Marketing of Renewable Energy: Solar Energy Users in Mysore City

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Abstract

This paper considers the impact of solar energy usage on customer satisfaction in Mysore city. The purpose of this study is to examine the role of solar energy usage as a mediator between price, promotion and customer satisfaction. Data were collected by questionnaires and Standard Equation Modelling was used for analysing the data. The results indicate that total effect of price and promotion with and without solar energy usage as a mediator is significant at bout cases. Therefore, solar energy usage is a partial mediator.

KEYWORDS: marketing, solar energy usage, price, promotion, customer satisfaction

1.Introduction

Marketing is the social process by which individuals and groups gain what they need and want through creating and exchanging goods and value with others (Philip Kotler,2010). According to the American Association (AMA) Board of Directors, Marketing is the activity, set of institutions, and process for creating, communication, delivering and exchanging offering that have value for customers, clients, partners and society at large. Green Marketing considers all attempts to consume, produce, distribute, upgrade, package and modify products in a sensitive and environmentally friendly manner. Green marketing identifies the need to consider the production, distribution and modification of products as integrated marketing components. The goal of green marketing is to limit all environmental impacts associated with consumption. Finally, green marketing should take into account the promotional efforts taken to obtain consumer support for environmentally friendly products. Todays, the use of renewable energy sources is essential, because non-renewable energy sources such as oil and gas are limited and use of these sources has caused environmental problems such as climate change, air pollution and environmental degradation. This study tries to investigate the relationship between solar energy and customer satisfaction in Mysore city. The main aim of this study is to find out how solar energy uses is influenced by price and promotion. It uses solar energy usage as a mediator between price, promotion and customer satisfaction. Solar energy in the form of sunlight is a source of energy that has existed since the advent of the earth. This energy can be obtained directly from the sun and even in cloudy weather. Solar energy is used globally and extensively to generate electricity and water heating. It is known in terms of heat and light and is used in two ways i.e. to generate heat and to generate electricity. Solar thermal system uses heat for cooking, water boiler, water purification, etc. The PV system converts the light energy into electrical energy. It is very useful technology for non-electric areas.

2.Review of Literature

Consumers have accepted solar as a viable energy system. Solar is a source of energy that causes reduction in electricity bill, increase safety, studying easily during night and receiving information from radio**(Gayathri and Abitha,2017).**

Companies should provide information to consumers at the time of installation and teach consumers about performance and operation of the system (**Mannes, 2017).**

Consumers are satisfied with solar home systems, because it provides enough light and more entertainment during night (**Jacobson, 2007).**

Solar home lighting system has positive effects on the duration of study, reducing kerosene consumption and improving standard of living (**Barman et al, 2017).**

Government's notice is necessary for installation of solar water heating system. Some factors that prevent solar water heating promotion are as follows: inadequate financial support and regulation, low awareness about the quality and operation of system and deficiency of skilled technicians (**Heet al,2015).**

Some important factors that have influence on consumers to go towards solar energy. Factors are as follows: An active energy market, Security of supply, energy prices, environment and climate situations (**Lavrijssen, 2014).**

Special ways for execution of renewable energy technologies. Creating opportunities for local income generation and local demand, including service and maintenance organization, are very important for implementation of renewable energy technologies. Promotion and management of renewable energy technologies play a significant role for execution of renewable energy technologies in private sector (**Borah et al, 2014).**

Solar lighting services are beneficial for children. They can study more during night, watch TV and listen to radios compare to children without solar services (**Akhi and Islam, 2014).**

Renewable energy in small scale household has an important role in perceived ease of use, perceived behavioral control, knowledge and awareness, cost reduction and relative profit (**Alam et al, 2014).**

Three main incentives for promoting solar thermal energy. The incentives include: 1.tax incentive 2.non-refundable grants 3. desirable line of finance**(Pablo-Romero et al, 2013).** Households are satisfied with solar home systems because of: equipment quality, energy savings, low dependence on kerosene, increase in study time at night and improvement in standard of living (**Komatsu et al, 2013).**

Most important benefits of solar home system; 1. It increases standard of living for a long-term. 2. It reduces the risk of using kerosene. 3. It is energy efficient. 4. It increases study time. 5. It provides better indoor air quality (**Rahman and Ahmad, 2013).**

Energy of the sun is abundant and there is no limitation for this energy. So, solar systems are very useful for rural areas (**Harish et al, 2013).**

Concluded that photovoltaic is very cost-effective for diminishing CO2 emissions compare to products that reduce consumer's operating cost**(Yamaguchi et al, 20130.**

Solar electricity provides an opportunity for rural people to watch television, so advertiser can obtain a larger number of audiences. It provides opportunity for students to study at night. Also, people in rural Kenya that have solar systems can use cellular phone **(Pode, 2013).**

There is less direct evidence on the capitalization for residential solar home market. Some household are proud that they are producing green energy by using solar home systems **(Hoque and Das, 2013).**

Most of users prefer to keep solar home systems although they have electricity grid. Solar home system is good in performance and very useful tool for solving pollution problems **(Bond et al, 2012).**

Solar energy is a clean and sufficient energy in nature and provides a sustainable development to the environment, so we can use it in accordance with nature**(Dastrup et al, 2012).**

Important reasons for installing PV in Texas. It reduces the emission of greenhouse gases on the environment. It is a prudent financially investment and investors consider risk and time horizon. Users have enough information about PV and the time of installation is certain from the date of ordering **(Rai and McAndrews, 2012).**

claims that installing of solar home systems enable household to have clean environment, high quality and reliable energy services. Solar home system improves education, recreation and communication in rural areas. It also increases standard of living in rural Bangladesh**(Buragohain, 2012).**

Solar energy is a clean, plentiful and environment-friendly energy source, while conventional or non-renewable energy sources like natural gases, coal and oil are limited in nature and lead to emission of greenhouse gases and environmental damage **(Sharma et al, 2012).**

Found that users are not satisfied with service qualities such as: convenient use of the system, sustainability of solar home systems, longevity of the solar home systems, availability of loan from system providers, friendly behavior of the personnel, the leaflet and catalog of the system and easy access to parts of solar in local market. So, service providers should enhance the service quality of the solar home systems in Bangladesh **(Momotaz and Karim, 2012).**

Indicate that solar water heater is accepted and used by consumers. They have more awareness about solar water heater than solar photovoltaic**(Yuan et al, 2011).**

Integrated solar home system has the following benefits: 1. Installation process is easy. 2. There is a considerable reduction in the cost of the system. 3. There is increase in efficiency by means of low cell-temperature operation. 4. There is increase in reliability by means of pre-manufactured and pre-tested units. 5. Standard AC output 6. Discretionary use of hot water as a by-product **(Kamalapur and Udaykumar, 2011).**

Solar energy has a great impact for development of rural area in India. The use of kerosene has reduced in all income groups because of solar home lighting systems. It is also very beneficial for women and children; they can do their activities at night. Due to availability of lighting system during night, crime rate also has been declining **(Iemsomboon, 2011).**

Fee for services and micro-credit system are two important factors for obtaining solar home systems. High installment cost and non-availability of flexible payment are barriers for lower income family to purchase solar home system (**Komatsu et al, 2011).**

Consumers tend to choose fee-for-services compare to other factors such as: donation, cash sales model and full subsidy for rural electrification in developing countries. Consumers prefer fee-for-services, because there is no need for high initial cost (**Wlokas, 2010).**

Implementers of solar PV believe that maintenance and monitoring of solar panels are very important. So, technicians and consumers should learn how to maintain and monitor solar panels (**Linguet and Hidair, 2010).**

Most important financial arrangements for solar PV on rural Bangladesh. They are as follow: 1. Fee for services and payment in installment 2. User's training about maintenance and operation of solar is a good way that enables consumers to solve the problems such as: adding distilled water and replacing fuses. 3. Women's training as main users of solar panels also is a way of developing panels in rural Bangladesh. 4. Availability of different variety of solar panels enables consumers to choose panels according to their needs and financial capacity (**Bond and Fuller, 2010).**

3.Research Methodology

Conceptual Framework

This study tries to analyse the marketing of renewable energy. The framework analyses the satisfaction of solar energy users in Mysore. The study identifies the relevant variables of solar energy users through the literature review. The variables are price, promotion, solar energy usage and customer satisfaction.

In this study, the independent variables are price, promotion and solar energy usage and dependent variable is customer satisfaction.

Objective of the Study

1. To investigate the role of solar energy usage in mediating the relationship between price and customer satisfaction
2. To test the role of solar energy usage in mediating the relationship between promotion and customer satisfaction.
3. To examine the impact of price on solar energy usage
4. To study the impact of promotion on solar energy usage
5. To investigate the impact of solar energy usage on customer satisfaction

Hypothesis of the Study

1. There is no significant relationship between solar energy usage and customer satisfaction
2. There is no significant relationship between price and customer satisfaction
3. There is no significant relationship between promotion and customer satisfaction
4. There is no significant relationship between price and solar energy usage
5. There is no significant relationship between promotion and solar energy usage

Price

Price is the amount of money charged for a product or service, or the sum of all the values that customers give up in order to gain the benefit of having or using a product or service (Kotler & Armstrong, 2009).

Price is the amount of money charged for a product or service. Broadly, price is the total amount that being exchanged by the customer to obtain a benefit of the product or service owning (Kotler, 2009)

Promotion

Promotion is any kind of marketing communication that is intended to inform or convince the target population about the values associated with a product, service or particular brand. The aim of promotion is to raise awareness, increase interest, increase sale or create brand loyalty (Mc Carthy & Jerome, 1964).

Solar Energy Usage

Solar energy is clean energy that is received from the sun. Household uses solar energy in two ways. Solar PV and Solar Water Heater.

Customer Satisfaction

Customer satisfaction is a sense of pleasure or disappointment that comes from comparing a product's perceived performance or outcome against his or her expectation (Kotler, 2009).

Instrumentation

In order to measure the constructs, the following scale in the respective research models were adapted from various resources.

1. Price – 4 questions
2. Promotion – 8 questions
3. Solar energy usage – 11 questions
4. Customer satisfaction – 7 questions

Sample Unit

A sample of 600 questionnaires are distributed to the household in Mysore city. The questionnaires are close and open ended.

Sampling Technique

The focus of this research is on the solar energy users in Mysore city. A convenience sampling method is used for research. Convenience sampling or availability sampling technique is a special kind of non-probability sampling that collects data from current and available individuals in the study. A convenience sampling is a type of sampling in which the source of the first primary data is available for research without the need for additional request. This type of sampling takes place wherever you can find participants and especially wherever they are available. In convenience sampling, no indicator has been identified prior to the selection of the items. All individuals available to participate in the sampling are invited (saunders et al, 2012). The researcher distributes questionnaire to the household of Mysore city.

Source of Data

This study relies only on primary data. Primary data is collected through questionnaires in different areas of Mysore city.

Data Analysis

Based on the type of data and research questions, appropriate statistical analysis was applied on the data collected from the respondents. Statistical software namely, SPSS (Version 25) and AMOS (Version 24) were used for data analysis.

Regression

Regression explores the relationship between dependent and independent variables. This model is an effective tool for perceiving and representing the relationship between variables. This model is used to evaluate actual results. Regression analysis includes several forms like liner, non-liner and multiple liner.

Structural Equation Modelling

Structural Equation Modelling is a quantitative method that helps the researcher to arrange his research and analyse empirical data in a multivariate model. Structural Equation Modelling helps the researcher to examine the theorical model that is composed of different components in the general and partial way. This model not only helps the researcher in the testing of single variable and bi-variate hypothesis, but can also be used to examine multivariate hypothesis concurrently. Structural Equation Modelling is typically a combination of measuring models and structural models. This model refers to complex relationship between one or more independent variables and one or more dependent variables.

4.Data Analysis

In this study, the role of solar energy usage on customer satisfaction is considered in Mysore city. In the first step, the impact of price, promotion and solar energy usage is determined directly on customer satisfaction also the impact of price and promotion on solar energy usage is calculated directly. In the second step, the impact of price and promotion is indirectly measured by solar energy usage as a mediator on customer satisfaction in Mysore city. There are five hypotheses in this study.

Hypothesis 1

Price→ Customer Satisfaction	Without Mediator		By Mediator	
	Coefficient	P-value	Coefficient	P-value
Direct	0.545	0.000	0.884	0.000
Indirect	–	–	0.000	0.000
total	0.545	0.000	0.884	0.000

***Significant @ 99%, ** significant @ 95%, * significant @ 90%

Interference: Total effect of variable price on customer satisfaction without and with mediator are 0.545 and 0.884 respectively which has been increased with mediator but is significant at both cases. Therefore, solar energy usage is a partial mediator.

Hypothesis 2

Promotion → Customer Satisfaction	Without Mediator		By Mediator	
	Coefficient	P-value	Coefficient	P-value

Direct	0.458	0.000	0.476	0.000
Indirect	–	–	0.000	0.000
total	0.458	0.000	0.476	0.000

Interference: Total effect of variable promotion on customer satisfaction without and with meditator are 0.458 and 0.479 respectively, which has been increased with mediator but is significant at bout cases. Therefore, solar energy usage mediator is a partial mediator.

Hypothesis 3

Price → Solar Energy Usage	Without Mediator	
	Coefficient	P - value
	0.530	0.000

Interference: The effect of variable price on solar energy usage is 0.530 and it is significant.

Hypothesis 4

Promotion → Solar Energy Usage	Without mediator	
	coefficient	P - value
	0.222	0.000

Interference: The effect of variable promotion on solar energy usage is 0.222 and it is significant.

Hypothesis 5

Solar energy usage → Customer Satisfaction	Without mediator	
	coefficient	P - value
	0.812	0.000

Interference: The effect of variable solar energy usage on customer satisfaction is 0.812 and it is significant.

5.Conclusion

This study investigates the impact of solar energy usage on customer satisfaction in Mysore city. Total effect of price on customer satisfaction with and without solar energy usage mediator is significant. The impact of price on customer satisfaction with and without mediator shows that households are satisfied with the price of energy, because by installing solar energy system, living expenditure reduces in long-run as compare to other fossil fuels. Solar energy has long-term savings, because it is free to capture the power of Sun. Cost of annual maintenance is reasonable and the initial installation cost is satisfactory. Total effects of promotion with and without solar energy usage mediator is significant. The impact of promotion on customer satisfaction with and without mediator shows that households are satisfied with the financial incentive, discount on solar setup, advice of retailor and product information. The effect of price and promotion on solar energy usage represents that households are satisfied with solar energy system. The effect of solar energy usage on

customer satisfaction is significant. It shows that solar energy usage has extremely impact on customer satisfaction because by using solar, standard of living has increase, there is security in energy supply and it reduces green house gas emissions.

References

Mannes, M. (2017). End-user evaluation of Solar Home System as a viable energy system for rural development in South Africa (Master's thesis, Norwegian University of Life Sciences, Ås).

Jacobson, A. (2007). Connective power: solar electrification and social change in Kenya. World Development, 35(1), 144-162.

Barman, M., Mahapatra, S., Palit, D., & Chaudhury, M. K. (2017). Performance and impact evaluation of solar home lighting systems on the rural livelihood in Assam, India. Energy for Sustainable Development, 38, 10-20.

He, G., Zheng, Y., Wu, Y., Cui, Z., & Qian, K. (2015). Promotion of building-integrated solar water heaters in urbanized areas in China: experience, potential, and recommendations. Renewable and Sustainable Energy Reviews, 42, 643-656.

Lavrijssen, S. A. C. M. (2014). The different faces of energy consumers: toward a behavioral economics approach. Journal of Competition Law and Economics, 10(2), 257-291.

Borah, R. R., Palit, D., & Mahapatra, S. (2014). Comparative analysis of solar photovoltaic lighting systems in India. Energy Procedia, 54, 680-689.

Akhi, R. A., & Islam, M. (2014). Prospects of Solar home system in Bangladesh and a case study for tariff calculation. International Journal of Innovation and Applied Studies, 7(1), 273.

Alam, S. S., Hashim, N. H. N., Rashid, M., Omar, N. A., Ahsan, N., & Ismail, M. D. (2014). Small-scale household's renewable energy usage intention: Theoretical development and empirical settings. *Renewable Energy*, *68*, 255-263.

Pablo-Romero, M. P., Sánchez-Braza, A., & Pérez, M. (2013). Incentives to promote solar thermal energy in Spain. *Renewable and Sustainable Energy Reviews*, *22*, 198-208.

Komatsu, S., Kaneko, S., Shrestha, R. M., & Ghosh, P. P. (2011). Nonincome factors behind the purchase decisions of solar home systems in rural Bangladesh. *Energy for Sustainable Development*, *15*(3), 284-292.

Rahman, S. M., & Ahmad, M. M. (2013). Solar Home System (SHS) in rural Bangladesh: Ornamentation or fact of development? Energy Policy, 63, 348-354.

Harish, S. M., Iychettira, K. K., Raghavan, S. V., & Kandlikar, M. (2013). Adoption of solar home lighting systems in India: What might we learn from Karnataka?. Energy policy, 62, 697-706.

Yamaguchi, Y., Akai, K., Shen, J., Fujimura, N., Shimoda, Y., & Saijo, T. (2013). Prediction of photovoltaic and solar water heater diffusion and evaluation of

promotion policies on the basis of consumers' choices. Applied energy, 102, 1148-1159.

Pode, R. (2013). Financing LED solar home systems in developing countries. Renewable and Sustainable Energy Reviews, 25, 596-629.

Hoque, S. M. N., & Das, B. K. Analysis of Cost, Energy and CO2 Emission of Solar Home Systems in Bangladesh" 2013, Volume 3, Issue 2, 2013. International Journal of Renewable Energy Research.

Bond, M., Fuller, R. J., & Aye, L. (2012). Sizing solar home systems for optimal development impact. *Energy policy*, *42*, 699-709.

Dastrup, S. R., Zivin, J. G., Costa, D. L., & Kahn, M. E. (2012). Understanding the Solar Home price premium: Electricity generation and "Green" social status. *European Economic Review*, *56*(5), 961-973.

Rai, V., & McAndrews, K. (2012, May). Decision-making and behavior change in residential adopters of solar PV. In Proceedings of the World Renewable Energy Forum.

Buragohain, T. (2012). Impact of solar energy in rural development in India. International journal of environmental science and development, 3(4), 334.

Sharma, N. K., Tiwari, P. K., & Sood, Y. R. (2012). Solar energy in India: Strategies, policies, perspectives and future potential. Renewable and Sustainable Energy Reviews, 16(1), 933-941.

Momotaz, S. N., & Karim, A. M. (2012). Customer satisfaction of the solar home system service in Bangladesh. *World*, *2*(7), 193-210.

Yuan, X., Zuo, J., & Ma, C. (2011). Social acceptance of solar energy technologies in China—End users' perspective. Energy policy, 39(3), 1031-1036.

Kamalapur, G. D., & Udaykumar, R. Y. (2011). Rural electrification in India and feasibility of photovoltaic solar home systems. International Journal of Electrical Power & Energy Systems, 33(3), 594-599.

Gayathri, S. B., & Abitha,(2017) A. SATISFACTION TOWARDS SOLAR WATER HEATER AT HOUSEHOLDS–A STUDY WITH SPECIAL REFERENCE TO POLLACHI TALUK.

Wlokas, H. L. (2010). A review of the solar home system concession programme in South Africa.

Linguet, L., & Hidair, I. (2010). A detailed analysis of the productivity of solar home system in an Amazonian environment. Renewable and Sustainable Energy Reviews, 14(2), 745-753.