CHAPTER - 5

RESEARCH METHODOLOGY
Research in common parlance refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. The advanced Learner's Dictionary of Current English lays down the meaning of research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge." Redman and Mory define research as a 'systematized effort to gain new knowledge." Some people consider research as a movement, a movement from the known to the unknown. It is actually a voyage of discovery. We all possess the vital instinct of inquisitiveness makes us probe and attain full and fuller understanding of the unknown. This inquisitiveness is the mother of all knowledge and the method, which man employs for obtaining the knowledge of whatever the unknown, can be termed as research.

Research is an academic activity and as such the term should be used in a technical sense. According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solution; collecting, or organizing and evaluating data; making deductions and reaching concussion; and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis, D. Slesinger and M. Stephenson in the Encyclopedia of Social Science define research as "the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art." Research is, thus, an original contribution to the existing stock of knowledge making for its advancement. It is the pursuit of truth with the help of study, observation, comparison and experiment. In short, the search for knowledge though objective and systematic method of finding solution to a problem is research. The systematic approach concerning generalization and the formulation of a theory is also research. As such the term 'research' refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solutions(s) towards the concerned problem or in certain generalizations for some theoretical formulation.
5.1 RESEARCH SIGNIFICANCE:

"All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention" is a famous statement in context of which the significance of research can well be understood. Increased amounts of research make progress possible. Research inculcates scientific and inductive thinking and organization of thought & findings.

The role of research in several fields of applied economics, whether related to business or to the economy as a whole has greatly increased in modern times.

Research provides the basis for nearly all government policies in our economic system for instance; government's budgets rest in part on an analysis of the needs and desires of the people and the availability of revenues to meet these needs.

Research has its special significance in solving various operational and planning problems of business and industry.

Research is equally important for social scientists in studying social relationships and in seeking answer to various social problems.

The objective of this study is to find out such additional factors & their role in deciding consumer behavior so that consumer & marketer may be mutually benefited in order to achieve perfect solution for each other.

5.2 RESEARCH PROBLEM:

It is generally observed that the region in and around Jhansi keeps extreme of hot & cold climate. Weather plays an important role in affecting productivity & efficiency of every one because it is supportive to keep one self in good mood, if it is positive. Hygienic environment is very much essential for good health. This comes through pureness and cleanliness of environment, place, things and soothing environment. A healthy person in good mood easily enjoy good
moments of life and also keep one self happy and satisfied, hence for the need of weather care products, water purifiers, cleaning & dust removers or 'devices to maintain temperature and humidity of the air' were felt and the same were developed by the producers and accepted by the users. Changing life style, awareness of the general people, desire for comfort & luxury, materialistic approach has improved and these have been supported by the purchasing power with proper backups of financial institutions. The usages rate of such products is very low in this region, which seeks attention of a researcher to find out solutions of complex buying motives of temperature & humidity maintainer along with water conditioning devices in the Jhansi region.

The problem has been identified & formulated for the research work as under.

5.3 RESEARCH TITLE:

"FACTORS AFFECTING CONSUMER BEHAVIOUR IN THE PURCHASE OF AIR & WATER CONDITIONING DEVICES IN JHANSI REGION."

5.4 RESEARCH PURPOSE & SCOPE:

Now many of the industries are entering into the market of perfect competition & no. Of brands with vast variety are available to the choice of consumer. In this scenario the relevance of this study is justified & purposeful so that marketer may turn in to more consumers oriented strategy. This will be helpful to the society as a whole. It will cause cost reduction as well as quality improvement. Tailor made product formation & product availability suiting the requirement of the consumers may be planned.

Air & Water conditioning devices are now rapidly penetrating in the Indian Market but Jhansi region is not observing the same changes. This research is an attempt to find out the factors that affect the consumer behavior in the purchase of such devices.
5.5 RESEARCH OBJECTIVES:

The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose hence this research also has some objectives.

i. Achieve new insights into it.
ii. Accurately the characteristics of a particular individual, situation or a group.
iii. To test a hypothesis of a causal relationship between variables.
iv. To find out various factors that influence consumer behaviour in the purchase of air and water conditioning devices in the Jhansi region.
v. To find out the relationship and inter-relationship between various factors.
vi. To find out the relationship and inter-relationship between two conditioning devices.
vii. To find out role of constraining factors in the purchasing decision of such goods.
viii. To find out the role of local factors in the purchase of such goods.

5.6 TYPE OF RESEARCH WORK:

The basic types of research are as follows:

Descriptive vs. Analytical: Descriptive research includes survey and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs, as it exists at present. The main characteristic of this method is that the researcher has no control over the variables. In analytical research, on the other hand, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

Quantitative vs. Qualitative: Qualitative research is based on the measurement of quantity or amount. Quantitative research, on the other hand, is concerned with
qualitative phenomenon, i.e., phenomena relating to or involving quality or kind. Qualitative research is especially important in the behavioral sciences where the aim is to discover the underlying motives of human behavior or which make people like of dislike a particular thing.

**Conceptual vs. Empirical:** Related to some abstract idea(s), Philosophers and thinkers to develop new concepts empirical research relies on experience generally use it. We can also call it as experimental type of research. Empirical research is appropriate when proof is sought that certain variables affect other variables in some way.

One-time research or longitudinal research: In the former case the research is confined to a single time-period, whereas in the latter case the research is carried on over several time-periods. Research can be field-setting research or laboratory research or simulation research. Research can as well be understood as clinical or diagnostic research. The research may be exploratory or it may be formalized. The objective research is the development of hypotheses rather than their testing, whereas formalized research studies are those with substantial structure and with specific hypotheses to be tested. Historical research is that which utilizes historical sources like documents, remains, etc.

This research is the mixture of some of the typed above mentioned here. However, main emphases lie on analytical character of the research. Some time it is descriptive while at many times it is analytical. Though it is not quantitative but it may fall in the category of qualitative research. Attempt to develop new concept makes this report some time conceptual also.

**5.7 RESEARCH APPROACH:**

The above description of the types of research brings to light the fact that there are two basic approaches to research, viz., quantitative approach and the qualitative approach. The former involves the generation of data in quantitative from which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. This approach can be further sub-classified into inferential, experimental and simulation approaches to research. The purpose of inferential approach to
research is to form a database from which to infer characteristics or relationship of population. This usually means survey research where a sample of population is studied (questioned or observed) to determine its characteristics, and it is then inferred that the population has the same characteristics. Experimental approach is characterized by much greater control over the research environment and in this case some variables are manipulated to observe their effect on other variables. Simulation approach involves the construction of an artificial environment within which relevant information and data can be generated. This permits an observation of the dynamic behavior of a system (or its sub-system) under controlled conditions. The term 'simulation' in the context of business and social sciences applications refers to “the operation of a numerical model that represents the structure of a dynamic process. Given the values of initial conditions, parameters and exogenous variables, a simulation is run to represent the behavior of the process over time.” Simulation approach can also be useful in building models for understanding future conditions.

Qualitative approach to research is concerned with subjective assessment of attitudes, opinions and behavior. Research in such a situation is a function of researcher’s insights and impressions. Such an approach to research generates results either in non-quantitative from or in the form which are not subjected to rigorous quantitative analysis. Generally, the techniques of focus group interviews projective techniques and depth interviews are used. All these are explained at length in chapters that follow.

**Approach adopted in the case of our research is qualitative as well as Inferential.**

**5.8 RESEARCH PROCESS ADOPTED:**

Research process consists of a number of closely related activates, But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that the various steps involved in
a research process are not mutually exclusive; nor they are separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps. However, the following order concerning various steps provides a useful procedural guideline regarding the research process:

i. Formulating the research problem:
ii. Extensive literature survey;
iii. Developing the hypothesis;
iv. Preparing the research design;
v. Determining sample design;
vi. Collecting the data;
vii. Execution of the project;
viii. Analysis of data;
ix. Hypothesis testing;
x. Generalizations and interpretation, and
xi. Preparation of the report or presentation of the results, i.e., formal write-up of conclusions reached.

i. Research problem formation:

There are two types of research problems, viz., those, which relate to states nature and those, which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest of aspect of a subject matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem were resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.
The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organizations, the problem is usually earmarked by the administrative agencies with whom the researcher can discuss as to how the problem originally came about and what considerations are involved in its possible solutions.

As a researcher, undersigned at the same time examined all available literature to get him acquainted with the selected problem. Two types of literature has reviewed – the conceptual literature concerning the concepts and theories, and the empirical literature consisting of studies made earlier, which are similar to the one, purposed. The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes, which would enable the researcher to specify his research problem in a meaningful context. After this the problem has been rephrased into analytical or operational terms i.e., to put the problem in as specific terms as possible. This task of formulating, or defining, a research problem is a step of greatest importance in the entire research process. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must; however, be taken to verify the objectivity and validity of the background facts concerning the problem. Professor W.A. Neiswanger correctly states that the statement of objective is of basic importance because it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report. If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact, formulation of the problem often follows a sequential pattern where a number of formulations are set up, each more realistic in terms of the available data and resources.
The research problem under consideration has been formulated as per the approach mentioned above.

ii. **Extensive literature survey:**

Once the problem is formulated, a brief summary of it in the form of ‘Synopsis’ has been submitted. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government publications were referred. It should be remembered that one source would lead to another. The earlier related studies which are similar to the study in hand, carefully studied. A good library would be a great help to the undersigned at this stage.

This part has been covered in the Chapter two of the thesis.

In the case of our research problem, all related published and unpublished data of various conferences, seminars, details submitted to various industry meets, internet websites, various related research thesis submitted at various Universities.

iii. **Development of working hypotheses:**

After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. They also affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data, which is required for the analysis. In most types of research, the development of working hypothesis plays an important role. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens type of data required and the type of methods of data analysis to be used.
How does one go about developing working hypotheses? The answer is by using the following approach:

**Approach:**

- Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution.
- Examination of data and records, concerning the problem for possible trends, peculiarities and other clues;
- Review of similar studies in the area or of the studies on similar Problems.
- Exploratory personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem.

Thus, working hypotheses raised as a result of a – priori thinking about the subject, examination of the available data and material including related studies and the counsel of experts and interested parties. Working hypotheses are more useful when stated in precise and clearly defined terms. It may as well be remembered that occasionally we may encounter a problem where we do not need working hypotheses, especially in the case of exploratory or formulative researches, which do not aim at testing the hypothesis. But as a general rule, specification of working hypotheses in another basic step of the research process in most research problem.

**Hypothesis:**

Hypothesis is usually considered as the principal instrument in research. Its main function is to suggest new experiments & observations.

Ordinarily, when we talk about hypothesis, one simply means a more assumption or some supposition to be proved or disproved. But for us i.e. researcher hypothesis is a formal question that he intends to resolve. Thus a hypothesis may be defined as a preposition or a set of preposition set forth as an explanation for
the occurrence of some investigation or accepted as highly probable in the light of established facts.

- "Additional (Limiting) factors hinder/ de motivates positive buying decision."
- "Additional factors do not play dominating role in decisions for the purchase of water & air conditioners."
- "Air & water conditioners are the products suitable for the saler's market."

iv. Research design:

The research problem having been formulated in clear cut term, the as a researcher, I would be required to prepare a research design, i.e., I would have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purpose may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation A flexible research design, which provides opportunity for considering may different aspects of a problem, is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximizes the reliability of the data collected and analyzed.

The preparation of the research design, appropriate for this research problem, involves usually the consideration of the following:

- The means of obtaining the information;
- The availability and skills of the researcher
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- Explanation of the way in which selected means of obtaining information will be organized and the reasoning leading to the selection;
- The time available for research; and the cost factor relating to research, i.e., the finance available for the purpose.

The research problem having been formulated in clear terms, it is required to prepare a research design i.e. conceptual structure within which research is likely to be conducted. The preparation of such design facilitates research to be as efficient as possible yielding maximum information.

**Overall design**: Flexible design (design must provide opportunity for considering different aspect of the problem.)

- **Sampling Design**: Non-probability sampling design (Purposive & Judgment sampling)
- **Sampling Plan**: Sampling unit, Sampling size, Sampling procedures
- **Sampling Size** - 100 (Approx.) (For customers or users group)
  o -15 (approx) (For dealers or sales group)
- **Sample Type**: Stratified random sampling.
- **Statistical Design**: No preplanned design for analysis.
- **Observational Design**: Unstructured instruments for collection of data.
- **Operational Design**: No fixed design about the operational procedures.
- **Data**: Primary and Secondary Data.
- **Contact Methods**: Telephone, Mail, Personal.
- **Type of Research**: Exploratory & conceptual
- **Research Instruments**: Questionnaire, Schedule.

- **Sample design**:

All the items under consideration in any field of inquiry constitute a ‘universe’ or ‘population’. A complete enumeration of all the items in the ‘population’ is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in
practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Not only this, census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample.

It is must to decide the way of selecting a sample or what is peculiarly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample a given population. Thus the plan to select 12 of a city’s 200 drugstores in a certain way constitutes a sample design. Samples can be either probability samples or non-probability samples. With probability samples each element has a known probability of being included in the sample but the non-probability samples do not allow the researcher to determine this probability. Probability samples are those based on simple random sampling, systematic sampling, stratified sampling, judgment sampling and quota sampling techniques. A brief mention of the important sample designs is as follows:

**Deliberate sampling** is also known as purposive or non-probability sampling. This sampling method involves purposive or deliberate selection of particular units of the universe for constituting a sample, which represents the universe. When population elements were selected for inclusion in the sample based on the ease of access, it was **convenience sampling**. At times such a procedure may give very biased results particularly when the population is not homogeneous. On the other hand, in **judgment sampling** the judgment is used for selecting items, which is considered as representative of the population. Judgment sampling is used quite frequently in qualitative research where the desire happens to be to develop hypotheses rather than to generalize to larger populations.

**Simple random sampling** is also known as chance sampling or probability sampling where each and every item in the population has an equal chance of
inclusion in the sample and each one of the possible samples, in case of finite universe has the same probability of being selected.

In some instances the most practical way of sampling is to select every 15\textsuperscript{th} name on a list, every 10\textsuperscript{th} house on one side of a street and so on. Sampling of this type is known as systematic sampling. An element of randomness is usually introduced into this kind of sampling by using random numbers to pick up the unit with which to start. This procedure is useful when sampling frame is available in the form of a list. In such a design the selection process starts by picking some random point in the list and then every n\textsuperscript{th} element is selected until the desired number is secured.

If the population from which a sample is to be drawn does not constitute a homogeneous group, then stratified sampling technique is applied so as to obtain a representative sample. In this technique, the population is stratified into a number of non-overlapping subpopulations or strata and sample items are selected from each stratum. If the items selected from each stratum are based on simple random sampling the entire procedure, first stratification and then simple random sampling, is known as stratified random sampling.

In stratified sampling the cost of taking random sample from individual strata is often so expensive that interviewers are simply given quota to be filled from different strata, the actual selection of items for sample being left to the interviewer's judgment. This is called quota sampling. The size of the quota for each stratum is generally proportionate to the size of that stratum in the population. Quota sampling is thus an important from of non-probability sampling. Quota samples generally happen to be judgment sample rather than random samples.

In practice, several of the methods of sampling described above may well be used in the same study in which case it can be called mixed sampling.

The sample design to be used must be decided by the researcher taking into consideration the nature of the inquiry and other related factors.
v. Data Collection:

In dealing with any real life problem it is often found that data in hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data, which differ considerably in context of money const, time and other resources at the disposal of the researcher.

Primary data could be collected through survey by any one or more of the following ways:

- Observation:

This method implies the collection of information by way of investigation's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by either the past behavior or future intentions or attitude of respondents. This method is no doubt an expensive method and the information provided by this method is also very limited. As such this method is not suitable in inquiries where large samples are concerned.

In some cases this alternative may be better than asking consumers how they act, because frequently discrepancies exist between how consumers say they behave and what they actually do. Benefit of the observation method is that it frequently can be accomplished subtly, so that consumers do not realize that they are subjects and then change their normal behavior. Therefore, this method may be quite successful in obtaining certain types of behavioral information.

The investigator follows a rigid procedure and seeks answers with the help of a set of pre-conceived questions through personal interviews. This method of collecting data is usually carried out in a structured way where output depends upon the ability of the interviewer to a large extent.
• Interviews:

Direct face-to-face interaction between the interviewer and the respondent is perhaps the personal interview's greatest advantage over other types of surveys. A large amount of information could be obtained with a relatively high degree of accuracy by this approach. Felicity is a further advantage, since questions could be modified to suit the situation or clarification could be provided if necessary. A major disadvantage of this approach, however, is its high cost. Personal interviews often occur in shopping malls because of the relative ease of obtaining a representative group of respondents. These are known as mall intercept interviews. But in our case no mall concept exist in our region i.e. Jhansi

• Through telephone interviews:

This method of collecting information involves contacting the respondents on telephone itself. This was not very widely used method in this research but it plays an important role in industrial surveys in developed regions, particularly, when the survey has to be accomplished in a very limited time.

The telephone survey can be a useful alternative to the personal interview because it provides for interviewer – respondent interaction and is quicker and less expensive to conduct than are personal interviews. Today, access to Wide Area Telephone Service (WATS) makes it easy for researchers to sample a vast geographic area for a comparatively low price. It is also easier to reach subjects by telephone, and many people who would not consent to a personal interview are willing to participate over the phone. These surveys generally achieve higher response rates than do mail surveys or personal interviews.

Telephone surveys have some basic limitations, however. First, the amount of information that can be obtained is limited because of difficulty in keeping respondents on the phone and interested for any extended period. Second, the type of information obtainable is limited. For example, measuring the intensity of consumers' feelings is difficult, and questions containing numerous response options are cumbersome
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- **Mail Surveys**

Although sometimes underestimated by market researchers, many companies have successfully used this approach. Mail-questionnaire surveys have long been used by researchers because of their low potential cost per respondent, their ability to reach widely dispersed consumer, and their ability to obtain large amounts of data and allow more sophisticated questioning techniques, such as measuring scales.

In this approach consumers receive a questionnaire in the mail, complete it at their leisure. And return it, usually in a postpaid envelope. Since respondents are seldom asked to identify themselves, a mail survey can reduce their reluctance to reveal sensitive information. Of course, there are also disadvantages to this type of survey. Mail interviews can result in a small number of responses, with many questionnaires ending up in wastebaskets. Another problem concerns the long time it may take for respondents to return the questionnaire. Follow-up letters to remind consumers of their delay can increase response rates but also boost costs. Also, since there is no interviewer–respondent interaction, questions must be worded carefully to avoid ambiguity and the questionnaire should be carefully protested to detect any deficiencies.

No matter, which survey method, is used, the researcher must be concerned about no response error introduced when those who are not reached or refuse to cooperate are different in important ways from those who do respond. For this reason researcher tries to increase participation by such means as pre-notifying the individual that a questionnaire is on its way, offering inducements to participate (such as enclosing a dollar bill with the questionnaire), and making callbacks for not-at-homes.

- **Mailing of questionnaires:**

The researcher and the respondents do come in contact with each other when this method of survey is adopted. Questionnaires were mailed to the some of the respondents (To whom direct contact was difficult) with a request to return after completing the same. It is the most extensively used method in various economic
and business surveys. Before applying this method, usually a Pilot Study for testing the questionnaire was conducted which revealed the weaknesses, if any, of the questionnaire. Questionnaire to be used must be prepared very carefully so that it may prove to be effective in collecting the relevant information.

- Through schedules:

Under this method the enumerators are appointed and given training. They are provided with schedules containing relevant questions. These enumerators go to respondents with these schedules. Data are collected by filling up to schedules by enumerators on the basis of replies given by respondents. Much depends upon the capability of enumerators so far as this method is concerned. Some occasional field checks on the work of the enumerators may ensure sincere work.

No enumerator was appointed for the purpose, Researcher himself went to respondents to get questionnaire filled.

vi. Execution of the project:

Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. As a researcher it should be seen that the project is executed in a systematic manner and in time. Since the survey was to be conducted by means of structured questionnaires, data could be readily machine-processed. In such a situation, questions as well as the possible answers were coded. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible. This, in other words, suitable steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy.
vii. Analysis of data:

After the data have been collected, the researcher turns to the task of analyzing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis. Thus, the raw data was classified into some purposeful and usable categories. Coding operation was usually done at this stage through which the categories of data were transformed into symbols that might be tabulated and counted. Editing was the procedure that improved the quality of the data for coding. With coding the stage was ready for tabulation. Tabulation is a part of the technical procedure wherein the classified data are put in the from of tables. The mechanical devices could be made use of at this juncture. Computers tabulate a great deal of data, especially in large inquiries. Computers not only saved time but also made it possible to study large number of variables affecting a problem simultaneously.

Analysis work after tabulation is generally based on the computation various percentage, coefficients, etc. by applying various well-defined statistical formulae. In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s). In brief, the researcher can analyze the collected data with the help of various statistical measures.

STATISTICAL TOOLS USED IN ANALYSIS OF DATA:

Contingency Tables

The cross-tabulation of categorical data is perhaps the most commonly encountered and simple form of analysis in marketing research (Hoffman and Franke, 1986). Examination of row and column profiles allows the researcher to examine the relative position of the columns and rows to each other and thus establish distinguishing characteristics. A simple interpretation of results can be
done by the visual examination of cell characteristics. Larger contingency tables, i.e. those with more rows and/or columns, can become very complex to interpret and several aids are brought to bear to assist in this process. Examination of row and column profiles allows the researcher to examine the relative position of the columns and rows to each other and thus establish distinguishing characteristics. The statistical analytical procedure that can be applied to a contingency table is the Chi-square test of independence. This statistical test is used to determine whether the rows and columns are independent of one another, or phrased differently, whether there is a statistically significant dependence between the rows and columns. It is important to note that, while this test may be used to establish dependence, little information is provided as to the nature of the dependence. However, visual interpretation may not be clear in larger contingency tables and the contribution of each cell to the total Chi-square score becomes a useful way of establishing the nature of dependency. Hypothesis tests may be performed on contingency tables in order to decide whether or not effects are present. Effects in a contingency table are defined as relationships between the row and column variables; that is, are the levels of the row variable differentially distributed over levels of the column variables. Significance in this hypothesis test means that interpretation of the cell frequencies is warranted means valid/true or in other words that the rows and columns in the contingency table are dependent. Non-significance means that any differences in cell frequencies could be explained by chance.

**Correspondence Analysis:**
Larger contingency tables, i.e. those with more rows and/or columns, can become very complex to interpret and several aids are brought to bear to assist in this process. Examination of row and column profiles allows the researcher to examine the relative position of the columns and rows to each other and thus establish distinguishing characteristics.
An alternative means of extracting the nature of the dependency between the rows and columns of the larger size contingency table is to represent the row or column profiles graphically.
The rows of contingency table can be represented graphically in column space. In can be shown in general that if there are $n$ columns (or rows), then perfect representation can be achieved in $n-1$ dimensions. It can be seen that perfect graphical representation becomes problematic when there are more than three or four columns (or rows) involved. Thus, the graphical procedure demonstrated is only useful for contingency tables that have a maximum of 3 rows or columns. There is considerable appeal in representing contingency tables graphically in low dimensional space for easy interpretation of any dependency between rows and columns. This is the idea behind correspondence analysis which analysis allows the optimal representation of a contingency table in low-dimensional space. For instance, it would be necessary to resort to 15-dimensional space for perfect graphical representation of a 16x16 contingency table, perhaps 75% of the subtlety of the table could be retained in just two dimensions. This represents an enormous gain in simplicity (2 versus 15 dimensions) for an acceptable trade-off in accuracy of representation (75% versus 100%). The mathematical procedures involved in correspondence analysis are well documented in Greenacre (1984), Lebart et al. (1982) and Hoffman and Franke (1986).

**Significance of Dependencies:**

The first step in the interpretation of correspondence analysis is to establish whether there is a significant dependency between the rows and columns. There are two approaches to establish significance. Firstly, the trace is examined. This appears in the eigen value report. The square root of the trace may be interpreted as a correlation coefficient between the rows and columns. As a rule of thumb, any value of this correlation co-efficient in excess of 0.2 indicates significant dependency. This is a rough and ready approximation and a more thorough approach is to calculate the chi-square statistic.

**Dimensionality of the Solution:**

The second step in interpretation is to determine the appropriate number of dimensions to use in the solution. This is achieved by examining the eigen value report in more detail. The sum of the eigen values is equal to the trace. The ratio
of the eigen value of any axis to the trace represents the proportion of the total "inertia" (or chi-square value) explained by that axis.

Interpreting the Axes:

It is common practice to simply plot the co-ordinates presented in the correspondence analysis output. This is termed the *French plot* or *symmetric plot*. While this plot may be useful, it may also lead to misinterpretation if examined in isolation or only visually. The reason for this is that *principal co-ordinates* are presented for both rows and columns. These co-ordinates represent the row and column profiles and not the apexes for which the *standard co-ordinates* are required. This means that while the distances between any row items and the distance between column items is meaningful and may be interpreted, the distance between any row and column items is not! In order to interpret any inter-point distances; the columns (profiles) must be presented in row space (vertices) or vice-versa. The French plot represents the row and column profiles simultaneously in a common space.

This problem may be overcome in one of two ways. The simplest way is to present only asymmetric plots. The apices of either the rows (or the columns) are plotted from the standard co-ordinates and the profiles of the columns (or the rows) are plotted from the principle co-ordinates. A more complex, but very much more satisfying way of overcoming this problem in terms of richness in meaning, is to interpret the axes in terms of the rows (or the columns) and plot only the column points (or row points) in the space of the labeled axes.

The above discussion represents a basic introduction to the use of correspondence analysis for the analysis of contingency tables in marketing research, specifically the construction of perceptual maps. Bendixen (1995) discussed a more advanced treatment of such data, including the segmentation of markets into perceptual groups; the use of itemised rating scales is common in research, e.g. a 5-point Likert scale. As a matter of convenience, such data is usually assumed to behave in an interval fashion whereas it is strictly only ordinal. Correspondence analysis may be used to rescale such data. Dual or optimal scaling involves considering the co-ordinates only on the first principal
axis (Greenacre, 1984). More recently, Bendixen and Sandler (1995) have proposed that the first two axes be used for this purpose so as to accommodate nonlinear effects.

Hoffman and Franke (1986, p225-226). Conclude that in the context of marketing research:

"Correspondence analysis is very flexible. Not only is it flexible in terms of data requirements, but also allows for incorporation of marketing knowledge."

"Categorical data are common products of marketing research. However, the analysis of such data often is hindered by the requirements and limitations of many familiar research tools. Correspondence analysis is a versatile and easily implemented analytical method that can do much to assist researchers in detecting and explaining relationships among complex marketing phenomena."

**Graphical depiction:**

Histogram and pie charts have been used for visual description of the observed data.

**Soft wares used:**
The statistical analyses of data were performed using SYSTAT software version 12.0, whereas the Histograms and Pie charts have been prepared using Microsoft Excel.

**Hypothesis testing:**

After analyzing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or thy happen to be contrary? This is the usual question, which should be answered while testing hypotheses. Statisticians have developed various tests, such as chi square test, t-test, F-test, for the purpose. The hypotheses may be tested through the use of one or more of such tests,
depending upon the nature and object of research inquiry. Hypothesis testing will result in either accepting the hypothesis or in rejecting it.

Since we had no hypotheses to start with, generalizations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

5.9 CONSUMER RESEARCH STRATEGIES

Many special strategies are available in the process of researching consumers. For example, studies may differ according to the goal of the research, the type of data used, and the time frame of the investigation.

GOALS OF CONSUMER RESEARCH:

Two major strategies of consumer research, classified according to their goals, are exploratory and conclusive studies.

Exploratory research is used to identify variables influencing consumers and discover how consumers may tend to react to these factors. This research occurs in situations when there is not enough known about consumers to draw conclusion about what variables are influencing their behavior. Two significant methods used in exploratory research are consumer suggestions and focus groups.

CONSUMER SUGGESTIONS: In the business world, many influences and problems encountered by consumers are discovered through the spontaneous suggestions of consumers themselves. Consumers suggestions collected through various means were recorded and the same became very much useful in analysis & drawing conclusions.
FOCUS GROUPS Another popular technique for exploratory research is the focus group interview. Focus groups generally bring together in a casual setting eight to ten people with similar backgrounds to apply the principles of group dynamics and free association to a marketing problem. A moderator guides the discussion but allows consumers to interact with each other.

Focus groups could be helpful in specific ways to

- Generate hypotheses about consumers and market situation.
- Suggest fresh and revitalized ideas.
- Understand consumers’ motivation.
- Understand consumers’ lifestyles and personalities.
- Understand various hidden factors affecting consumer behavior.

It is important to appreciate that the primary objective of exploratory research such as focus—group interviewing was hypothesis formulation, that is, forming a conjectural statement about the relationship between two or more variables.

Conclusive Research Conclusive research builds upon exploratory research, specifically; the major goals of conclusive research are to describe consumers’ behavior and to offer explanations for its causes. In addition, the predication of consumers’ behavior and methods of influencing it can be suggested by conclusive research.

MEASURING CONSUMER CHARACTERISTICS

Consumer research may also be classified according to whether demographic; activity, or cognitive information was sought. The following discussing will focus primarily on cognitive research approaches.

Demographic Measures

Demographic research is concerned with gathering vital statistics about consumers—such characteristics as their age, income, sex, occupation, location, marital status, and education. Since these characteristics were easily
quantifiable, they enable the marketer to describe accurately and specifically and to understand better certain consumer characteristics.

Much of the demographic data on consumer markets is a product of state, and local government sources. One of the best sources of demographic data was the ‘U.P. & Uttrakhand at a glance’ by Dainik Jagran. Population statistics and other official information were easily obtained and could be useful.

**Cognitive Measures**

Consumer researchers who desire to know more about their market than just demographic characteristics or activity patterns may attempt to collect cognitive information, what is, information about consumers' knowledge, attitudes, motivations, perceptions and information processing. Merely observing consumers cannot fully explain why they behave as they do, and questioning often does not provide reliable answers because of consumer's inability or reluctance to reveal true feelings to an interviewer. Thus, researchers attempt to utilize other techniques to explore intervening variables potentially useful in explaining consumer behavior.

This describes associative and projective techniques that were used in consumer research to help explain the why of consumer behavior. Also, the depth interview is discussed because of its primary use in uncovering motives. Finally, attitudinal research approaches incorporating rating scales are presented.

**Sentence-completion test** is an adaptation of the word-association test in which the interviewer begins a sentence and the respondent finishes it. The story-completion test is yet another expanded word-association test in which the respondent was told part of a story and is instructed to complete it in his or her own words. This technique could be useful in uncovering the images consumers have about various stimuli.

**PROJECTIVE TESTS:**

Projective tests calls for the respondent to decide what another person would do in a certain situation. People may be reluctant to admit certain weaknesses or
desires, but when they are asked to describe a neighbor or another person, they usually respond without hesitation. Thus, projective techniques are based on the assumption that respondents express their own attitudes or motives as they infer the attitudes or motives of someone else.

Mason Haire conducted a classic motivation research study regarding consumer attitudes toward instant coffee and based on this theory in 1950. Direct-question interviews revealed a dislike of instant coffee because of the tests, but this was believed to be a stereotyped response rather than the true reason. In an effort to discover other reasons for this negative attitude, an in direct approach was used. Respondents were shown one of two identical grocery shopping list, varying only in the brand and type of coffee. One list contained “Nescafe Instant Coffee and the other, “Maxwell House Coffee (drip ground).” They were then asked to characterize the woman who purchased the groceries. Descriptions indicated that compared to the drip-ground buyer, the instant-coffee purchaser was thought to be lazy, a spendthrift, not a good wife, and one who failed to plan household purchases and schedules well. Although these findings are probably not true today, they were initially useful in better understanding consumer motivation. They indicated that respondents were not really dissatisfied with the taste of instant coffee, but rather the idea of using it was unacceptable. Respondents were projection their own feelings about instant coffee onto the descriptions of the woman who purchased it.

One question in the questionnaire is of this nature.

Another form of projective test makes use of pictures as stimuli. One example is the Thematic Apperception Test (TAT), in which respondents are shown ambiguous pictures concerning the product or topic under study and asked to described what is happening in the picture. Because the pictures are so vague, it is believed what is happening in the picture. Because the pictures are so vague, it is believed that the respondents will actually reveal their own personalities, motivations, and inner feelings about the situation.
DEEPTH INTERVIEWS

As are the focus-group interviews, depth interviews are unstructured and informal. General questions are usually asked, followed by more specific questions that probe for needs, desires, motives, and emotions of the consumer. Also, the questioning is sometimes indirect, such as, “Why do your friend do not drink non purified water?” as opposed to the direct question. “Why do your friend prefer water purifiers?” Again, this method attempts to circumvent inhibitions the respondent, an interviewer can ask a series of questions that probe for underlying motivations.

The key factor with depth interviewing (as well as focus-group interviewing) is the interviewer’s skill, which calls for imagination and thoroughness in probing consumer leads while not influencing the respondent’s answers. Because of their very nature, interview results are interpreted subjectively rather than quantitatively. Thus, there is a great possibility for bias. An additional source of error from depth and focus-group interviews may arise with the use of small samples, which may not be representative of the entire population.

Depth interviews of various experts, experienced dealers and Company's marketing officers were taken.

ATTITUDE-MEASUREMENT SCALES

Significant strides have been made in the area of measuring consumer's attitudes. This has resulted in the development of various self-respecting attitude-rating scales. The scales are termed self-reporting because consumers express their own evaluation of their attitudes by responding to the scale in the way they think most appropriate.

The many scales available differ mainly in their structure and in the degree to which they actually measure attitudes. This section presents two of the more widely used scales in consumer research—the Likert scale and the semantic differential.
LIKERT (SUMMATED) SCALES:

Use of this approach involves compiling a list of statements relevant to the attitudes under investigation with agreement-disagreement response scales ranging, for example, from "strongly agree" to "strongly disagree." Each location on the scale carries a point value. Consumers indicate which response most nearly expresses their attitude about the statement.

Often an individual's responses are summed to produce a total or summed score.

As in all of the approaches that have been mentioned, the decision to use a specific method or scaling technique must depend on the type of information being sought by the researcher as well as the way in which the data are to be applied.

This brief review of research methods used in this research thesis to know more about consumers was certainly not designed to be comprehensive or even fully descriptive of each of the techniques chosen for the research. However, it is hoped that what has been provided will provide needed results to discover about consumers and their behavior.