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Consumer's Buying Behavior towards Solar Energy Equipments in H.P.

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ABSTRACT—

Sustainable consumption can be reached by gaining knowledge and framing strategies related to Consumption of resources. In modern competitive world, marketers have adopted customer centric approach, that is marketing starts and end with consumers. It is very relevant to marketer to understand how its products/services can be accepted, perceived and responded by consumer. More effective product, place price promotion decision can be framed by marketer if they get clear understanding of the benefits that are sought by customer and how they make purchase decision. The study involves the study of how people acquire, use, experience, and make decision about solar energy equipment in selected district of H.P. The present study provides us consumer differences in buying and using solar energy equipments. Solar energy equipment derives energy from sun light which is renewable energy resources which are in abundance in nature and utilization can overcome the pollution problem and environmental concern and other economic issues of society. For the purpose of study 375 individual respondents were taken into study. Data collected is analyzed with the suitable technique such as descriptive, chi- square, F test to gain insight about Consumer behavior towards solar energy equipments in selected area.

Index Terms—Sustainable Consumption, Solar Energy Equipments, Consumer Behavior, Renewable Energy

Introduction.

Understanding what causes the consumer to buy a particular goods and service manufacturer will be able to determine the product and services to be manufactured or marketed. The consumer behavior varies across states, region and countries. All consumers do not behave in the same manner. Different consumers behave differently. For instance, the behavior of urban consumer is different from that of rural consumer. Normally, the rural consumers are conservative in their buying behavior.

Sustainable consumption is the use of products and services in a way that minimizes the impact on the environment, so that human needs can be met not only in the present but also for future generations. When sustainable consumption is practiced, resources are used wisely, and waste products and pollution are minimized. The main way this is achieved is by doing more and better with less. In other words, we can find ways to meet our needs and desires without depleting our planet's finite natural resources. Sustainable Consumption, then, would also include analyses of efficiency, infrastructure, and waste, as well as access to basic services, green and decent jobs and a better quality of life for all.

Energy Resources: Renewable and Non- Renewable Resources

Energy is defined as "the capacity to work". We need energy for different activities in our day-to-day life. It is used in industry for running machines, for irrigation of crops, for cooking as fuel, for transportation as fuel, for using home appliances like T.V., Refrigerator, Iron press, Mixer-grinder and so on. Practically energy is required for every activity, and we are so much dependent on it that we cannot think life without it. If energy resources are not there, life will come to a standstill.

Renewable energy sources are those sources of energy which can be replaced. They are available in abundance but are to be managed properly. These are comparatively less polluting and hence their importance has increased. They are also called non- conventional source of power. They are inexhaustible sources and will continue to give us energy. These resources can be categorized into following categories.

Solar Energy- is derived by capturing radiant energy from sunlight and converting it into heat, electricity, or hot water. Photovoltaic (PV) systems can convert direct sunlight into electricity through the use of solar cells.

Wind Energy- Wind farms captures the energy of wind flow by using turbines and converting it into electricity.

Hydroelectric Energy- Water flows through the dam's turbines to produce electricity, known as pumped-storage hydropower.

Ocean Energy- the Ocean can produce two types of energy: thermal and mechanical. Ocean thermal energy relies on warm water surface temperatures to generate energy through a variety of different systems. Ocean mechanical energy uses the ebbs and flows of the tides to generate energy, which is created by the earth's rotation and gravity from the moon.

Geothermal Energy- Geothermal heat is heat that is trapped beneath the earth's crust from the formation of the Earth This heat can be captured and used to produce geothermal energy by using steam that comes from the heated water pumping below the surface, which then rises to the top and can be used to operate a turbine

Biomass Energy- Bio energy is a renewable energy derived from biomass. Biomass is organic matter that comes from recently living plants and organisms.

Non- Renewable Energy Sources of power are those which once used cannot be used again. Coal, petroleum and natural gas are included in this category. These are formed due to decomposition of plants and animals which were buried under the rock millions of years. So these are called fossil fuel, being used as traditionally they are called conventional or traditional source of power. These are limited and exhaustible in nature.

Growing energy Needs:

Energy is closely related to the economic development. Energy consumption is also considered to be the indicator of living standards. Man has been using energy resources since long times. Initially he was using own power and animal power. Then he started using wood as fuel. With the advent of coal, petroleum and other energy sources, he started using these resources. Initially the demand for these resources was very less. But with the growth of population, industrial revolution and economic development demand for energy resources has increased.

For almost 200 years coal was the main source of energy. At the time of industrial revolution, it was coal resource but with the discovery and extraction of petroleum it took the place of coal. Now it has become the most important fuel resource in the world. petroleum account for almost 39 % of the total energy consumption while coal 24%, natural gas 24%, nuclear, hydro and other sources of power together account for almost 13% of the total energy consumption.

In the 20^{th} century energy consumption has increased many times. This is due to increasing use of electricity in every field like industries, domestic sector, agriculture, transportation. Total energy needs increased four times between 1950-1990.With the economic development, the energy consumption will increase further in almost all parts of world. A developed nation uses much more energy than developing nation. On an average an American uses 24 times more energy than Indian. In the coming years Asia- Pacific Region is expected to surpass North America in energy consumption. The consumption of energy has already reached its peak and with greater use of energy in future, man is inviting disaster for his survival and for the planet itself.

Solar Power and Solar Energy- the concept

Solar power is derived from sun radiation. Solar power refers to the conversion of energy from sunlight into electricity, directly using photovoltaic, indirectly using concentrated solar power, or a combination, concentrated solar power system use lenses or mirrors and tracking system to focus a large area of sun light into a small beam. Sun is the Primary and ultimate source of energy whatever energy we are using, it has come from sun itself directly or indirectly. Plants get solar radiation from Sun for photosynthesis and prepare their food. They provide us food which is a source of energy for us. The fuel resources like coal, petroleum etc are formed due to deposition of plants and animals in the ground. They were buried under the rocks for millions of years and transformed into energy resources. We are getting water because of sun. Solar energy falls on the ocean and water get evaporated. It condenses in the atmosphere; clouds are formed, and we get rainfall.

Solar power means the photovoltaic process that transform sunlight into electricity doesn't require any fuel and have no variable cost. It is a unlimited source of energy and is a key to clean energy future on earth as there is no harmful CO_2 emission are released into the air when electricity is produced by solar panel. It is a renewable source of energy having low operating cost.

A solar energy is radiant energy and heat from the sun that is harnessed using a range of ever evolving technologies such as solar heating. Solar energy is CO_2 free renewable energy resource; solar electric photovoltaic system can produce electricity for home or office. Solar systems are also installed by home or business owner to offset their electricity cost.

As we know sun is the main source of energy and in country like India. Sun light or energy is in abundance here. India being tropical country we get vertical solar radiation almost throughout the year. We need to harness this energy for economic development of country. If we tap this resource, there will be no shortage of energy in future. This energy can be used in different ways. These days' solar geysers are installed with storage tank. It can store hot water even up to 72 hours. But when there is no sunshine, it cannot heat the water. In Israel 80% of the homes have the solar water heater. In India it also becomes popular. It is widely used in town, cities and villages.

Today with growing advancement and pace of development India needs more power. Not only to cover its daily power shortfalls (several hours per day), but also to support its economic development. In 2008 According to CEA, the peak demand was 120 gigawatts of power, while only 98 gigawatts could be supplied. According to an analysis by the Indian PV project developer Astonfield, quoting the President of India Energy Review, this deficit is likely to grow. The targeted share of renewable energy is likely to grow, with the amount of solar energy increasing to 56 gigawatts of installed power. In India Demand for solar products has been rapidly rising for the recent years, especially in rural areas, and is expected to continue growing substantially during the period (2022-25). Most popular applications in India are Solar Street lighting systems, home lighting systems, power plants, solar cookers, solar pumps and solar water heating systems. The number of solar water heating systems is projected to grow at a rapid CAGR of about 22% between 2019 and 2025.

Literature review

Amulya Kumar N. Reddy (1982) has analyzed "Rural Energy Consumption Pattern- a field study on energy consumption in six villages", namely, Arjunahalli, Hanchipura, Keelara, Pura, Sugganahalli and Ungrain the state of Karnataka. He observed that the energy survey of 560 households and examined the proportion of energy plans consumed by them from different sources and related them to the annual energy plans of these households. He

has analyzed that nearly 95% of the total energy plans has been obtained from non-commercial energy sources while commercial energy sources have contributed an insignificant proportion of the overall energy use example in the villages.

Gene R. Heinze and Fry (1986) in their study, "The Financial aspects of home solar powered water warming and the job of sunlight based duty credits", expresses that the funds of home solar oriented water warming, utilizing level plate gatherers and an ordinary water radiator for reinforcement, for 69 urban communities in 46 states. Gaseous petrol is a less expensive than that electric appliance warming in many territories, yet a large portion of the home worked in1978-83 has electric warmth, while just 40% use gas.

Maikhuri, R.K. (1996) has analyzed **"**Eco energetic analysis of village ecosystem of different traditional societies of north east India", the rural eco energetic of four tribal societies in north eastern India, the Nishis, Karbis, Kacharis and Chakmas of Arunachal Pradesh. There searcher has conclude that in all cases intervention technologies such as biogas plants, standard cook stoves, micro hydro power plants, solar and wind generation could minimize the burden on local forests which were already over-exhausted.

Khan, H.J. and Huque, A.J. (1998) **"**Market Assessment Survey of Solar PV Application in Bangladesh", the author reported that a important market survey of solar PV application in Bangladesh. The article provides market opinion based on administrative districts and household income categories. By this estimation, about 4.8 million village households could pay for a solar home system. This explanation was nearly 45percent of all village households are without electricity. They appeared that the village households commonly do not have adequate income for purchasing a solar home system in cash. However, the use of credit or other forms of extended payment can expand the potential market altogether.

Cabraal, A. et al. (2000) the researcher noted that "Accelerating PV market development -Progress in Photovoltaic: Research and Applications", successful accelerating PV market development for village electrification needs the eviction of financial and institutional barriers and the other major issues to be designed are the high initial costs, the establishment of a responsive and sustainable infrastructure and the guaranteeing of quality products and services.The findings of their searcher concluded on their studies in Indonesia, Sri Lanka, the Philippines and the Dominican Republic.

Nieuwenhout, F.D.J. et al. (2000) discussed **"**Monitoring and Evaluation of Solar Home Systems – Experiences with applications of solar PV for households in developing countries", the need of solar energy systems in households in developing countries, found that there was no single outstanding organizational model to improve the spreading of solar home systems. However, Spreading calculate on institutional, legal, socioeconomic and cultural circumstance in these countries.

Jeffrey,Gordon (2001) stated that" Solar Water Heater Markets and Comparison of Markets in Different Countries", it is suitable for all the favorable climatic conditions, the utilizing of water heaters is find to be more in Isral than other countries. The major countries like United States, Australia, Greece are the very largest explorer of solar water heaters. The only sustainable handout made by France in the export of solar products towards overseas countries and U.S. exports mainly to the Caribbean area. Australian Companies exports nearly 50% of its production and contributing to the countries which do not have heavy cold climate. China has identified and verified as the leading market for advanced evacuated tabular solar collector.

Asthana, D.K. and Meera Asthana (2001) in the book the authors explained about the "Environment Problems and Solutions usage of Solar Thermal Energy", They believe that adequate amount of sunshine is available in our country which contribute light as well as heat. Solar heat can be captured by using reflecting devices which concentrate solar energy to a particular area. However, department of non-conventional energy sources has been trying to popularize the need of solar cookers and solar water heating devices by contributing generous subsidies to the customers. Solar drier, solar water heater and desalinization plants have been become popular in India at some places earlier.

Bhave,A. (2002)" Customer Satisfaction Measurement, Quality and Productivity", suggested that customer satisfaction measurement is the king of marketing. There view of literature on customer satisfaction and regain intention to demonstrates the important role of service quality and recognized value as critical in determining satisfaction and decision. Customer satisfaction measurements help to encourage a focus on maximizing customer outcomes and stimulate the extra-ordinary improvements in the work practices and processes used within the company.

Tiwari, G.N. (2005) stated that "Solar Fundamentals, Design, Modeling and Applications", the economic analysis of solar energy products. The author stated that techno-economic investigation in the field of engineering augment and gathered experience used in the application of scientific fundamental principles and techniques to problems of project program in cost control, profitability analysis, planning, scheduling and positive operational research etc., The present research covers a broad range of task such as time value of money, maintenance, organizational structures, integrated projects task control, quality and resource management life cycle and risk analysis etc., The researcher further discussed on payback period. His view on various topics such as profitability is a measure of the total income for a project task compared to the total outlay. Money going into the project is taken as pessimistic and money coming back from the project as optimistic. Payout time is one of the measurements of profitability.

Adam Faiers(2006), In his study revealed that the early adopters are currently adopting, the system. It was also found that unless the attributes of solar power change or external factors increase the relative advantage, the early majority are unlikely to adopt. Early majority may influences how marketing messages should be directed and delivered at a time when solar power becomes attractive to the early majority.

Dutta, B. (2009) In his article Sustainable Green Marketing, expresses that Green Marketing includes growing great quality items, which can address buyer issues and needs by concentrating on the quality, execution, estimating and comfort in a situation well disposed way without harming the nature

Sudha Mavuri (2011) in his study analyzed the Consumer buying behaviour for Solar Products. Since the factors to purchase solar products are slightly different as that of usual products. Here the interest comes mostly from the producers or policy makers to promote consumption of such products when compared to consumers. The driver for boosting the consumption is limited by awareness and this in turn is influenced by income and education. This study found that there is a strong influence of education and income on awareness but income has relatively more weightage on influencing the buying decision of these products. Also, there is a requirement for creating confidence in the consumers of solar products by the producers about addressing the problems of usage and after sales services to avoid the effect of negative information from the current consumers on future (potential) demand.

Martinez-Caraballo et al., (2011) Variety seeking behaviour is present in the consumer. Shoppers uses several stores to cover their shopping needs and being frequent buyer, influence their variety seeking behaviour. Brand experience and brand personality affects customer satisfaction and customer loyalty positively. Variables like sensory, affective, behavioural and intellectual were identified with the help of exploratory factor analysis on brand experience dimensions.

Venkatram, M., and Sheeba, M., (2014) Customer's attitude towards solar energy devices is changing due to various reasons; various advantages of using solar energy devices over electrical devices are one of the important reasons. There is significant increase in awareness about solar energy equipment. Consumer's attitude towards energy devices solar were influenced by many factors, major factors are changing of trends, educational qualification of the customer and standard of the living of people.

Kumar,D.P. and Raju, V.K., (2014) Conducted a study on public perception about suitability of solar power panel as an alternative energy source in Andhra Pradesh. The objective of the study was to get insight into the perception of power consumer solar power and solar panel. Survey method was used and sample size of 110 was taken using non-probability convenient sampling technique. Relation between education of the respondents and his level of awareness about solar energy is significant. Generally higher education level leads to higher level of awareness about solar energy. From the study it was also found that relation between income of respondents and number of electricity sources they are possessing is also significant. This generally shows the tendency of higher income people to gain more sources of electricity, as there is increase in the number of people interested to use solar as alternative source. People with kids in family were showing interest towards solar panels, they interested to buy solar panel on if available on EMI. However higher cost of solar panel and other inhibitions about the working of solar panel lowering the interest of people towards solar panel.

Ahmed, N., (2015) research was conducted to find out the factor influence the consumer choice towards renewable energy in Netherlands revealed that several factors influencing consumer choice towards renewable energy. He used literature and identified these factors based on Post Keynesian theory and theory of consumption values, further Concept of 4 P's, Green marketing strategies used out to find out factors influencing consumer choice from the view of organisation. A research method of case study was adopted. Case study is an in-depth examination of single instance of some social phenomena. Further interview with the renewable energy provider was conducted. It was found that main factors relating to an adoption of renewable energy are energy cost reductions, energy supplier independency, increasing market price for energy, positive recommendation from people within the social network as well as financial support through grant. Adoption of renewable energy provides lot of benefits. The organisations promoting renewable energy need to get more active within their marketing network.

Aziz, N.N.A. And Wahid, A.N., (2015) attempt was made to review on consumer purchase intention of Solar Panel in Malaysia. The important influencing factors were identified who affect the purchase intention of solar panel in Malaysia. The six influencing factor namely environmental Concern, perceived cost, perceived maintenance, government subsidies, Solar panel aesthetics expose solar panel and experience to solar panel significantly affect the purchase intention of consumer about solar panel.

Soni, M. (2016) SWH adopted by affluent class of society who are educated and mostly living in independent Houses having built up area of 1500sqf or more. The respondents having sufficient disposable income and large families were adapted to SWH. Solar Water Heater are among the most successful green energy technologies adopted as compared to any other a green energy innovation and if taken seriously this will be one of the fastest adopting household entity. Saving of electricity through long time usage is main adoption driver of SWH. Easy financing with long term pay back facilities through financial institutions such as banks, taxation policies (such as tax benefits), after sales support and reliability of the performance of SWH, combining all together can bring significant acceleration in adoption. The study also inferred that, the solar water heaters have the capacity to save 1500 units of electric power annually, which is evaluated as the consumption of an electric geyser. The solar water heaters are environment friendly and follow the go green motive; it has the capability to prevent emission of 1.5 tonnes of carbon dioxide every year. Moreover, the increasing prices and increasing demands of the conventional energy also tend to make the people get attracted towards SWH.

Sharma, H. and Bhattarchaya, R. (2018) study was conducted to identify the factors of adoption and attitude towards solar energy in higher educational institutions in Kamrup district of Assam. The four important factors namely environmental friendly, saves Money, Techno-savvy group and social consciousness were identified which are related with adoption of solar energy and these four factors play a critical role in making an impact on consumer mind as why he should adopt solar energy over conventional energy.

Mohansundri, R and Devi, N (2018) studied the customer's attitude, preferences and their awareness about the usage of solar energy Products in Tirupur district of Tamilnadu and their evolution in the market trend. For the purpose of study 50 respondents were taken by using convenient sampling technique. It was found that the consumption of energy has been increasing in abundant amount and the customers have become more conscious about saving power and switching on to other sources of power like solar energy for their consumption. Customer's attitude towards solar energy products is definitely changing due to many valid reasons and also there has been a significant increase in the awareness and benefits of using solar energized products over electrical products in Tirupur district of Tamilnadu.

Gowrishanker, A. 2019 in his study on consumer awareness towards solar products with special reference to Nilgiri District of tamilnadu revealed that level of awareness about solar energy products is prevailing in market. It was also found that there is significant difference between gender and level of awareness about solar energy products prevailing in market.

Saini, R. and Devi, R., (2019) made a study on awareness and attitude towards solar energy in Kurukshetra (Haryana) revealed that Age and education level of consumer affects the awareness about solar energy system in rural as well as in urban areas. People with higher education level would have more knowledge and awareness about solar energy. They have also positive attitude towards solar energy.

Ayoub, S.,Dastigr, G. And Wagas, M., (2019) attempted to find the factors affecting consumer purchase intention for solar energy applications at domestic level in Pakistan. The objective of the study was to find the factors that affect the practical use of the solar energy at domestic level. After available literature, it was found that there are four factors that impact the consumer purchase intentions regarding the solar energy application at domestic level. All the four independent variables were analysed with the dependent variable of consumer purchase intentions, and it as found that all the four factors significantly impact the consumer purchase intentions. A cross sectional research design was used in study and data from 260 participants was collected through mix of systematic and convenient sampling. Consumer purchase intention is significantly affected by 4 factors namely usefulness of solar energy application, cost of using and purchasing solar energy application, perceived ease of use and attitude towards purchase of solar energy.

Kowsiga, S. and Tharangini, S.S.P., (2020) in his study on customer awareness towards alternative source of energy revealed that young people like to adopt solar energy products. Customers of age group 25-35 possess maximum awareness towards solar energy products usage. The relation between age of customer and the awareness possessed in utilizing the solar energy products was significant. It was also found that solar energy sector is growing and consumers are switching to solar energy devices.

II. Research Methodology

Research methodology is the set of different methods used to conduct successful research to reach conclusion and to solve the problem in hand. For the present study, primary as well as secondary data shall be used. For the collection of primary data, different solar energy equipment users (respondents) who are making use of solar energy devices. For this purpose, convenient random sampling technique will be used, and the data will be collected through well-designed questionnaires. To analyse the collected data various statistical test, tools will be used as per requirement of the study. The sources of secondary data will be a newspaper, magazines, online portals, official websites, articles, research papers, journals, annual reports, and various textbooks.
Sources of Data: Primary Data, Secondary data.

Research Design: Descriptive and exploratory

The study adopts survey method to collection of data. Study is mainly based on primary data. Respondents surveyed with well- prepared sequentially arranged and structured questionnaire and were asked to answer the question in questionnaire according to their preferences and perceptions about solar energy devices.

Sample Design

Respondents from 375 families of different villages of three districts of Himachal Pradesh are selected for the study.

Sampling Technique

Convenient random sampling technique will be used to collect the information from rural consumers. Convenient sampling attempts to obtain a sample of convenient element.

Research Instrument

Structured questionnaire will be framed and used to collect the primary data from the respondents as a research instrument to measure the various constraints and variables related to consumer behaviour towards Solar energy devices.

Data Analysis

The data collected is analyzed with the help of suitable technique descriptive, percentage, chi-square and F test.

Need and Scope of study

The study is conducted to cover the gap existing in literature regarding consumption of solar energy equipment's at domestic level in H.P. Variable such as customer purchase intention, , awareness, satisfaction will also be considered to fill the aim of study to cover the research gaps in the relevant field, the research issues which are proposed in the present research.

Objectives of study:

The study aims to get insight to following objectives under study..

- To study the buying behaviour of consumers using solar energy equipment.
- To analyze the overall satisfaction level of consumers towards solar energy equipment usage. data analysis and interpretation

In this section an attempt is made to break down and analyze information. Research is process of analysis, usage and drawing conclusions based on the collected data. Hence an attempt is made in this chapter to analyze and interpret the data collected regarding consumers' buying behavior towards solar energy equipments in H.P. The data has been collected from 375 respondents through the structured questionnaire.

Thus, in order to study the above objectives and to find out facts and figures on those objectives primary data have been collected from 375 respondents. The collected data have been analyzed with various statistical tools such as, cross table, simple percentage analysis, descriptive statistics, chi-square test, 'F' test,

RESEARCH OBJECTIVE - 1

Objective: To study the buying behavior of consumers using solar energy equipments.

The consumers buying behavior and perception towards using the solar energy products are analyzed with the various aspects viz., purchase decision maker in the family, source of information about the solar energy product, brands of solar product, duration of using solar energy product, opinion about the price of the product, place of purchased, reasons for buying, opinion about the subsidy received, opinion about promotion of manufacturing and promotional activity. These variables are analyzed with the help of cross table, simple percentage analysis and graphical presentation.

SOURCE OF INFORMATION ABOUT SOLAR ENERGY PRODUCT

Information search means data that induces the consumer to construct or alter an existing decision process for the relevant product, including raw data, encoded symbols, and any other data capable of representing reality to the decision maker. Hence, consumer makes information search to obtain all relevant facts that could provide satisfactory solution to the problem.

TABLE 4.1

SOURCE OF INFORMATION ABOUT SOLAR ENERGY EQUIPMMENTS

Source of Information	No. of Respondents	Percentage of Respondent
Media Advertisement	**10**	**2.67**
Manufacturer Advertisement	**40**	**10.67**

Articles in newspaper/ Books/ Magazines	**50**	**13.87**
Through Agent	**61**	**16.40**
Energy Conservation Programmes	**80**	**21.33**
Through Internet	**48**	**12.67**
Social Networks	**64**	**17.07**
Seen Installed Around My House	**11**	**2.40**
Friends and Relatives	**11**	**2.93**
Total	**375**	**100.00**

Source: Primary data

It is stated from the Table 4.1 that, out of 375 respondents, 21.33 per cent of the respondents are known about solar energy equipments from energy conservation programmes, 17.07 percent of the respondents are known about solar energy equipment from social networks, 16.40 percent of the respondents are known about solar energy product from agents, 13.87 percent of the respondents are known about solar energy equipment from articles in newspaper/ books/ magazines, 12.67 per cent of the respondents are known about solar energy equipment from internet, 10.67 per cent of the respondents are known about solar energy equipment from manufacturer advertisement, 2.93 per cent of the respondents are known about solar energy equipment from friends and relatives, 2.67 per cent of the respondents are known about solar energy equipment from media advertisement, and 2.40 per cent of the respondents are known about solar energy equipment from seen installed around my house.

It is concluded that majority (21.33%) of the respondents are known about solar energy equipments from energy conservation programmes.

PERIOD OF USING THE SOLAR ENERGY PRODUCTS BY THE RESPONDENTS

The decision process and physical activity individuals engage in when evaluating, acquiring, using of solar energy products. The following analysis discusses about the period of using the solar energy equipments by the respondents. For the purpose of the study, it has been classified into four categories viz., Below 1 year, 1 - 2 years, 2 - 3 years and Above 3 years. The details are furnished in the following Table 4.14.

TABLE 4.2

PERIOD OF USING THE SOLAR ENERGY EQUIPMENTS BY THE RESPONDENTS

Period of using Solar Energy	No. of Respondents	Percentage of Respondents
Below 1 year	**82**	**23.20**
1 – 2 years	**83**	**18.13**
2 - 3 years	**141**	**38.80**
Above 3 years	**69**	**19.87**
Total	**375**	**100.00**

Source: Primary data

It is stated from the Table 4.2 that, out of 375 respondents, 38.80 per cent of the respondents are using solar energy equipments from 2 to 3 years, 23.20 per cent of the respondents are using solar energy equipments below 1 year, 19.87 per cent of the respondents are using solar energy equipments more than 3 years and 18.13 per cent of the respondents are using solar energy equipments from 1 to 2 years.

It is concluded from the analysis that maximum (38.80%) of the respondents are using solar energy equipments from 2 to 3 years.

OPINION ABOUT THE PRICE OF THE PRODUCT

The price is the only factor which kindles the buyers to make a final decision in purchasing the product. It is must to study the opinion about the price of the product in the minds of the consumer. The details are furnished in the following Table 4.14.

TABLE 4.3

OPINION ABOUT THE PRICE OF THE PRODUCT

Opinion about the price of the product	No. of Respondents	Percentage of Respondents
High	**143**	**24.80**
Moderate	**112**	**29.73**
Reasonable	**97**	**25.87**
Low	**73**	**19.60**
Total	**375**	**100.00**

Source: Primary data

It is clear from the Table 4.3 that, out of 375 respondents, 29.73 per cent of the respondent feel that the price of the product is moderate, 25.87 per cent of the respondent feel that the price of the product is reasonable, 24.80 per cent of the respondents feel that the price of the products is high, and 19.60 percent of the respondents feel that the price of the products is low. It is concluded from the analysis that most (29.73%) of the respondents feel that the price of the product is moderate.

PURCHASING PLACE OF SOLAR ENERGY EQUIPMENTS

In today's world, purchasing place is defined as public convenience in their door steps, the right source should be utilised for delivering the product to the right place at the right time. In order to study, the consumer behaviour it is must to study the opinion about the purchasing place of the product in the minds of the consumer. The details are furnished in the following Table 4.4

TABLE 4.4 PURCHASING PLACE OF SOLAR ENERGY EQUIPMENTS

Purchasing Place of Solar Energy Products	No. of Respondents	Percentage of Respondent
Local Electrical Shops	**41**	**10.80**
Showroom	**114**	**30.53**
Online Shopping	**158**	**42.13**
Direct Agent	**62**	**16.53**
Total	**375**	**100.00**

Source: Primary data

It is clear from the Table 4.4 that, out of 375 respondents, 42.13 percent of the respondents are purchasing the products in online shopping, 30.53 per cent of the respondents are purchasing the products in showroom, 16.53 per cent of the respondents are purchasing the products from direct agents and 10.80 per cent of the respondents are purchasing the products in local electrical shops.

It is concluded from the analysis that majority (42.13%) of the respondents are purchasing the products in online shopping

REASONS FOR BUYING THE SOLAR ENERGY EQUIPMENTS

Solar energy is that it represents a clean, green source of energy. Solar power is a great way to reduce your carbon footprint. There's nothing about solar power that pollutes mothers nature, doesn't release any greenhouse gases, given clean water to function and eco-friendly. In order to study, the consumer behavior it is must to study the reason for buying the solar energy products. The details are furnished in the following Table 4.17.

TABLE 4.5 REASONS FOR BUYING THE SOLAR ENERGY EQUIPMENTS

Reasons for Buying	Level of Agreement					Total
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Government schemes such as loans, subsides and rebate on tax	**15** **4.13%**	**31** **8.27%**	**53** **14.00%**	**151** **40.40%**	**125** **33.20%**	**375** **100.00%**
My friends/ relatives/ neighbor is using it	**15** **3.87%**	**49** **13.20%**	**103** **27.47%**	**154** **41.07%**	**52** **14.40%**	**375** **100.00%**
Shorter payback period (3-4 years)	**43** **11.47%**	**75** **20.00%**	**50** **13.47%**	**241** **32.13%**	**172** **22.93%**	**375** **100.00%**
It is Affordable	**36** **4.80%**	**113** **15.07%**	**264** **35.20%**	**220** **29.33%**	**117** **15.60%**	**375** **100.00%**
My Engineer suggested me	**32** **53 7.07%**	**55** **14.67%**	**132** **35.20%**	**98** **24.40%**	**70** **18.67%**	**375** **100.00%**

Source: Primary data

From the Table 4.5, indicated that, out of 375 respondents selected for the study, 4.13 per cent of them are strongly agree, 8.27 per cent of them are agree, 14.00 per cent of them are neutral, 40.40 per cent of them are disagree, 33.20 per cent of the respondents are strongly disagree about the government schemes such as loans, subsides and rebate on tax. Among 750 respondents, 3.87 per cent of them are strongly agree, 13.20 per cent of them are agree, 27.47 per cent of them are neutral, 41.07 per cent of them are disagree 14.40 per cent of the respondents are strongly disagree about the friends, relatives using the solar energy products. Out of 750 respondents, 11.47 per cent of them are strongly agree, 20.00 per cent of them are agree, 13.47 per cent of them are neutral, 32.13 per cent of them are disagree and 22.93 per cent of the respondents are strongly disagree about the shorter payback period. In case of 750 respondents, 4.80 per cent of them are strongly agree, 15.07 per cent of them are agree, 35.20 per cent of them are neutral, 29.33 per cent of them are disagree and 15.60 per cent of the respondents are strongly disagree about the affordable. Out of 750 respondents, 7.07 per cent of them are strongly agree, 14.67 per cent of them are agree, 35.20 per cent of them are neutral, 24.40 per cent of them are disagree, 18.67 per cent of the respondents are strongly disagree about the engineer suggested the solar energy products.

OPINION ABOUT THE FEATURES OF THE SOLAR ENERGY PRODUCTS

Consumers' develop expectations of products and services prior to adoption based on product features. Understanding consumers' opinion towards the features of solar energy products provides the key benefits such as string the weakness can be identified and managed effectively and clear marketing strategy can be framed. Thus, consumers' opinion about the features of solar energy products is analyzed and presented in Table 4.6

TABLE 4.6

OPINION ABOUT THE FEATURES OF THE SOLAR ENERGY PRODUCTS

Features of the Solar Energy Products	Responses		Percent of Cases
	No of Respondent	Percent	
Energy Saving	449	13.13%	67.62%
Cost effective	456	13.33%	68.67%
Long Life	376	10.99%	56.63%
Safety while Using (Operative safety)	361	10.56%	54.37%
Subsidized price	338	9.88%	50.90%
Good Quality	316	9.24%	47.59%
Environment Friendly	403	11.78%	60.69%
Brand Name	415	12.13%	62.50%
Tax Benefits	306	8.95%	46.08%
Total	3420	100.00%	515.06%

Source: Primary data

From the above Table 4.6, it is observed that consumers' multiple opinions about the features of their solar energy equipments in the study, 13.33 per cent of the respondents stated that the solar energy product is cost effective, 13.13 per cent of the respondents stated that the solar energy product saves energy, 12.13 per cent of the respondents stated that brand name, 11.78 per cent of the respondents stated that environment friendly, 10.99 per cent of the respondents stated that the product can be utilized for long life, 10.56 per cent of the respondents stated that safety, 9.88 per cent of the respondents stated that subsidized price, 9.24 per cent of the respondents stated that good quality and 8.95 per cent of the respondents stated that tax benefited products.

PROMOTIONAL ACTIVITIES TO ENHANCE SOLAR ENERGY CONSUMPTION

The promotional activities to enhance solar energy consumption to be implemented by the government to encourage solar energy products is analyzed and presented in the Table 4.7

TABLE 4.7

PROMOTIONAL ACTIVITIES TO ENHANCE SOLAR ENERGY CONSUMPTION

Promotional Activity	Level of Opinion					Total
	Very High	High	Moderate	Low	Very Low	
Advertisement through mass media/Social Network	65 8.67%	85 11.33%	122 16.27%	235 31.33%	243 32.40%	375 100.00%
Free Demonstration	75 10.00%	109 14.53%	176 23.47%	243 32.40%	147 19.60%	375 100.00%
Free exhibitions to be conducted to the public	66 8.80%	136 18.13%	256 34.13%	184 24.53%	108 14.40%	375 100.00%
Solar products to be provided as freebie by the government	66 8.80%	137 18.27%	259 34.53%	182 24.27%	106 14.13%	375 100.00%

Source: Primary data

From the Table 4.7, it is indicated that, out of 375 respondents, 8.67 per cent of them have very high level of opinion, 11.33 per cent of them have high level of opinion, 16.27 per cent of them have moderate level of opinion, 31.33 per cent of them have low level of opinion, and 32.40 per cent of them have very low level of opinion about advertisement through mass media/social network. Among 750 respondents, 10.00 per cent of them have very high level of opinion, 14.53 per cent of them have high level of opinion, 23.47 per cent of them have moderate level of opinion, 32.40 per cent of them have low level of opinion, and 19.60 per cent of them have very low level of opinion about free demonstration. In case of 750 respondents, 8.80 per cent of them have very high level of opinion, 18.13 per cent of them have high level of opinion, 34.13 per cent of them have moderate level of opinion, 24.53 per cent of them have low level of opinion and 14.40 per cent of them have very low level of opinion about free exhibitions to be conducted to the public. Out of 750 respondents, 8.80 per cent of them have very high level of opinion, 18.27 per cent of them have high level of opinion, 34.53 per cent of them have moderate level of opinion, 24.27 per cent of them have low level of opinion and 14.13 per cent of them have very low level of opinion about solar products to be provided as freebie by the government.

RESPONSE OF THE DEALER/ INSTALLER WHEN CONTACTED

The dealer/installer response plays a significant impact on consumers' buying behaviour. Consumer's opinion has great influence on his buying behaviour which in turn, depends about the dealer / installer of the solar energy products is analyzed and presented in the Table 4.8.

TABLE 4.8 RESPONSE OF THE DEALER/ INSTALLER WHEN CONTACTED

The Dealer/ Installer Response	No of respondents	Percentage of respondents
Prompt and informative	**152**	**40.53**
Delayed and uninformative	**223**	**59.47**
Total	**375**	**100.00**

Source: Primary data

From the Table 4.8, it is observed that, out of 375 respondents, 59.47 percent of the respondents have opinions about the dealer / installer delayed and uninformative, 40.53 per cent of the respondents have opinions about the dealer / installer always prompt and informative. It is concluded that more than (59.47) % of the respondents have opinions about the dealer/ installer was delayed and uninformative.

PERFORAMANCE OF THE MARKETING EXECUTIVE

Level of performance of the marketing executive is often tied to consumer attitude and preferences. Performance of the marketing executive is a powerful influence on consumer behaviour, it is analyzed and presented in the Table 4.9.

TABLE 4.9 PERFORMANCE OF THE MARKETING EXECUTIVE

Performance of the Marketing Executive	No of respondents	Percentage of respondents
Sufficient	**151**	**40.27**
Insufficient	**224**	**59.73**
Total	**375**	**100.00**

Source: Primary data

From the above Table 4.21 shows that, out of 375 respondents, 59.73 per cent of the respondents did not get sufficient informative materials from the marketing executive, 40.27 per cent of the respondents get sufficient informative materials from the marketing executive.

It is concluded from the analysis that majority (59.73) % of the respondents did not get sufficient informative materials from the marketing executive.

PERFORMANCE OF THE MANUFACTURER

Outstandingly in today's competitive networking world the manufacturer plays an important role to achieve the marketing goals. Therefore, performance of the manufacturer influence purchase decisions and buying behaviour is analyzed and presented in Table 4.10.

TABLE 4.10

PERFORMANCE OF THE MANUFACTURER

Performance of the Manufacturer	No of respondents	Percentage of respondents
Good	136	36.27
Better	168	44.80
Bad	71	18.93
Total	375	100.00

Source: Primary data

From the above Table 4.10 indicated that, out of 375 respondents, 44.80% of the respondents gave a better opinion about the manufacturer regarding their information, 36.27% of the respondents gave a good opinion about the manufacturer regarding their information, and 18.93% of the respondents gave bad opinion about the manufacturer regarding their information.

It is concluded from the analysis that majority (44.80 %) of the respondents gained a better knowledge about the information provided by the manufacturer.

MODE OF BUYING THE SOLAR ENERGY PRODUCTS

Consumer preference and attitude can change promptly especially when people become briskly aware of trends and mode of buying and paying in different balancing methods. Thus, mode of buying the solar energy products by the consumers is analyzed and presented in the Table 4.11.

TABLE 4.11

MODE OF BUYING THE SOLAR ENERGY PRODUCTS

Mode of Buying	No of respondents	Percentage of respondents
Purchase on Cash	**165**	**44.00**
Purchase on Instalments	**119**	**31.73**
Loan with Government subsidy	**73**	**19.47**
Loan without Government Subsidy	**18**	**4.80**
Total	**375**	**100.00**

Source: Primary data

From the above Table 4.11 it is observed that, out of 375 respondents, 44.00 per cent of the respondents purchased the product on cash, 31.60 per cent of the respondents purchased the products on instalments, 19.47 per cent of the respondents purchased the products on loan with government subsidy and 4.93 per cent of the respondents purchased the products on loan without government subsidy.
It is concluded from the analysis that most 44.00 % of the respondents purchased the product on cash.

MODE OF PAYMENTS

Ultimately what's essential is to identify why, in the array of choices consumers have, they would want to buy your product in different mode of payments. Therefore, the mode of payment on the solar energy products by the consumers is analyzed and presented in the Table 4.12.

TABLE 4.12 MODE OF PAYMENTS

Mode of Payment	No of respondents	Percentage of respondents
Online Payment	**81**	**21.60**
Cash	**187**	**49.86**
Credit/Debit card	**94**	**25.06**
Net Banking	**13**	**3.46**
Total	**375**	**100.00**

Source: Primary data

From the above Table 4.12 it is observed that, out of 375 respondents, 49.86 per cent of the respondents have paid their payment on cash, 21.60 per cent of the respondents have paid their payment through online, 25.06 per cent of the respondents have paid their payment through credit / debit card and only 3.46 per cent of the respondents have paid their payment through net banking while buying the solar energy products.
It is concluded from the analysis that majority (49.86%) of the respondents have paid their payment on cash.

RESEARCH OBJECTIVE - 2

Objective: To analyze the overall satisfaction level of consumers towards solar energy equipments.

To analyze the overall satisfaction level of the consumers towards solar energy equipnents and the relationship between demographic factors and level of satisfaction towards solar energy products by the sample consumers in the study area are analyzed with the help of cross table, Descriptive, Chi-Square Test, ANOVA Test,

LEVEL OF SATISFACTION TOWARDS SOLAR ENERGY EQUIPMENTS

The consumer's satisfaction about the solar energy products was obtained using the methods of total rating, especially using the five-point Rensis Likert's scale. Accordingly, 30 statements are provided explaining the various satisfactions of solar energy EQUIPMENTS, and consumer receive an assessment of their satisfaction for each statement.

As a result, the value of the score is assigned as follows: '5' – Highly Satisfied, '4' – Satisfied, '3'– Neutral, '2'– Dissatisfied, '1'– Highly Dissatisfied. Thus, the total score is calculated for 30 statements, and for all statements the individual score of consumer is calculated. The value of the score varies from 30 to 150. Based on the value of the score, the consumer satisfaction is evaluated in three ways: Low (score value up to 89), Medium (score is 90) and High (score value from 91 to 150). The distribution of the consumer satisfaction is presented in Table 4.13

TABLE 4.13

LEVEL OF SATISFACTION SCORE

Level of Satisfaction	N	% of Total N	Sum	Mean	Std. Deviation	Minimum	Maximum
Low	**179**	**47.73%**	**10653**	**59.51**	**20.62**	**30**	**89**
Medium	**109**	**29.07%**	**9810**	**90.00**	**0.00**	**90**	**90**
High	**87**	**23.20%**	**11755**	**135.12**	**19.78**	**91**	**150**
Total	**375**	**100.00%**	**3222**	**85.91**	**34.55**	**30**	**150**

Source: Primary data

Table. 4.13 show that, the consumer satisfaction on solar energy equipments. Out of 375 respondents selected for the study, 47.73% have low, 29.07% have medium, and 23.20% have high level of satisfaction. Then the average value of the satisfaction is 59.51 with low satisfaction, 90.00 with neutral satisfaction and 135.12 with high satisfaction with the standard deviation of 20.62, 0.00 and 19.78 respectively.

5.1 FINDINGS OF THE STUDY

RESEARCH OBJECTIVE –

Objective: To study the buying behavior of consumers using solar energy products. It is observed from the analysis that majority (21.33%) of the respondents are known about solar energy product from Energy Conservation Programmes. It is concluded from the analysis that maximum (38.80%) of

the respondents are using solar energy products from 2 to 3 years. It is found from the analysis that most (29.73%) of the respondents feel that the price of the product is moderate. It is observed from the analysis that most (42.13%) of the respondents are purchasing the product in online shopping. It is clear from the analysis that maximum (40.40%) of the respondents are disagree about the government schemes such as loans, subsides and rebate on tax. It is found from the analysis that most (41.07%) of the respondents are disagree for buying the solar energy products through friends, relatives, neighbor is using it. It is observed from the analysis that maximum (32.13%) of the respondents are disagree about the shorter payback period. It is clear from the analysis that most (35.20%) of the respondents are neutral about the affordable price of the product. It is identified from the analysis that maximum (35.20%) of the respondents are neutral about the engineer suggested the solar energy product. It is found from the analysis that maximum (13.33%) of the respondents stated that the cost of the solar energy product is effective. It is clear from the analysis that most (32.40%) of the respondents have very low level of opinion about advertisement through mass media/social network. It is observed from the analysis that maximum (32.40%) of the respondents has low level of opinion about free demonstration. It is clear from the analysis that maximum (34.13%) of the respondents have moderate level of opinion about free exhibitions to be conducted to the public. It is observed from the analysis that most (34.53%) of the respondents have moderate level of opinion about solar products to be provided as freebie by the government. It is found from the analysis that most (59.47%) of the respondents have opinions about the dealer/installer delayed and uninformative. It is observed from the analysis that maximum (59.73%) of the respondents did not get sufficient informative materials from the marketing executive. It is found from the analysis that maximum (44.80%) of the respondents gave a better opinion about the manufacturer regarding their information. It is clear from the analysis that most (44.00%) of the respondents purchased the product on cash. It is observed from the analysis that maximum (49.73%) of the respondents have paid their payment on cash. 21.60% of the consumers have paid their payment through online, 49.73% of the consumers have paid their payment on cash, 25.20% of the consumers have paid their payment through credit / debit card and only 3.47% of the consumers have paid their payment through net banking while buying the solar energy products.

The calculated chi-square values of gender, age, marital status, educational qualifications, occupation, family monthly income, family type and family size are greater than the tabulated values. So, the null hypothesis of a 5 percent significance level is rejected and concludes that there is a significant relationship between the gender, age, marital status, educational qualifications, occupation, family monthly income, family type and family size of the consumer and their level of satisfaction regarding the perception of solar energy products. That 66% of the differences in satisfaction towards the solar energy equipments are explained by all independent variables. The nine independent variables included in the study influence consumer satisfaction towards the solar energy products. Of which four variables, such as age of the consumer, educational qualifications of the consumers, occupation of the consumers, and family type of consumers were statistically significant at 5%.

5.3 SUGGESTIONS

Based on the findings of the study the following suggestions are offered to increase the usage of solar energy equipment in the study area. The suggestions are also proposed to promote the solar equipments both in the study area and in other areas of India, as well. The study observed that majority of the sample population is under the age category of 31- 40 years and married. So it is recommended that, the makers and marketers of sun based energy items should focus on more youngsters.

As many of them are residing in hostels and separate homes for education, training, business and other purposes, the potential for products like heaters, chargers, lighting panels is rich among these people.

The study also have observed that majority of the consumers surveyed are with post graduate qualifications. Thus, it is proposed to frame a marketing strategy to cover other peoples as they may not aware of the solar products, though with good potential and eager to buy these electricity compromising products.

Government employees and government offices may put more efforts to promote solar energy equipments, so that facts about the importance of fossil fuels and its exhaustion can be injected easily.

Marketers should take care to aware, acquire and access the customer by increasing satisfaction level towards solar energy Products. Manufacturer must encourage customers for purchasing the product by sales promotion, advertisement through TV and other media techniques such as social network and mass media to take the product to a different level.

The focus should be on customer value by satisfying consumer's needs, both manufacturers and marketers of solar energy products have to effectively frame methodologies to sell the solar inventors, solar lantern, water purifiers, car battery chargers, power generation systems etc., among the commercial establishment and educational institutional customers. Solar manufacturing companies should attract the minds of the public that the solar products are eco-friendly, safe to use and involves low maintenance costs. Marketing is all about providing value to your customers. So, the marketing strategies should be focused on customer needs. Thus the marketing organization should design the strategies in such a way that it must be close to the ultimate consumers Marketers need to follow trends of the customer and respond to the product development and innovation. Price is considered most important criteria for purchasing decision, so pricing strategy should be focused on building suitable price strategy accordingly . . It is suggested to the manufacturers to go for small and compact solar energy equipments Proper disclosure of terms of credit and price information help in building up confidence on the retailer and ultimately lead to good customer-retailer relationship.

After sales service is a way through which the customers can be attracted. It also plays an important role in customer satisfaction and customer retention and brand value. It is proposed to the marketing companies to enhance after sales services.

The government and manufacturer can promote solar oriented items, by expanding its deals through exchange fairs, presentations and trade shows, where a salespersons can straight forwardly contact the clients and can clarify the significance of these items, monetary utilization, esteem for cash idea, ecological safety measures and securities and the advantages of utilizing elective energy and so on. Attractive and simple hand books on solar energy equipments can be supplied to the public and prospective buyers to educate and elite them to go for these products

5.4 CONCLUSION

The Present Study will enable the solar energy equipments marketers to leverage the hidden opportunities in Market. The marketers can gain insight into finding mentioned in the study and accordingly frame marketing strategy mention in the study to tap consumer in selected district of H.P. in most appropriate manner.

5.5 SCOPE FOR FURTHER RESEARCH

This study is subjected to few practical limitations. The researcher firmly feels that the limitations should be taken care of in future studies in order to deliver new and better outcome. The present study is restricted to shorter geographical area and small sample of just 375 respondent solar energy users. The future studies can be conducted with the large population size and sample size. The present study made an attempt to analyze the buying behavior and satisfaction towards solar energy equipments with special reference to selected Districts of H.P. alone.

Future study can be carried out regarding the availability of renewable energy resource in order to save energy. This study can be extended in other parts of the State to know about the buying behavior and satisfaction towards solar energy equipments.

The study can be focused at the national level to know the different perception, attitude, awareness on solar energy equipments among the consumers. Future studies can concentrate on various marketing strategies of solar energy can be focused in a detail manner. A comparative analysis can be made between conventional and non – conventional sources of energy.

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