



OFF-GRID SOLAR ENERGY MARKETING IN KERALA: IDENTIFYING CUSTOMER PERCEPTION

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Abstract: Solar energy consumption getting more importance now a days as Energy becomes inevitable. In Kerala, the awareness of solar energy increasing day by day. People are more interested in shifting their consumption pattern of conventional energy into new sources of energy not only to reduce the cost of energy but also to be a member of having good energy consumption habit. The study has been conducted in Thrissur district in Kerala to know the awareness level of customers and factors influencing the decision to change into solar energy consumption. Data analysed through percentage method and weighted mean method. The main factor which leads to use off grid solar power plants on household rooftop is benefit that received from the product and cost benefit. Perceived value analysed through the variable such as simple to install, repairs and maintenance. Government part in promotion the off-grid solar power plants play an important role.

Keywords: Off-grid solar, Customer perception

INTRODUCTION

During these times, energy is not a luxury but a necessity for economic development. It is considered as one of the standards for measuring quality of life of people living in a country. According to world bank report, consumption of electricity is escalating day by day. But still there is 250 million people of India find difficulty in accessing electricity. India is not able to meet the growing consumption needs of energy very well. That is why power cuts and power failures are reporting most part of the country. One of the basic human needs, electricity places a vital role.

Energy can be categorized into conventional and non-conventional sources. The conventional source of energy consists of coal, natural gas, oil, fuel woods, hydro power nuclear energy etc. This creates pollution immensely. Emission of greenhouse gases increases because of the fossil fuel combustion.

India is one of the countries which hold the position of largest emitter of CO₂ and it also includes 13 most polluted cities. World energy outlook (2020) points out that due to the Covid 19 pandemic low emission reported for a short while, because of the economic downturn. But it is not a good strategy. Because, this will further exploit vulnerable section of the world.

Here comes the need for renewable energy through which we can attain sustainability. It is a clean energy that contributes zero pollution to the environment. The energy collected from renewable sources are known as renewable energy. The various renewable sources include sunlight, rain, waves, tide, wind and geothermal heat. Renewable energy helps in creating a clean atmosphere without compromising any hazards to the future generation. It is an investment for the future for maintaining sustainability along with economic growth. There is a trend going on becoming 'Green'. Non-conventional sources of energy are a green one.

There are a lot of initiatives are being taken by the government for the transparent promoting of solar energy in our country. India has fifth global position in the solar power deployment. solar power capacity has increased by more than 14 times in the last 5 year from 2630 MW to 37505 MW in December 2019. India has set a goal to achieve 175 GW of renewable power capacity by 2022 in order to facilitate non-fossil based installed electric capacity to 40% by 2030(MNRE annual report 2019-2020). Jawaharlal Nehru National Solar Mission, launched on 11th January 2010 with a target of deploying and developing 20 GW of solar power by 2022. In 2015, it has revised its plan to attain 100 GW instead of 20 GW.

Kerala has won the title that the first state in our country which attain 100% household electrification. Till 1980s, this was a power surplus state without any power cuts or load shedding. But now the situation has been changed. Demand for electricity is enhancing day by day. Kerala has only generated 30.49 per cent of its power requirement in 2018-19. Of the balance requirement, 68.63 per cent of the power requirement is met from outside through power purchases, while open access consumers constitute the rest 0.88 per cent. Total installed capacity of power in the State as on March 2019



is 2,995.88 MW. Of which, hydel power contributed the major share of 2,124.92 MW (70.93 per cent); while 676.56 MW was contributed by thermal projects (22.58 per cent), 60.28 MW from wind (2.01 per cent), and 134.117 MW (4.48 per cent) from solar (Source: Economic Review 2019). During the fiscal year 2020, the demand for power in Kerala increased by approximately 2%.

In Kerala, densely populated area, solar rooftop powerplants are gaining popularity. Agency for New and Renewable Energy Research and Technology (ANERT) is the state nodal agency for Ministry of New and Renewable Energy (MNRE). It has planned 10000 Solar Rooftop Power Programs in 2013. This initiative has been declared as a successful one and won award. In 2017, it completed by installing all the 10000 systems. The revised tariff policy requires all states to reach eight percent solar RPO by 2022. Off grid rooftop solar applications have been promoted through the provision of subsidies from Government. Kerala has 6.11% estimated solar energy potential in the country by 31st March 2020(MNRE Annual Report). As part of New Kerala Mission, the finance minister in his budget talked about proportioning 130-15- crore units' electricity to the consumers from 500MW from rooftop solar pv projects and 500 MW from floating and terrestrial solar pv projects. 50 MW scheme under KSEB's SOURA project has been granted for residential sector under MNRE's the Phase II of MNRE's RTS program.

LITERATURE REVIEW

Chandan Parsad, Shashank Mital and Raveesh Krishnankutty (2020) evaluates investor's behaviour on solar rooftop PV adoption in Kerala using Structural Evaluation Model. Government subsidies plays an important role in investing in new technology. Low maintenance cost and shorter payback period are also motivating in investment decision. The main non-financial factor is environmental consciousness. This study depends upon behavioural finance and institutional theory.

Akeem Bolaji Wahab and Olamiposi Joy Oni (2020), this study is based on photovoltaic solar water pump. It analyses the factors affecting the adoption and perception of customers in Nigeria. The most important factor is technical knowhow and at the same time the biggest advantage is less time taken for getting water.

Joana Abreu, Nathalie Wingartz and Natasha Hardy (2019), this study talks about Building applied photovoltaic technology (BAPT) which can be installed on building surface. Researchers uses Theory of Planned Behavior for evaluating attitudinal, normative and controlled behavior among Americans. They conclude that social norms and attitudinal behavior have significant impact on perception than controlled behavior.

Vikas Kumar, Bikramjit Singh Hundal and Kulwinder Kaur (2019) explains the reasons for selecting solar water pump for farming in Punjab. The researcher uses SERVQUAL model to explain the satisfaction of customers with regards to service quality dimensions. The factor tangibility place a major gap between expectation and perception. The result shows that cost, government subsidies have significant impact on consumer behaviour. But environmental concern does not place any role. Researchers use exploratory factor analysis for analysis.

Heather P. Bedi (2019) describes the solar energy prospects in Kerala with reference to land issues. Kasargod solar park is an infrastructure development in Kerala for meeting energy demand. In this study, researcher point out that Adivasi people opposed the acquisition of land for solar project. Because of these opposition 200MW solar park reduced to 50MW. It suggest that due consideration should be given to historical places and the local people living there, while implementing renewable energy policies.

Pushpendra Kumar Singh Rathore, Durg Singh Chauhan and Rudra Pratap Singh (2019), this paper highlights the importance of decentralised solar power policies in India. Researchers make an investigation into the motivating factors for adopting solar power system. Opportunities and challenges are also highlighted.

Willy Arafah, Lucky Nugroho, Rowlan Takaya and Soeharjoto Soekapdjo (2018) looks into the marketing strategies of renewable energy in Indonesia. This study analyzes the various opportunity to shift into renewable energy using both internal and external factor evaluation analysis and SWOT matrix. Technological improvement helps in depending on renewable energy rather than fossil energy. Indonesia had a huge potential, but 86% of power capacity still depend on conventional energy.

Ansari Sarwar Alam (2018) chooses Theory of Planned Behavior (TPB) with marketing strategies to analyze the purchase intent of consumers. TPB involves three variables attitude, subjective norms and perceived behavioral controls. From this study, attitude, subjective norm, price and promotion have positive relationship with the purchase intent of consumers. The author also tries to analyze the demographic factors for knowing buying decision of customers.

Sreesankar V, Ashik A, Vinu R Krishnan, Abin Velayudhan and Vinod Gopal (2017) conducts a study among street vendors in Kerala. Their requirements and problems are identified. Standalone solar power system financially supports the vendor and helps in overall development. But government support in the form of subsidy is needed.

M.F. Hossain, S. Hossain, M.J. Uddin (2017), in this study authors depicts the picture of solar energy markets in Bangladesh. The perception of consumers is measured through convenience and will enhance the possibility of using solar home system, if proper sales and services are given to customers. Also suggest that motivational awareness should be promoted.



Maheshkumar Sankanr Kedar (2016) recognizes the adaptability of non-conventional source of energy as compared to conventional source of energy. He identifies that there is a need to create more awareness among consumers regarding non-conventional source and more employment opportunities in this field. Ease of availability is a factor which sustain consumers in conventional energy. But the bill generated by electricity consumption and the frequent power failures force them to shift into non-conventional energy. Consumer's decision on selection or rejection of a product is known as 'adoption'. The adoption process involves five stages i.e. awareness, interest, evaluation, trial and adoption. Moreover, government subsidies tempting consumers to purchase more solar products.

Varun Rai and Ariane L Beck (2015) this study focuses on the behavioural aspect of people in Texas city towards solar energy product through an empirical investigation. Also tries to address the issues associated with adoption of solar energy for tapping the market. The main issues associated with electricity consumption includes increasing demand, more emission, lack of water etc.

Anupama s. Chawaan (2014) develops different strategies for enhancing the market for solar energy products in Gujarat. She considers four types of solar energy products i.e. Solar Water heaters, Solar Street Lights, Solar LED Lights and Solar Inverters. In order to analyse the buying pattern of customers, different variables have been selected such as utility of the product, cost of installation of solar energy products, after sale services, availability of the product, credit or loan facility, Government incentives given to customers and social and environment concern.

RESEARCH GAP

From the available literature review, it could analyze that small number of studies are conducted in Kerala regarding solar energy. Kerala had a lot of potential to contribute to Solar energy in the country. It also takes initiatives to bring more opportunities in this field. Government puts more emphasize on promoting solar energy. Kerala is a densely populated area and there is more demand for electricity. To meet this energy crisis, solar will be helpful. In order to understand the awareness level of consumers and their perception towards solar home systems, this study will be helpful.

STATEMENT OF THE PROBLEM

Energy is one of the basic needs. Every sector need energy in order to perform for the economic development. Report shows that conventional source of energy going to deplete in 2040. Globally renewable source of energy gaining attention for protecting the environment and emit zero pollution to the universe. Solar energy is treated as the king in the electricity usage. Till 1980s Kerala was a power surplus state. But the growing demand for electricity created a path for power cuts and load shedding. Kerala depends upon hydro power, thermal power, wind power and solar power. Of these wind and solar energy constitute of small value. Becoming green is the mantra of all sectors in the economy. Energy sector is also trying to change into green energy. Solar is the most appropriate energy which does not harm anything or anybody. It is a clean energy. Kerala facing the problems of land constraints.so we have to focus on roof top solar power plants. According to the annual report of MNRE, Kerala has 6.11% estimated solar energy potential in the country by 31st March 2020. Both central and state government take initiatives to promote solar energy in the country and state level. Anert introduced its solar energy policy in 2013. It initiated a program of 10000 off grid roof top solar power panels which was successfully completed. This include both domestic and commercial users. Here the study concentrates on the consumer perception on off grid solar home systems. Most of the people are not aware of the technology. Even if they know it does not willing to put into practice. To know the factors which are leading to introduce the system by the users and the problems associated in using, a comprehensive study is needed.

SIGNIFICANCE OF THE STUDY

Solar energy is a good option to meet the raising demands of power in our country. It is infinite in nature. India is blessed with lots of sunny days, almost 300 days. We can depend on its source with reliability. A lot of study has been conducted on solar energy consumption. This will give fruitful result into promoting the consumption of solar energy. But in Kerala, such kind of study is less in number. This study concentrates on the perception of customers of solar energy. This will help in formulating enough strategies to manufactures or suppliers of solar energy for capturing the emerging market in Kerala. This will further provide insights to consumers in formulating good consumption habit giving due importance to the environment. Government can also take initiatives to promote solar energy, which focus on sustainable development by giving more importance to clean energy, through understanding the various problem faced by users especially with refence to off grid solar rooftop power panels.



OBJECTIVES

- 1 To understand the awareness level of customers towards solar energy.
- 2 To analyses the factors responsible for using solar Energy.

RESEARCH METHODOLOGY

The study is carried out to know the awareness level of customers and factors responsible for the adoption of solar energy especially off-grid solar energy marketing. Data were collected through well-structured questionnaire. Targeted population is the off-grid solar rooftop households in Thrissur districts in Kerala. A sample of 100 customers both male and female in Thrissur district who installed off-grid solar panel on their household rooftops dully filled up their questionnaire. Sampling method used here is convenience sampling. The questionnaire is designed on the basis of 5-point Likert- scale. Data analysis is done through percentage method. Secondary data has been collected from MNRE and ANERT report, various books, Journals, Newspaper articles.

DATA ANALYSIS AND INTERPRETATION

Frequency distribution of awareness of solar energy

Variable	Fully aware	Aware	Partly aware	Not aware	Not at all aware	Total
Aware of solar energy	41	32	22	5	0	100
Aware of solar products	34	27	20	14	5	100
Aware of advantages of off-grid solar powerplants	29	26	22	11	12	100
Aware of financial assistance by Government	34	21	22	7	16	100

Frequency distribution of factors responsible for the use of off-grid solar powerplants

Variable	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Product utility	48	26	8	18	0	100
Cost benefit	45	23	21	9	2	100
Environmental concern	35	26	28	7	4	100
Word of mouth practices	33	29	16	16	6	100
Technology acceptance	38	38	8	10	6	100

Frequency distribution of perceived use of off grid rooftop solar power plants

Variable	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Total
Simple to install	29	35	27	7	2	100
Durability	19	23	26	22	10	100
Repairs and maintenance	31	29	28	8	4	100
Better after sale services	34	24	29	7	6	100

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Variable	Weighted mean score
Aware of solar energy	4.21
Aware of solar products	3.71
Aware of advantages of off-grid solar powerplants	3.49
Aware of financial assistance by Government	3.50



Level of factors responsible for the use of off-grid solar powerplants

Variable	Weighted mean score
Product utility	4.04
Cost benefit	4.02
Environmental concern	3.85
Word of mouth practices	3.67
Technology acceptance	3.9

Level of perceived use of off grid rooftop solar power plants

Variable	Weighted mean score
Simple to install	3.82
Durability	3.19
Repairs and maintenance	3.75
Better after sale services	3.73

From this analysis it can be concluded that most of the respondents are aware of the solar energy and products which consumes solar energy. But there should be some more awareness regarding off-grid solar powerplants. The main factor which leads to use off grid solar power plants on household rooftop is benefit that received from the product and cost benefit. Perceived value analysed through the variable such as simple to install, repairs and maintenance.

CONCLUSION

The present study is portraying the customers perception regarding off – grid solar energy marketing in Kerala. It concluded that customers are aware about the solar energy and its environment friendly nature in the consumption of energy. People are more interested in adopting the technology in order to save the energy consumption. The perceived value of solar products seems to be more as consumers get more than what they pay for. From the sample tested, product utility considered as the main factor for choosing solar off grid powerplants on rooftops in order to meet the energy needs of households. Government assistance is commendable but still need more intervention to make it available the needy as possible. Financial assistance or subsidies by government should be more effective. Customers are satisfied with the timely services given by providers such as repairs, maintenance, battery changing, Handling of grievances etc.

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