are randomly selected for data collection. The sample size was determined based on the population size and desired confidence level, resulting in a total of 150 respondents. SPSS software is used to assist in coding and analysing quantitative data. The collected data was coded and entered into statistical software SPSS is used for analysis. Percentage is used to summarize the demographic characteristics of the respondents. ANOVA was then conducted to examine the differences in rooftop solar satisfaction across the five income groups. The significance level was set at 0.05.

6. DATA ANALYSIS

THE SOCIO- ECONOMIC PROFILE OF THE RESPONDENTS:

The socio-economic profile of the respondents provides a comprehensive understanding of their demographic, socio-economic, and financial characteristics, which is essential for analysing their satisfaction and awareness of the Rooftop Solar System. This profile offers a snapshot of the respondents' age, gender, marital status, education, occupation, income and residence among other factors. By examining these characteristics, this study aims to identify the socio-economic factors that influence the satisfaction and adoption of the system and to understand how these factors impact their decision process. The socio-economic profile of the respondents is a crucial component of this study, as it provides valuable insights into the needs, preferences, and behaviour of the respondents.

Table- 1

Sl no.	Socio- Economic Variables		Respondents	Percentage
1.	Gender	Male	98	65.33
		Female	52	34.67
2.	Age Group	18-35 years	29	19.33
		36-45 years	37	24.67
		46- 55 years	50	33.33
		55 and above	34	22.67
3.	Education	Below SSLC	14	9.33
		SSLC	18	12
		HSC	20	13.33
		Graduate	40	26.67
		Post Graduate	33	22
		Professional	25	16.67
4.	Occupation	Agriculture	11	7.33
		Govt. Employee	38	25.33
		Business	45	30
		Private Employee	31	20.67

		Others	25	16.67
5.	Annual Income	Less than 100000	26	17.33
		100000-300000	30	20
		300000-500000	48	32
		500000-700000	24	16
		Above 700000	22	14.67

Source: Primary Data

SATISFACTION AND INCOME LEVEL

Table -2

Source: Computed Data

ANOVA				
	Sum of Squares	**Mean Square**	**F**	**Sig.**
Rooftop solar system's electricity generation and efficiency are satisfactory	151.093	1.386	1.381	.243
environmental benefits of rooftop solar system is effective	59.333	.326	.815	.517
After service and maintenance provided by the company are excellent.	318.540	.802	.369	.831
Installation and aesthetic looks are very advanced.	317.093	3.270	1.560	.188
Government subsidies and incentives are adequate	285.173	5.511	3.037	.019
Promotional efforts and awareness are very effective	356.693	5.638	2.447	.049

7. INTERPRETATION

To test the null Hypothesis Analysis of Variance (ANOVA) is used. Six factors are used to identify the level of satisfaction are efficiency, environmental benefits, after service, aesthetic looks, government subsidies and promotional efforts. The ANOVA test shows that four factors such as efficiency, environmental benefits, after service and aesthetic looks have calculated value is more than 0.05 (critical value) it means that income level have significant impact on the satisfaction level of respondents. Out of the six factors, two factors government subsidies and promotional efforts shows calculated value 0.019 and 0.049 respectively, which is less than the critical value (0.05). That shows there is a significant difference in satisfaction level among respondents with different income levels.

8. CONCLUSION

The satisfaction levels among users of rooftop solar systems are generally high, driven by several key factors. Users appreciate the significant reduction in electricity bills and the positive environmental impact of using renewable energy. This study examined the satisfaction level of rooftop solar system among different income level respondents, revealing significant disparities in satisfaction levels. High income respondents reported greater satisfaction, likely due to financial stability. In contrast, lower income level respondents lack overall satisfaction with rooftop solar. The reliability and low maintenance requirements of modern solar systems also contribute to user satisfaction. Additionally, government incentives and subsidies enhance the financial attractiveness of adopting solar energy. However, continued efforts in education and support are essential to address any lingering concerns and to ensure that users fully understand and maximize the benefits of their rooftop solar systems.

Continued research is essential to investigate the factors that affect satisfaction of rooftop solar systems. Gaining such insights will be crucial for refining the program and ensuring it addresses the varied requirements of all stakeholders.

CONFLICT OF INTERESTS

None

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