2.1 Introduction:

Research is nothing but search for knowledge. It is the original contribution to the existing stock of knowledge undertaken for the advancement of the work. Today there is a need of research in every field for fulfilling the continuously increasing demand of growing population for variety of products and services. Research can help in developing the innovative concepts, ideas, product design which can be helpful for increasing efficiency of the products. To be in competition, it is essential for private and public organizations to focus their attention on research. Research has become a key factor for the business as well as for the government for the upliftment and betterment of the society. It may be based on survey.

The definition of research by the Advanced Learner’s Dictionary of Current English is given as “a careful investigation or inquiry especially through search for new facts in any branch of knowledge.”

Research methodology is a tool to handle the research problems systematically. In research methodology the problem which is under consideration is studied thoroughly by applying the logic. It is the science of doing research in a scientific manner. Researcher should know not only the research techniques/methods but also the methodology. Researchers should know about various techniques which he/she can use for the purpose of further calculation or analysis part of the study as per the requirement of problem under consideration. It is necessary to understand about the various techniques and their applicability for the particular criteria. The research methodology is different for the different problems, so it is necessary to formulate the research methodology as per the requirement of researcher.
2.2 Methods of data collection
The techniques which are used for the purpose of collecting information for the research work are known as data collection methods. Basically they are divided into two parts-

1. Primary data collection
2. Secondary data collection

2.2.1 Primary Data Collection Methods:
The methods of collecting primary data are dependent on the type of research which is undertaken for the purpose of study. Mainly it is used in where survey for collecting information is essential. In descriptive research also it is useful.

i. Observation Method
It is the commonly used method especially in studies relating to behavioral sciences. Observation with specific purpose, used as a method of data collection which is systematically planned and recorded becomes a scientific tool for the researcher. It can be used for the purpose of control on validity and reliability. In this method information is collected directly without asking any question to the respondent.

ii. Interview Method
The interview method of collecting data involves presentation of oral-verbal responses. Now a day’s because of time constraint telephonic interviews and normal personal interview method can be used for collecting information. It is useful in gathering different type of information intensively and extensively.

There are different types of interview like

(a) Personal interviews: Face to face contact is there in this type of interview between interviewer and interviewee. The form of this type of interview may be a straightforward enquiry or asking indirect questions to the interviewee. In personal investigation interviewer personally collects the information from the related sources. By going actually on the spot and meeting people information is collected. An indirect oral examination can be conducted for getting information from such a person who might have the knowledge about which the
data collection is conducted, and then that data is recorded. For the purpose of investigations this method is used by the commissions /committees formed by government.

(b) Structured / Unstructured Interview:
Structured Interview: This type of interviews involves the questions which are prearranged. And the collected information is recorded with standardized techniques. Because of the advantages of this type of interview such as economical, generalisation is possible, these are used for descriptive type of research.

Unstructured interview: This type of interview have flexibility in asking questions. Questions are asked for getting information in the flow of subject and no particular recording technique is used. In this type interviewer have freedom to add or replace or delete the questions as per the situation and time requirement. He/She may even change the sequence of questions. At the time of recording also researcher have freedom to include or exclude some aspects. Flexibility given may become limitation for comparing the responses and so analysis becomes difficult and time consuming. It is useful in case of exploratory research studies. It needs greater skill and deep knowledge about the subject on the part of the interviewer.

iii. Collection of Data through Questionnaires
For collecting similar type of information from large number of people this technique of collecting information is used, specifically in case of big enquiries. It is used by, research workers, private and public organizations, private individuals and even by governments.

In this method a questionnaire is sent (usually by post) or email to the persons who can give the related information requesting to return it after giving the responses. A questionnaire consists of definite order questions in a printed or typed form. The space is provided to write the answers. The respondents are expected to fill the questionnaire at their own. Before using this method, ‘pilot study’ for testing of questionnaire is suggested for the purpose of bringing out the weaknesses, if any in the questionnaire.
iv. Schedule:
It means Performa containing a set of questions. It is similar to questionnaire method with little difference only that it is filled by the enumerators who are specially appointed for the purpose of giving exact information.

2.2.2 Secondary methods of data collection:
The data which already being gathered and used by somebody else or available in written form is known as Secondary data. Simply it means it is the second hand information which already used may be for different purposes. It may be published or unpublished. This type of data is mainly useful for descriptive research work.

The data collected through secondary sources can be collected for the references useful for the study.

In the present study, the data is collected by using both primary and secondary methods of data collection. In north Maharashtra, the main solar manufacturing industries which are covered in the present study are – Jain Irrigation, Deshmukh Solar, Shree solar, Pacific energy solutions, Zeneith Enterprises, Essential Equipments

2.3 Statement of Problem
“A study of opportunities and challenges before solar product manufacturing industries in North Maharashtra.”

2.4 Justification of Statement of Problem
North Maharashtra has a substantial industrial base and is urbanizing rapidly. Most of the industry is predominantly dependent on traditional energy sources and so also are the urban towns. Given the impending global energy crisis the need for alternative energy sources will soon become very critical. North Maharashtra has a good sunny climate which gives a great potential for use of
solar products both for industrial and domestic use. The objective of the study will help identify

a) The potential for different types of solar energy based products
b) The challenges that are being faced by manufacturers and their analysis

The study will be helpful for anyone who intends to invest in this area of business and to the common people who want to use the solar products.

2.5 Objectives of the Study

1. To study the need of solar energy and its utilization in the present scenario.
2. To study the selected solar product manufacturers in North Maharashtra.
3. To study the advantages / benefits and future prospects of solar products as energy savers.
4. To study the challenges before solar product manufacturers and distributors.
5. To identify the awareness of different Government schemes available for promotion of solar equipment.

2.6 Statement of Hypotheses

1. People prefer to solar equipment because of limited supply of other sources of energy.
2. For house hold as well as industrial consumers, the use of solar product leads to saving in power cost in the long run.
3. There are major challenges before solar product manufacturing industries especially higher capital investment and lack of awareness to the end users.
2.7 Scope of Study
With the global temperatures rising over the past 2 decades, the Greenhouse effect cannot be taken lightly any more. Countries across the world have realized the dangers associated with use of fossil fuels and there is an increasing pressure from governments to encourage the use of alternative energy sources and also to discourage indiscriminate use of fossil fuels. This in itself points to a great potential for businesses who invest in alternative energy sources. Apart from this there is also the fact that the supply of fossil fuels is limited and as per estimates of experts it won’t last very long.

Amongst the alternative sources of energy solar power is one which has some distinct advantages, particularly in India -

- India gets good sunlight through a substantial part of the year
- No one can restrict the use of solar energy like they have done with oil.
- It does not create pollution in air, water and in oceans.
- It does not lead to global warming.
- Source of solar supply is in abundance for years.

2.8 Limitations of Study
The first limitation of the study is limited time period; the period considered for the proposed study is 2004 – 2016 only. Another limitation of the study is the study is restricted to North Maharashtra only. Solar energy is used all over India but for detailed study purpose a limited area is selected and study is focused on selected geographical area. But India is considered in general.

2.9 Sample Size
The selected sample size is representing the total population. In this sampling size the perception of solar manufacturers and distributors has been studied. The role of policy makers of government has been understood. The opinion of experts in this field has been studied. Industrial and household consumer’s
awareness about the subject has been observed. Geographically North Maharashtra region is very large so the sample which represents the data as per the requirement of the study has been selected.

Sample Size for the present study:

North Maharashtra is divided into Nasik, Dhule, Jalgaon, Nandurbar and Ahmadnagar District. Out of these districts the solar product manufacturers were selected as a sample for the study purpose. Random sample selection method is used for sample selection purpose. The sample of the study is as follows.

**Table 2.1 Selected Samples from North Maharashtra**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Total No.</th>
<th>Sample selected</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar product manufacturers from North Maharashtra</td>
<td>31</td>
<td>06</td>
<td>19.35</td>
</tr>
<tr>
<td>Solar product distributors-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nashik</td>
<td>21</td>
<td>06</td>
<td>28.57</td>
</tr>
<tr>
<td>Dhule</td>
<td>07</td>
<td>03</td>
<td>42.85</td>
</tr>
<tr>
<td>Jalgaon</td>
<td>06</td>
<td>03</td>
<td>50.00</td>
</tr>
<tr>
<td>Ahmednagar</td>
<td>12</td>
<td>04</td>
<td>33.33</td>
</tr>
<tr>
<td>Nandurbar</td>
<td>--</td>
<td>--</td>
<td>----</td>
</tr>
</tbody>
</table>

(Source: Industrial directory – 2012)

2.10 Methods of data collection

This study is based on field work. The primary data has been collected by taking personal interviews and discussing the topics by using schedule.

For the study the data has been collected by using following methods of data collection:
2.10.1 Primary data collection:
Primary data has been collected through the questionnaires to the various groups of respondents by

a. Interview – From the North Maharashtra region the solar product manufacturers Interview was taken for collecting information for the purpose of study.
b. Questionnaire- Questionnaire was prepared for household users, commercial users, conventional users, manufacturers and distributors.
c. Schedule- Schedule was prepared for collecting information from distributors and commercial users.

2.10.2 Secondary data collection:
The secondary data has been collected through published material like-

a) Various government published reports,
b) Subject related books,
c) Research Journals,
d) Magazines,
e) Articles from newspapers,
f) Electronic media.

2.11 Classes of respondents to be contacted

2.11.1 Solar product manufacturers from North Maharashtra are as follows:

i) Deshmukh solar - Nashik
ii) Pacific enterprises – Nashik
iii) Shri solar systems – Nashik
iv) Jain irrigation systems ltd. – Jalgaon
v) Zenieth energy system – Ahmednagar
vi) Essential equipments - Dhule

2.11.2 Selected 15 solar product distributors from North Maharashtra,

i) Sudarshan solar distributors – Dhule
ii) Anand solar – Dhule  
iii) Pathak Aditya solar shop – Dhule  
iv) Aditya solar shopee – Nashik  
v) Inifinite value – Nashik  
vi) Nitsun solar power system – Nashik  
vii) Manik power solution – Nashik  
viii) Green Energy solution – Nashik  
ix) Sahil Solar shopee - Nashik  
x) Electrotech energy – Jalgaon  
xi) Sudarshan solar systems – Jalgaon  
xii) Jayesh enterprises – Jalgaon  
xiii) Shree Enterprises – Ahmednagar  
xiv) Sudarshan solar – Ahmednagar  
xv) Amit solar – Sangamner

2.11.3 Solar product users- This category is divided into two parts-A) Household solar product users, B) Commercial users of solar products.  
A) Household users- 150 Respondents those who are using any solar product are selected randomly from Nashik, Dhule, Jalgaon, Ahmednagar and from Nandurbar.  
B) Commercial users- 15 commercial users from North Maharashtra have been interviewed.

2.11.4 Conventional energy users – 150 Respondents those who uses conventional source of energy has been selected randomly from Nashik, Dhule, Jalgaon, Ahmednagar and from Nandurbar.
2.12 Methods of Data Analysis

The Data analysis is the process which is related with number of closely related operations that are performed with the purpose of summarizing the collected data. Data analysis process involves –

i. Inspection of collected data
ii. Editing the collected data,
iii. Transforming it in the required format,
iv. Designing the data which will highlight the important information,
v. Based on the collected information giving suggestions,
vi. Arriving to the conclusions.

Adequate statistical tools have been used in data analysis as per the requirements- For example tables, charts, graphs. Percentage is calculated for better comparative analysis of data. Chi-square test is applied for testing the hypotheses.

2.13 Chapter Scheme of the Study

There are total seven chapters. In each chapter the points which are going to be included are given in brief.

CHAPTER-1 INTRODUCTION:

This chapter discusses the introductory part of the research. This chapter is based on secondary information and covers theoretical framework of the topic under study. Different types of energy, details about solar energy, consumption of solar energy in the world-nation-Maharashtra state are explained. Impacts of solar energy on environment, benefits of solar energy
consumption are discussed. Various Government policies on solar energy are explained.

CHAPTER-2 RESEARCH METHODOLOGY

Outline of the research work is presented in this chapter. The objectives of the study, justification of objectives, hypothesis, statement of the problem, sample size selected for the present research work, justification of the sampling, statistical tools which are applied for testing of hypotheses and methods of data collection are explained in this chapter. The chapter ends with the scope and limitation of the present study.

CHAPTER-3 REVIEW OF LITERATURE

The review of literature is done to study wide variety of available literature while researching a particular area. The literature referred to includes articles, books, magazines, published reports by government or private institutions, research papers, Ph.D. thesis etc. Apart from these sources, information which is available on internet is also taken into consideration as a literature. In this chapter, available literature is studied from different sources.

CHAPTER-4 PROFILE OF NORTH MAHARASHTRA

The area for research study is North Maharashtra which includes- Nashik, Dhule, Nandurbar, Jalgaon and Ahmednagar districts. Therefore profiles of these five districts are studied in this chapter. This chapter includes history, industrial history, geographical and demographic conditions of all the above five districts.

CHAPTER-5 SOLAR PRODUCT MANUFACTURING INDUSTRIES IN NORTH MAHARASHTRA

This chapter has profile of selected industries which manufacture solar products from research area north Maharashtra region from Nashik-Deshmukh
solar, Pacific enterprises, Shri solar systems, Jalgaon- Jain irrigation systems ltd., Ahmednagar- Zenith energy system, Dhule- Essential Equipments.

CHAPTER-6 DATA ANALYSIS

This chapter is based on primary information. Analysis, testing and interpretation is done in this chapter based on the collected data through questionnaires. For illustration purpose different types of graphs are used and testing of hypotheses are done with the help of statistical tools.

CHAPTER-7 CONCLUSION AND SUGGESTIONS

This chapter is also mainly based on primary information. Findings are written from the collected information. The primary data is collected through questionnaires, schedule and interviews. Suggestions are prescribed to different sections which are related directly or indirectly to the concerned sector. Conclusions are drawn. The chapter is concluded with scope for future study about opportunities and challenges before solar product manufacturing industries.

Reference:
