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CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

I CONCLUSIONS

8.1 Summary

The study is related to consumer buying behaviour for solar energy equipments. This study highlights various facts about the consumer buying behaviour and the responses of the consumers towards use of solar energy equipments.

In this study, researcher had analyzed the causes of poor response to solar energy equipments, studied the reasons for failure of marketing communication in attracting consumers towards the solar energy equipments. The study was limited to Maharashtra state but the suggestions offered may be useful to other places also. This chapter gives the outline of what was done to accomplish the objectives of this study and whether the hypotheses are proved. Before putting up conclusions and recommendations the detailed outline of the study is summarized as follows:

Chapter I: In this chapter researcher had presented the area of study and brief review about the purpose of the study. The researcher had given introduction of non-conventional and renewable energy sources; the brief idea of the need of non conventional energy sources, in rationale of the study researcher had discussed the reasons for taking up this study, in statement of the problem researcher had discussed the what is the view of this study has for finding certain solution, and chapter scheme for the thesis.

Chapter II: This chapter deals with the research methodology and describes the research objectives, hypotheses, scope and limitations of the study. The following objectives are set for the study:

Objectives:

- To study the consumers’ buying behaviour and perceptions about solar energy equipments.
To know and analyse the causes of poor response to solar equipments.

To study the marketing efforts of the organizations to attract the consumers.

To make suggestions for enhancing the use of solar equipments.

To study the reasons of failure of marketing communication by various agencies.

**Hypotheses:**

For this study following hypotheses were set-

- The initial investment in the solar systems is the key criteria while selecting the solar equipments.
- The effective marketing communication of the organization has impact on buying behaviour of the customers of solar equipments.
- The social status of the consumer has impact on buying behaviour of the consumers of solar equipments.
- Despite of knowing the benefits of solar equipments customers are not willing to buy solar equipments.

**Chapter III:** This chapter is about literature review. It contains the previous studies and findings which are reviewed. This gives an academic touch to the study. The chapter aims at providing an overview of the research performed on consumer buying behavior and consumer buying behaviour of solar products by other scholars. The consumer’s buying behaviour is influenced by cultural, social, personal, and psychological factors. Sometimes even consumer may not be aware about his deeper motivations and the reason ‘why’ of buying and may change his mind. Researcher had discussed various models of consumer buying behaviour and decision process like model of consumer buying decision by Schiffman and Kaunk, David & Bitta and Philip Kotler.

**Chapter IV:** This chapter deals with Profile of Study Area. The History, Geographical conditions, industry, agriculture, economy, educational institutions, industries, transportation etc. are described and studied. The State has 35 districts which are divided into six revenue divisions, Konkan, Pune, Nashik, Aurangabad, Amravati and Nagpur for administrative purposes. These 35 districts are further divided into 109 sub-divisions of the districts and 355
talukas. The state’s contribution in country’s industrial output is 13%. There is huge requirement of energy for the development of energy.

**Chapter V:** This chapter deals with the profile the renewable energy status in the world, India and state. Researcher had taken overview of global renewable energy scenario. There is significant growth in installed renewable energy capacity in last decade around the world. In India Tamil Nadu, Karnataka, Andhra Pradesh, Gujarat, Maharashtra, Rajasthan and Himachal Pradesh are the state contributing almost 80% of the installed renewable energy capacity. About Maharashtra state there are 250-300 days of clear sun with an available average radiation of 4 to 6 kWh/sq.meter over a day. There is a capacity to generate 1.5 million units/MW/year through solar photovoltaic systems & up to 2.5 million units/MW/ year through solar thermal systems (MEDA, 2012).

**Chapter VI:** The chapter deals with analytical study of the data collected through questionnaires dealing with Individual users. In this chapter the researcher had applied the statistical techniques to test the hypotheses.

**Chapter VII:** The chapter deals with analytical study of the data collected through questionnaires dealing with institutional users. In this chapter the researcher has applied the statistical techniques to test the hypotheses.

**Chapter VIII:** The last chapter comprises the summarized study, the conclusion and recommendations of the study.

8.2. **Conclusions for individual consumers:**

I. The first hypothesis for the study is “The initial investment in the solar systems is the key criteria while selecting the solar equipments.”

For testing this hypothesis researcher had collected data from respondents across Maharashtra state randomly.

1. The researcher had tested the above data at 5% significant level. The computed Chi-square value for above data 27.635 is greater than table value 9.488 for 4 degree of freedom. Thus, there is an association between variables or there is significant relationship between the variables. Hence hypothesis is accepted.
2. Researcher had divided individual consumers in users and non user groups, data collected shows that more than 85% users are having income above Rs. 2 lakh. (Table 6.5, page no 97). Table no. 6.26, on page no 123 shows that 78.2 % user respondents are highly dissatisfied about the prices of the solar energy equipment, table no.6.27 on page 124 shows total 80.4% user respondents are not satisfied regarding cost of installation. It is very clear from these tables that though consumers are using solar energy equipments maximum respondents are dissatisfied about initial investment required for the solar energy equipment.

3. With respect to non users 55.7 % non user respondents are below Rs. 2 lakh income, 70.1% were aware about the benefits of solar energy equipments but 90.2% nonuser respondents say that they will not purchase solar system in future. 48.2% non user respondents said major reason for not buying solar energy equipment is its high initial price. Despite of knowing the benefits of using solar energy equipments 90.2 % respondents were not ready to buy solar systems and major reason is the high prices of the solar energy equipments.

4. It is found that maximum i.e. 78.2% respondents were highly dissatisfied about the prices of the solar energy equipments. This is mainly due to high initial cost of the solar energy equipments.

5. 50% respondents are highly dissatisfied and 30.4% respondents (total 80.4%) were somewhat dissatisfied regarding cost of installation which adds up to initial investment.

The above data analysis shows that there is significant relationship in the parameters hence **Hypothesis is accepted.**

II. The second hypothesis for the study is “**The effective marketing communication of the organization has impact on buying behaviour of the customers of solar equipments.**”

For testing this hypothesis researcher had collected data from respondents across Maharashtra state randomly.
1. The researcher had tested the above data at 5% significant level. The computed Chi-square value for above data 3.415 is lesser than table value 3.841 for 1 degree of freedom. Thus, the variables are not dependent or there is no significant relationship between the variables. **Hence hypothesis is rejected.**

2. Most of the respondents (30.2%) came to know about the solar equipment after seeing installed system in their area followed by 26.9% of respondents came to know about the solar equipment and its uses through their Friends / Social circle. Some of the respondent (18.2%) are came to know about the solar equipment and its uses through advertisement by media or govt. Few of the respondents (5%) came to know about the solar equipment and its uses through articles in newspapers / books and only 13% respondents came to know about solar system through advertisement by the manufacturer. This shows that; very less percentage of consumers is getting marketing communication by manufacturers and consumers are buying solar equipments.

3. After getting information about the product consumers try to get information about the uses and benefits of the product. Most of the user respondents (78.6%) are not aware of the proper use of solar equipment. Marketing executives are the people who interact with consumers directly for giving information about the product. 68% of user respondents were not provided with sufficient information related to the product and still consumers had bought the product.

4. Solar energy equipment is not ready to use equipment; it has to be installed at proper place at proper angle which will ensure its effective and efficient functioning. Every site/house is not identical in all the respect. Marketing executive plays vital role in solar energy equipments marketing. His job is to evaluate the possibility of installation and educate consumer. Maximum i.e. 68% of the respondents opined that information and informative material provided by marketing executive was not sufficient.

All above observation and analysis of the data clearly supports the results of hypothesis testing that ‘there is no effect of marketing
communication on consumers buying behaviour’ Hence hypothesis is rejected.

III. The third hypothesis for the study is “The social status of the consumer has impact on buying behaviour of the consumers of solar equipments.”

For testing this hypothesis researcher had collected data from respondents across Maharashtra state randomly.

1. The researcher had tested the above data at 5% significant level. The computed Chi-square value for above data 15.177 is greater than table value 7.815 for 3 degree of freedom. Thus, the variables are dependent or there is significant relationship between the variables. Hence hypothesis is accepted.

2. Table no 6.51 shows various income groups’ data from income point of view. It shows that low income group i.e. up to Rs. 2,00,000. has maximum (69.9%) non users where as all other higher income groups have maximum users i.e. 70.4% for income between Rs.2,00,001 to Rs.4,00,000 , 87.1% for income between Rs.4,00,001 to Rs.6,00,000and 82% for income above Rs.600001. This supports the results of hypothesis testing.

All above observation and analysis of the data clearly supports the results of hypothesis testing that “The social status of the consumer has impact on buying behaviour of the consumers of solar equipments.” Hence hypothesis is accepted.

IV. The fourth hypothesis for the study is “Despite of knowing the benefits of solar equipments customers are not willing to buy solar equipments”.

For testing this hypothesis researcher had collected data from respondents across Maharashtra state randomly.

1. Most of the non-user respondents (70.1%) were aware of the benefits of solar-equipment and 29.9 % of the respondents were not aware of the benefits of solar-equipment. It also seen that most of the respondents (92.2%) had not thought of installing solar
system in near future and only few of the respondents representing 7.8% had thought of installing solar system in future.

2. Researcher had divided respondents in two categories as those who were aware about the benefits of solar energy equipments and those who did not know the benefits of solar energy equipments. Data was then tabulated in table no. 6.53. It inferred from the table no 6.53 that maximum of respondents i.e. 89.6% from those who were aware about the benefits of the solar equipments are not willing to buy solar systems in future.

All above observation and analysis of the data clearly supports the statement that despite knowing the benefits of solar energy equipments customers are not willing to buy solar energy equipments. **Hence hypothesis is accepted.**

V. Consumer buying behaviour:

1. People are becoming more and more energy conscious and solar equipments are becoming an essential part of the household as television, refrigerator and washing machine. It is observed that majority of respondents (61.60%) were using solar energy equipments and only 38.40% were non users of the solar energy equipments.

2. Amongst the users of solar energy equipment it was observed that maximum respondents were from 31 to 40 yrs age group (table no. 6.2). This is the high time in life where a person starts thinking about settling in life and tries to buy a household or utilise earnings very carefully so that maximum benefits are achieved. Investment in buying solar energy equipment gives lot of benefits in long term; as the energy utilised is free of cost and results in direct saving of energy. Maximum number of non-users i.e. 80.7% belongs to 21 to 30 yrs age group (table no. 6.38). This is the age when a person is at the beginning of career, planning for marriage and searching for a permanent job. There is more of instability which might be the major cause for having more non users in this age group. **Hence it can be**
said that age of the consumer affects in buying solar energy equipments.

3. It is found out that amongst users; graduates i.e. 30.4% and undergraduates 31.2% (table no. 6.3) constitute large part and in non-user also graduates i.e. 39.6% and undergraduates 30.2% (table no. 6.39) constitute large part. Hence it can be concluded that educational qualification does not affect the buying of the solar energy equipments.

4. The ultimate outcome of the buying behaviour is the last stage; decision to buy or not. Table no. 6.51 shows various income groups’ data from income point of view for users and non-users. It shows that low income group i.e. up to Rs. 2,00,000 has maximum i.e. 69.9% non-users whereas all other higher income groups have maximum users i.e. 70.4% for income between Rs.2,00,001 to Rs.4,00,000, 87.1% for income between Rs.4,00,001 to Rs.6,00,000 and 82% for income above Rs.600001. Researcher had tested data for relationship with Chi-square test, the test shows that there is significant relationship between income level and decision to buy solar energy equipment. This can further be checked with the following tables based on responses of users and non-users. Users had taken decision to buy and non users had not bought the equipments after going through the process. This supports the results of hypothesis testing hence the hypothesis is accepted. One of the reasons for this is the higher initial costs of solar energy equipments. Lower middle class people need this kind of equipments but they have constrains due to high initial cost.

5. Basically solar energy now a days has many applications and many solar appliances are available in the market but they are not much popular and do not have a customer base hence researcher had selected four major equipments; two from thermal application and two from photovoltaic applications. It was found that maximum i.e. 67%
of users are using Solar Water Heaters, 20% are using Solar Cooker, very less i.e. 12.8% combined are using photovoltaic applications. This shows that consumers prefer thermal applications over photovoltaic applications. The thermal applications do not have any part which needs regular maintenance and replacement or replenishment but photovoltaic applications have battery which needs maintenance and replacement after regular interval. This particular aspect increases the running cost; this adds up to already high initial cost.

6. Awareness about the proper uses of any equipment after buying or during buying leads to lack of awareness about taking maximum output from the equipment. It was found out that 78.6 % of the users were not aware about the proper use of the solar energy equipments.

7. Whenever a person decides to buy anything he/she has some information regarding the product which is derived from various resources. The researcher had found out that maximum users (30.2%) came to know about the solar energy equipments when they saw such equipments installed at houses around. The second number source is the friends and social circle (26.9 %). The least i.e. 5% respondents came to know from articles. The other sources like advertisements by manufacturer, advertisements by government, various energy conservation programmes are also not used to its potential. It can be concluded that major source of information are visibility of installations and friends / social circle.

8. When potential consumer is searching for information he also tries to find out information from suppliers or dealers in the area. It was found out that 50% respondent feel that dealers are prompt and provide informative material and remaining 50% feel that dealer were not prompt and were not providing information. It is understood that selling solar energy equipment is like selling a concept to a customer and for concept selling promptness is very important. At the same
time clearing the doubts and queries of the customers also helps in selling or closing the call.

9. While buying any product the features of the product plays vital role in consumer decision making process. Researcher had considered some attributes of the solar energy equipments which may influence in buying decision process. Following are the attributes considered for the study-
   a. Energy saving
   b. Cost effectiveness
   c. Long Life span
   d. Operating safety

Maximum respondents i.e. 89.3% highly agree that solar energy equipment has energy saving attributes. This attribute is the major concern on which Government is trying to persuade consumers for buying solar energy equipments.

79.5% respondents highly agree that soar energy equipments are cost effective and 10.9% respondents somewhat agree for the same. The initial cost of the solar energy equipments is the point of concern but it has very less maintenance cost or running cost and most of the time payback period is of 3 to 4 years; hence respondents feel that solar energy equipments are cost effective.

Maximum respondents i.e. 51% highly agree that solar energy equipments have long life span and 18.8% respondents highly disagree on long life span of the solar energy equipments. Technically there are no moving parts in either of the applications of solar energy so life span depends on the type and quality of material used for manufacturing other supporting equipments for example Hot Water Tank of Solar water heating system. Company like Sintex launched solar water heater with plastic based material which had less life span compared to other stainless steel and copper based solar water heating systems.
Maximum respondents i.e. 66.1% highly agree that solar energy equipments are safe while operating. This unique attribute of solar energy equipment makes it more acceptable in the society. If electric geyser / heater is used for heating water there is a risk of getting an electric shock while using it; one has to be very cautious while using these electrical appliances but in case of solar water heater which is installed on the terrace of the house there is no chance of getting any electric shock as this does not use any electricity. One can handle a solar photo voltaic panel while it is generating electricity in day light. Hence maximum consumers say that solar energy equipments are safe for operations.

10. Researcher had tried to indentify major causes for buying solar energy equipment. Following are the causes / reasons on which researcher had focused and collected responses-

a. Government schemes like loans, subsidies and rebate on tax.

b. Influence of relatives and friends.

c. Shorter payback period.

d. Affordability.

e. Suggestion by the architect.

The options were asked to respondents separately so that they could give separate thought on each reason deeply. It can be concluded from the data that –

31.8% respondents highly disagree and 26.8% respondents disagree (total 58.6%) that Government schemes such as – loans, subsides and rebates are the reasons for their buying of solar energy equipment. Various Government schemes such as – loans, subsides and rebates are not popular or not effective in attracting consumers.

22.7% respondents highly agree and 19.2% respondents agree (total 41.9%) that their friend and relatives have solar energy equipment and that is the reason they also took decision for buying solar energy equipment. Only 10.9% and 22.6% respondents deny that they took
decision due to the solar energy equipments used by their relatives or friends. Influence of friends and relatives is mostly accepted reason for purchase decision.

Responses are almost distributed equally over the range of agreeing and disagreeing. 16.6% respondents highly agree that they thought about this reason while buying and 17.7% respondents highly disagree for the same reason. The consumers of solar energy equipments are not thinking much about payback period of the solar energy equipments.

It is generally said that a consumer buys consumer goods or any product when it is affordable to him/her. In case of this study it is observed from the collected data and data analysis that 26.8% respondents highly disagree and 27.1% respondents disagree (total 53.9%) that affordability was the reason for taking buying decision. Only 13.8% respondents highly agree and 10.9% respondents agree that affordability was the reason for their buying decision.

Suggestion by the Architect was the reason considered by the researcher due to the trend in the market. Now a days architect gives full and final design of a house to be constructed in which he recommends solar energy equipments as a part of contribution towards environment conservation and to get some rebate to his client from house tax. Maximum respondents i.e. 41.6% highly disagreed on this reason that they took buying decision due architect’s suggestion. Only 4.1% respondents highly agreed that they took this decision due to suggestions from their architect.

11. During the buying decision process consumer tries to get maximum information about the product and if possible tries to get the feel and experience of the product. This helps to get the correct decision in line with the requirements of the consumer. Researcher had found out this true in case of solar energy equipments also. 70.5% respondents
among users had experienced the product functioning before buying.

12. Before buying any product; consumer search for the information regarding the product and its features. This information is available to him through various sources and manufacturer is one of the most authentic sources for reliable information. This information helps consumers for taking buying decision. Manufacturer provides information through – Information brochure, Advertisements, organizing various demonstrations at dealer’s outlet or at exhibitions. Researcher had tried to find out the usefulness of such information in case of solar energy equipments. 56.2% respondents felt that information provided by the manufacturer was useful.

VI. Responses of consumers

1. Consumers of solar energy equipments have various financing options to buy solar energy equipments. Government of India, various state governments and dealers / installers have announced various schemes for financing purchases of solar equipments to encourage use of non-conventional and renewable energy sources. Government provides loan at subsidised interest rates through many nationalised banks. Manufacturer and installers provide loan through various non-banking financial institutions as per the consumers’ needs but not at subsidised interest rates. Researcher had found out the opinion of consumers regarding these schemes. 36.7% respondents were highly dissatisfied and 22.1% respondents were somewhat dissatisfied (total 58.8%) regarding various finance scheme available for buying solar energy equipments. It generally observed that the procedure and time taken are the reasons for dissatisfaction.

2. Most of the respondents (28.4%) were Moderate with the schemes regarding subsidies, 21.3% of the respondent were somewhat dissatisfied with schemes regarding subsidies, 20.5% of the respondent were somewhat satisfied with schemes regarding subsidies, 18.5% of the respondent were highly dissatisfied with schemes regarding subsidies. Few of the respondents (11.4%) are
highly satisfied with the schemes regarding subsidies.
There is mixed reaction regarding satisfaction about various subsidies available for the users of solar energy equipments.

3. In another attempt to attract consumers towards solar energy equipments government had declared certain tax benefits and guided state governments to pass on. Individual users get benefit in house tax only. Industrial or institutional consumer gets rebate in income tax as well. Researcher had found out that 80% of the respondents were not satisfied with the tax benefits given to individual users.

4. Solar energy equipments are basically the concept products. There is little scope for addition or alteration of the design. For example solar water heating system has to have a solar heat collector panel and storage tank. Almost all manufacturers have same design except for colour combination. 17.5% respondents are highly satisfied and 24% are somewhat satisfied (total 41.5%) about the features of the product. This indicates that there is a need to work on design aspect to add more features and glamour to the solar energy equipments.

5. Price is one of the important criterions for purchase of any product. It is found that maximum i.e. 78.2% respondents were highly dissatisfied about the prices of the solar energy equipments. This is mainly due to high initial cost of the solar energy equipments.

6. Solar energy equipment needs to be exposed to sunrays hence they are installed at suitable site for better utilisation. Sometimes alterations are needed in existing structure. Considering this as one of the important aspect researcher had taken cost of installation as one consideration for consumers’ satisfaction. 50% respondents are highly dissatisfied and 30.4% respondents (total 80.4%) were somewhat dissatisfied regarding cost of installation.

7. Performance of the product is one of the important aspects in post
purchase consumers’ satisfaction. Consumer can experience the features and promises of manufacturer through performance of the product. The evaluation of the performance of the product goes long way in developing brand loyalty and acceptance of the concept of the product. 37.8% respondents were highly satisfied and 19.8% were somewhat satisfied about the performance of the product. Only 8.1% were highly dissatisfied and 3.2% were somewhat dissatisfied about the performance of the product.

8. Marketing management takes marketing activities beyond sales. After sales service is one of the important factor in consumers’ satisfaction. Solar energy equipments need installation by experts and any deviation in the guidelines affects the performance of the product. There are definite pattern in which solar equipments need to be used. Hence; after sales support from company / dealer is considered as important aspect by the researcher. 34.3% respondents were highly satisfied and 11.9% were somewhat satisfied regarding after sales support given by the dealer. Only 8.3% respondents were highly dissatisfied about dealers’ after sales services.

9. There are people who do not buy a product because it is difficult to use. In today’s market user friendly products gain popularity very easily. If a product can be used very easily then it adds up to consumers’ satisfaction and also increases the utilisation. Maximum respondents i.e. 67.4% were highly satisfied and only 6% respondents were highly dissatisfied regarding the easy utilisation of the solar energy equipments.

10. After buying any product consumer looks at running cost required to facilitate daily usage of the product. Maintenance cost is key criterion for cost effectiveness of the product. Researcher had found out the satisfaction regarding maintenance cost of the solar energy equipments. Maximum i.e. 62.2% respondents were highly satisfied about the maintenance cost which means they agree that it is low or it
is within their considered limits. Only 0.6% respondents were highly dissatisfied about the maintenance cost required for solar energy equipments.

11. Any solar energy equipment has a collector plate as integral part of it which has to be exposed to sunlight. The solar energy equipment can function efficiently when sunrays fall on the collector plate. Hence requirement of correct and suitable space is must for solar equipment. Present day situation regarding space where rates for square feet of space are scaling high. Maximum respondents i.e. 80.7% were highly dissatisfied regarding the space required for installation of solar energy equipments.

12. Durability of the product is one of the desired qualities. Solar energy equipments have very high durability; this is true as 66.9% respondents were highly satisfied about the long operating life of the solar energy equipments. Only 9.3% consumers are highly dissatisfied about durability of the solar energy equipments.

13. Appeal of the product which means the looks, attractiveness and aesthetic value of the product. It generally includes shape, size and colour combinations with assembly of the product. The solar energy equipments have very less aesthetic appeal, it does not add to looks of the site where it is installed. This is true as 89.8% respondents were highly dissatisfied regarding appeal of the solar energy equipments. Only 0.5% respondents were highly satisfied about the appeal of the products.

14. Despite of various causes of dissatisfaction maximum respondents i.e. 73.7% have intention to buy other solar energy equipment in future.

15. While working closely with the solar energy equipments manufacturer and dealers researcher had listed some common problems addressed by the dealers. Maximum respondents i.e. 36.7% faced problem
regarding glass breakage. This is generally a toughened glass placed over a collector panel. Solar energy equipments are generally installed on the terrace of the house or building and due care is not taken glass panel breaks. 24.4% respondents faced problem of scaling of salts in the water heating system. In solar water heating system there are two types of collector panels one is made of copper and the other is of evacuated glass tubes. Copper panel has copper tubes with small diameter in which water gets heated and if water has salts it gets deposited on the inner side of the tube resulting in reduction of efficiency and finally blockage of the tube. 21.4% respondents faced problem of air locking or no water at the tap problem. This happens when there is no water at the cold water storage tank and due to malfunction of NRV (non-return valve). 17/5% respondents had reported problems in the performance in monsoon season. In monsoon season availability of sunlight is poor which causes lower levels of performances in case of solar energy equipments.

16. Majority of the respondents i.e. 59.6% had purchased solar products only on cash. 24.7% of the respondents purchased the solar products on loan with government subsidy. This shows that less number of consumers are availing government schemes which are designed for promoting sale of solar energy equipments. 12.3% of the respondents purchased solar products on loan without government subsidy and rest of 3.2% of the respondents purchased solar products for installment given by the company or dealers.

VII. Reasons for poor responses

1. Most of the non-user respondents (70.1%) are aware of the benefits of solar-equipment and 29.9 % of the respondents are not aware of the benefits of solar-equipment. It also seen that most of the respondents (92.2%) haven’t thought of installing solar system in future and few of the respondents representing 7.8% are having thought of installing
solar system in future.

2. Researcher had divided respondents in two categories as those who were aware about the benefits of solar energy equipments and those who did not know the benefits of solar energy equipments. It inferred from the table no 6.53 that maximum of respondents i.e. 89.6% from those who are aware about the benefits of the solar equipments are not willing to buy solar systems in future this supports the fourth hypothesis “**Despite of knowing the benefits of solar equipments customers are not willing to buy solar equipments**”. Hence the hypothesis is accepted.

3. Researcher had tried to identify the reasons for not buying solar energy equipments. Following reasons were listed out after discussion with research guide, manufacturers and dealers –

   a. High initial price  
   b. No space for installations 
   c. Spoils the looks of house  
   d. No scope for alterations  
   e. Not suitable for my life style.

4. Most of the respondents (48.2%) not buying solar energy equipment’s because of its High initial price followed by 34.1% of the respondents not buying solar energy equipment’s because of not having installation space. Some of the respondents (7%) not buying solar energy equipment’s because there is No scope for alterations and 5.7% of the respondents not buying solar energy equipment’s because it is spoils the looks of house. and few of the respondents (4.9) not buying solar energy equipment’s because it is not suitable for their life style.

5. Most of the respondents i.e. 61.7% were aware about various financial assistance schemes / subsidies provided by the government but only
7.8% respondents were ready to avail the government subsidy or loan, 92.2% respondents were not ready to avail the government subsidy or loan.

6. Researcher had tried to find out the reasons for not availing the government subsidy or loan. Most of the respondents i.e. 42% had no reason and did not know about the loan or subsidy. 24% respondents did not have required documents hence not availing government subsidy or loan, 22% respondents were not availing government subsidy or loan because it needs lot of documentation and 12% respondents were not availing government subsidy or loan because it needs lot of time.

VIII. Marketing efforts of the organizations

1. Marketing efforts for selling solar energy equipments were put at two levels i.e. at Government organizations like MEDA in Maharashtra and by manufacturers / dealers / installers.

2. Spreading awareness regarding use of solar energy equipments is the main objective in government’s promotion campaign. They are using mostly print media like newspapers and magazines. Indian government through MNRE conducts various energy conservation workshops and seminars. Information of these workshop and seminars is put on the official websites and few prominent personalities and manufacturers are informed. Other nodal agencies like MEDA for Maharashtra are asked to conduct programs at their level. Akshay Urja Divas is celebrated to spread awareness about nonconventional energy resources. Only 18% of the respondents came to know about the solar energy equipments through advertising from Government sources and few i.e. 5.8% respondents came to know through energy conservation programs. This clearly shows that marketing communications by government is not much effective.

3. Manufacturers / dealers / installers are using print media, demonstration through exhibitions. They use local newspaper
advertising, information brochures and hoardings. Only 13.8% respondent came to know about the solar energy equipments through advertising from Manufacturers / dealers / installers.

**8.3 Conclusions for industrial and institutional consumers:**

I. The first hypothesis for the study is “The initial investment in the solar systems is the key criteria while selecting the solar equipments.”

22% of respondents from industry are dissatisfied, and 52% are highly dissatisfied. 28% of respondents from hostels are dissatisfied, and 40% are highly dissatisfied about the price of solar product and 31% of respondents from hospitals are dissatisfied, and 34% of respondents are highly dissatisfied about the price of solar product. This shows that maximum respondents from all the institutional categories are dissatisfied about the price of the solar energy equipments.

Researcher had formed a table no. 7.26 with the help of table no. 7.23 showing intention to buy solar products in future and table no. 7.24 showing the respondents opinion for not purchasing solar equipments in future. From the total institutional respondents 50% of the respondents are not willing to purchase solar energy equipments in future. Table no. 7.26 and the graph no. 7.26 give the analysis of the reasons for not purchasing solar energy equipments.

Initial expenses for buying and installing solar energy equipment are its price and cost of installation. Maximum institutional respondents i.e. 60% are giving high initial price as a reason for not buying solar energy equipments and 42% respondents from industry, 36% respondents from hostels and 33% respondents from hospitals are highly dissatisfied about the cost of installation (refer table no. 7.19, page no. 191).

The above data analysis shows that the hypothesis “The initial investment in the solar systems is the key criteria while selecting the solar equipments” is true and hence hypothesis is accepted.
II. The second hypothesis for this study is “The effective marketing communication of the organization has impact on buying behaviour of the customers of solar equipments.”

1. The researcher had collected data from institutional respondents i.e. industries, hostels and hospitals for testing this hypothesis. The researcher had considered two things that is usefulness of the information given by the manufacturer and intention to buy solar energy equipments in future. The resulted data has been summarized in table no 7.27.

2. 66% of the respondents from industry, 54% of the respondents from hostels, 68% of the respondents from hospitals feel that information given by marketing executive was not useful.

3. The researcher had tested the above data at 5% significant level. The computed Chi-square value for above data 22.22 is greater than table value 3.841 for 1 degree of freedom. Thus, the variables are dependent or there is significant relationship between the variables. Hence hypothesis is accepted.

III. The fourth hypothesis for this study is “Despite of knowing the benefits of solar equipments customers are not willing to buy solar equipments.”

1. The researcher had collected data from institutional respondents i.e. industries, hostels and hospitals for testing this hypothesis. Two major aspects i.e. knowledge of benefits of solar energy equipments and intention to buy solar equipments in future are considered. 72% of the industrial respondents knew the benefits of solar energy equipments, 62% of the respondents in hostels knew the benefits of solar energy equipments and 59% of the respondents in hospitals knew the benefits of solar energy equipments.
2. 58% of the respondents from industry, 52% of respondents from hostels and 45% of respondents from hospitals do not have intention to buy solar products in future.

3. Researcher had formed a table no. 7.28 from the data available. From the total institutional respondents 50% of the respondents are not willing to purchase solar energy equipments in future. 63% institutional respondents know the benefits of the solar energy equipments and 37% do not know the benefits of the solar energy equipments.

4. The researcher had tested the above data at 5% significant level. The computed Chi-square value for above data 10.382 is greater than table value 3.841 for 1 degree of freedom. Thus, the variables are dependent or there is significant relationship between the variables. **Hence hypothesis is accepted.**

IV. **Consumer buying behaviour:**

1. The institutional customers’ will make purchases when requirement is justified. It is seen that 64% of the hostels and 71% hospitals are having 75% of occupancy of customers and patients respectively. Maximum respondents have 75% occupancy in their respective units of hostel or hospitals.

2. Most of the industries i.e. 54% are using solar lighting systems followed by 30% of the industries are using solar water heater and 16% if the industries are using solar inverter. Most of the hostels i.e. 72% are using solar water heater followed by 16% of the hostels are using hybrid solar inverter and 12% of the Hostels are using solar lighting system. Most of the hospitals i.e. 69% are using solar water heaters followed by 21% hospital are using solar lighting system and 10% of hospital are using hybrid solar inverters. It can be concluded that maximum hostels and hospitals are using solar water heater for providing hot water to their occupants and maximum industries are using solar lighting systems.
3. 40% of industries got information about solar products by the advertisement given by manufacturer, 38% of hostels got information about solar products by the articles in newspapers and 42% of hospitals got information about solar products by the advertisement given by MEDA or government. This shows that different type of customers got information from different sources.

4. Most of the respondents i.e. 66% from industry, 82% from hostels and 78% from hospitals thought that the response given by the dealer or installer was delayed and uninformative. This shows that maximum institutional customers got delayed and uninformative response from the dealers. This is one of the most important thing for products where initial investment is high.

5. 66% of the respondents from industry, 54% of the respondents from hostels and 68% of the respondents from hospitals felt that the information given by marketing executive was not useful. It can be concluded that maximum of the respondents from all institutions did not get useful information from marketing executive.

6. 72% of the industrial respondents, 62% of the respondents in hostels and 59% of the respondents in hospitals knew the benefits of solar energy equipments. It is inferred that maximum of respondents from all categories know the benefits of the solar energy equipments.

7. More than 60% of the respondents from all types of institutional customers agree on energy saving ability of the solar energy equipments. 36% industrial respondents strongly agreed about the energy saving ability of solar products followed by 30% of industrial respondents agreed about the energy saving ability of solar products. (total 66%). 38% respondents from hostels strongly agreed about the energy saving ability of solar products followed by 30% of respondents from hostels agreed about the energy saving ability of solar products (total 68%). 38% respondents from hospitals agreed about the energy saving ability of solar products followed by 31% of respondents from hospitals strongly agreed about the energy saving ability of solar products (total 69%).
8. Most of the (30%) industrial respondents strongly agreed and 30% of industrial respondents agreed that the solar products are cost effective. 42% respondents from hostels agreed and 34% of respondents from hostels strongly agreed that the solar products are cost effective. 47% respondents from hospitals agreed and 39% strongly agreed that the solar products are cost effective. Hence it can be concluded that total 60% of respondents from industry, 76% from hostels and 86% from hospitals strongly agree and agree that solar products are cost effective.

9. Most of the (24%) industrial respondents disagreed and 18% strongly disagreed on the durability of solar products. 22% industrial respondents agreed and 20% industrial respondents strongly agreed on the durability of solar products. Total of 42% agree and 42% disagree on the durability of solar products. No respondent from hostel and hospital strongly disagreed on the durability of solar products. Maximum of the respondents agree that solar product are durable.

10. Most of the (32%) industrial respondents strongly agreed and 32% agreed about the environmental friendly nature of solar products. Most of the (28%) respondents in hostels strongly agreed and 26% of respondents in hostels agreed about the environmental friendly nature of solar products and Most of the (40%) respondents from hospitals agreed and 32% of respondents from hospitals strongly agreed about the environmental friendly nature of solar products. It clear that maximum respondents agree that solar energy equipments are environment friendly.

11. Most of the consumers agreed that the government is taking initiative for promoting use of solar energy equipments. 40% of the respondents from the industry strongly agreed and 32% agreed that the government is taking initiative for promoting use of solar energy equipments, 44% from the hostel strongly agreed and 24% of the respondents agreed that the government is taking initiative for promoting use of solar energy equipments and 49% from the hospital strongly and 32% of the respondents agreed that the government is taking initiative for promoting use of solar energy equipments. Hence,
it can be concluded that government is taking initiative for promoting solar energy equipments.

12. 34% of the respondents from industry are highly satisfied, 20% of the respondents are satisfied towards the information provided by the manufacturer, 34% of the respondents from hostels are highly satisfied, 26% of the respondents are satisfied towards the information provided by the manufacturer and 39% of the respondents from hospitals are highly satisfied, 22% of the respondents are satisfied towards the information provided by the manufacturer. Hence it can be concluded that institutional consumers are satisfied by the information provided by the manufacturer.

V. Responses of consumers

1. 28% of the respondents from industry were highly satisfied, 20% of the respondents were satisfied towards the various finance schemes, 32% from hostels were highly satisfied, 28% of the respondents were satisfied towards the various finance schemes and 36% of the respondents from hospitals were highly satisfied, 34% of the respondents were satisfied towards the various finance schemes. Maximum respondents are satisfied towards various finance schemes.

2. 22% of the respondents from industry were highly satisfied and 24% were satisfied for subsidies and schemes on purchase of solar energy equipments, 18% of the respondents from hostels were highly satisfied and 32% of the respondents were satisfied for subsidies and schemes on purchase of solar energy equipments and 36% of the respondents from hospitals were highly satisfied and 30% of the respondents were satisfied for subsidies and schemes on purchase of solar energy equipments. Hence conclusion is that maximum institutional respondents are satisfied about the subsidies and schemes on purchase of solar energy equipments.

3. 30% of the respondents from industry were dissatisfied and 44% of the respondents from industry were highly dissatisfied about the tax benefits available with the solar products, 22% of the respondents
from hostels were dissatisfied and 38% of the respondents were highly dissatisfied about the tax benefits available with the solar products while purchasing and 27% of the respondents from hospitals were dissatisfied and 30% of the respondents were highly dissatisfied about the tax benefits available with the solar products. This concludes that maximum institutional respondents are dissatisfied about the tax benefits available with the solar products.

4. 74% of the respondents from industry, 62% of the respondents from hostels and 67% of the respondents from hospitals feel that the solar products were not having good appearance. This means that solar energy equipments are not having good looks, shape and colors.

5. 24% of respondents from industry are highly satisfied, 16% of respondents are satisfied, 30% of respondents from hostels are highly satisfied, 18% of respondents are satisfied and 30% of respondents from hospitals are highly satisfied, 15% of respondents are satisfied about the features available with the solar product. 20% of respondents are dissatisfied, and 28% of respondents are highly dissatisfied about the features available with the solar product. It can be concluded that maximum respondents from industry are dissatisfied about the features available with solar energy equipments and maximum respondents from hostels and hospitals are satisfied about the features available with solar energy equipments.

6. 22% of respondents from industry are dissatisfied, and 52% are highly dissatisfied28% of respondents from hostels are dissatisfied, and 40% are highly dissatisfied about the price of solar product and 31% of respondents from hospitals are dissatisfied, and 34% of respondents are highly dissatisfied about the price of solar product. This shows that maximum respondents from all the institutional categories are dissatisfied about the price of the solar energy equipments.

7. 30% of respondents from industry are dissatisfied, and 42% are highly dissatisfied about the cost of installation of solar product, 22% of respondents from hostels are dissatisfied, and 36% are highly dissatisfied about the cost of installation of solar product and 29% of
respondents are hospitals dissatisfied, and 33% are highly dissatisfied about the cost of installation of solar product.

8. There are mix responses regarding the after sale support by the company/dealer. The percentage of satisfied and dissatisfied respondents is almost equal hence it is not possible to conclude about it. More detailed study in this regard will have to be carried out.

9. 50% of respondents from industry are highly satisfied, 20% of respondents are satisfied, 42% of respondents from hostels are highly satisfied, 28% of respondents are satisfied and 35% of respondents from hospitals are highly satisfied, 39% of respondents are satisfied about the maintenance cost. It is concluded that maximum institutional respondents are satisfied about the maintenance cost for solar energy equipments.

10. 32% of respondents from industry are dissatisfied, and 54% are highly dissatisfied towards the space for installation of solar products, 28% of respondents from hostels are dissatisfied, and 62% are highly dissatisfied towards the space for installation of solar products and 24% of respondents are dissatisfied, and 61% of respondents are highly dissatisfied towards the space for installation of solar products. Hence it can be concluded that maximum institutional respondents are dissatisfied about the space required for the installation of solar energy equipments.

11. 58% of the respondents from industry are not having intention to buy solar products in future, 52% of respondents are not having intention to buy solar products in future and 45% of respondents are not having intention to buy solar products in future. It can be concluded that 50% of the total institutional respondents are not ready to buy solar energy equipments in future.

12. 55% of the respondents from industry, 69% of the respondents from hostels and 58% of the respondents from hospitals will not be purchasing solar products due to high initial price. 41% of the respondents from industry, 23% respondents from hostels and 22% respondents from hospitals will not be purchasing solar products due
to large space requirement for installation. Hence it can be concluded that maximum respondents will not be buying solar energy equipment in future because of high initial price. Space required for installation is the next reason for not buying.

13. 70% of the respondents from industry had problem of performance in monsoon. As the maximum respondents from industry have solar lighting system they have problem of performance in monsoon as availability of sunlight is very less in monsoon. 58% of the respondents from hostel and 44% respondents from hospitals had problem due to glass breakages. As maximum respondents from hostels and hospitals have solar water heating systems installed at the terrace and many times students in hostel or inpatients’ relatives in hospitals use terrace which results in breakage of glass of the collector panel. 38% of the respondents from hostel and 41% of the respondents from hospitals had problems due to scaling of salts. This is mostly due use of hard water from bore wells.

8.4 Consumer buying behaviour model for solar energy equipments

Researcher had developed a structural model to graphically explain the relation between factors influencing for consumer buying behaviour for solar energy equipment. Model explains various external factors affecting the basic processes consisting of need recognition, information search and evaluation of alternatives. Then the black box, consisting of psychological factors gives output. The model is based on study conducted by the researcher. Researcher had tried to generalize model to increase the scope of applicability.

There are three inputs major factors influencing the buying decision process, they are as follows:

**Marketing communication by manufacturer and dealers:** Manufacturer and dealer communicate with consumers through their promotional activities. It is observed that mainly three ways are used advertisements, articles and brochures. These are basically giving the information about the benefits of the product and are published in Newspapers. During winter hoardings are also used to generate awareness and reminding consumers about the need of hot water. Sometimes a road show or canopy displays are used to attract consumers.
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**Marketing communication by Government agencies:** Government had set up agencies like ‘IREDA’ – Indian renewable Energy Developing Agency. IREDA is a Public Limited Government Company established in 1987, under the administrative control of Ministry of New and Renewable Energy (MNRE) and MEDA in Maharashtra state. These agencies communicate with consumers with the help of advertisement and various celebrations like Akshay Urja Divas August 20\(^{th}\) and promote usages of renewable energy equipment’s by launching various schemes.

**Demographical Factors:** Various demographic factors also have impact on consumer decision process. Environmental aspects such as social and cultural factors affect on consumer decision making process.

**Need Evaluation and Justification:** Consumers of solar energy equipment’s evaluate the need based on various factors and justify their need with the help of factors shown in the diagram. The factors shown in the diagram from outer circle to inner part of the circle have importance in decreasing order. Energy saving being the highest weighed factor followed by safety, long life, shorter pay back and affordability respectively.

**Information Sources:** Consumers of solar energy equipment try to collect information through various sources. As per the diagram family and friends in the society contribute as the most sought information source followed by government and nodal agencies, advertisement by manufacturer and various publicity activities carries out by government agencies and manufacturer.

**Evaluation of Alternatives:** When Consumer decide to buy solar energy equipment’s the first thing which needs to be decided is the type of solar equipment for which consumer is thinking about e.g. solar water heater, solar lighting system, solar cooker, or solar inverter (hybrid), then the decision about price and make is taken after comparing the available information in the market.
**Consumer Evaluation (Black Box):** In the stage of consumer decision making process the factors which contribute are the psychological factors such as motivation, attitude, personality etc. This stage gives the output which leads to final decision of the consumer which leads to stage where consumer takes and experience of the product and gathers additional information about the product functioning and features of the products. After this the final decision of buying/purchasing is taken by the consumer. The next stage after buying is a repeat purchase and post purchase behavior which includes consumer’s perceptions and feedbacks to the manufacturer, dealers and the government and its nodal agencies for further corrective actions.

**II RECOMMENDATIONS**

**8.5 RECOMMENDATIONS:**

**I - Recommendations for Individual consumers**

1. “The initial investment in the solar systems is the key criteria while selecting the solar equipments.” Prices of solar energy equipment’s are high compared to the electrical energy based products e.g. a electrical water heater cost very low compared to solar water heater. Initial investment also includes installation cost. Hence researcher recommends following
   a. Manufacturing companies should focus on more research and development and develop new technique and technology which will bring down the production cost. It can be on the material cost reduction also. Value addition through new techniques in designing the solar equipment’s may improve efficiency and increase the value of the product.
   b. Individual consumer may be given exemption from the income tax on price of the solar energy equipment for buying solar products. This facility is provided to institutional consumers.
   c. Government should provide the subsidies for the purchase of solar energy equipments. This will reduce the initial investment for the consumers.
   d. All corporations while passing building plan may make it compulsory to make provisions for installing solar energy equipments especially solar water heater in future.
   e. Rebate in house tax / property tax for the houses with solar water heater installed may be given. Nashik Municipal Corporation has already
implemented the same. This will motivate consumers to use solar energy and help energy conservation.

2. “The effective marketing communication of the organization has impact on buying behavior of the customers of solar equipment’s.” Though the study had rejected the hypothesis; following are the recommendations based on data collected:
   a. Manufacturers and installers can carry out promotional campaign with proper planning with set of objectives and may be done frequently in newspapers.
   b. The Manufacturers and installers may carry out demonstrations at various locations with the help of live systems installed on small trucks. This will help people to experience the functioning of the system and will get proper information.

3. “The social status of the consumer has impact on buying behavior of the consumers of solar equipments.” The high income group has the dominance in the consumers of solar energy equipment’s. Following are the recommendations:
   a. To facilitate purchase of solar energy equipments by middle or low income group, the co-operative banks and private financial institutions may be authorized to provide loan at subsidized rate.
   b. The dealers or installers who offer instalments to the consumer should be given some financial incentive in terms of more discounts in dealer price. This will encourage dealers or installers to sell more.

4. The dealer, installers and all sales executives of all dealers should be trained compulsorily by the proper authorities. This will enable them to demonstrate the benefits of solar energy equipment’s to the consumers. This will reduce the percentage of consumers not knowing the proper use of solar energy equipments.
5. The manufacturer can use innovative designs for the hot water storage tanks; within the financial constrains to improve appeal of the product. Trendy colors can be used for outer cover instead of conventional colors.

6. The procedure for availing subsidized loan for purchasing may be made simple to encourage more and more consumers to approach for loan.

7. Nodal agency MEDA should increase activities to promote domestic use of solar energy equipments. Various competitions like essay, debate, poster making competition at college level on renewable energy sources, sponsoring various events and setting up stalls at various exhibitions may be increased. This will spread the awareness amongst the consumers.

8. Manufacturers must increase the channels of distributing solar products. Conventional type of distribution may not come up with increasing the level of penetration. So, the organization must introduce personal selling, online sales…etc.

9. Manufacturers must provide proper attention for solving the queries raised by the consumers. Due to that manufacturer must provide toll free number for solving the consumer queries and arrange a separate desk for helping consumer for solving their problems / queries.

II - Recommendations for Institutional consumers:

1. “The initial investment in the solar systems is the key criteria while selecting the solar equipments.” Basically institutional consumers invest the money with the intention of benefits to business they are into. The prices and long breakeven period forces them one step back towards accepting solar energy equipments. All recommendations are same as mentioned in Part-I, sub point 1.

2. “The effective marketing communication of the organization has impact on buying behavior of the customers of solar equipments.” MEDA and other
central nodal agencies should reach maximum potential consumers through the properly designed approach.

3. “Despite of knowing the benefits of solar equipment’s customers are not willing to buy solar equipments.” Initial investment in purchasing and installing solar energy equipment is the major cause. More tangible benefits should be passed on to the institutes using solar energy equipment’s. Organization using solar energy equipments or renewable energy equipment’s may be given special status and preference in processes like sanction of a loan, extension of a license etc.

4. There should be special marketing executive for industrial marketing who has some knowledge in industrial energy utilization, energy saving techniques, various benefits that are extended to organizations using solar energy equipments.