RESEARCH METHODS

I-MBA 6th Semester

MODULE-1

MEANING OF RESEARCH

Research in simple terms refers to search for knowledge. It is a scientific and systematic search for information on a particular topic or issue. It is also known as the art of scientific investigation. Several social scientists have defined research in different ways.

Research is the search for knowledge, using objective and systematic methods to find solution to a problem.

OBJECTIVES OF RESEARCH

The objective of research is to find answers to the questions by applying scientific procedures. In other words, the main aim of research is to find out the truth which is hidden and has not yet been discovered.

- To gain familiarity with new insights into a phenomenon (i.e., formulate research studies);
- To accurately portray the characteristics of a particular individual, group,or a situation (i.e., descriptive research studies);
- To analyse the frequency with which something occurs (i.e., diagnosticresearch studies); and
- To examine the hypothesis of a causal relationship between twovariables (i.e., hypothesis-testing research studies).

RESEARCH METHODS VERSUS METHODOLOGY

Research methods include all those techniques/methods that are adopted for conducting research. On the other hand, research methodology is the way in which research problems are solved systematically.

TYPES OF RESEARCH:

❖ There are different types of research.

1. DESCRIPTIVE VERSUS ANALYTICAL:

Descriptive research consists of surveys and fact-finding enquiries of different types. The main objective of descriptive research isdescribing the state of affairs as it prevails at the time of study. The term‘ex post facto research’ is quite often used for descriptive research studies in social sciences and business research. The researcher has no control over the variables here. He/she has to only report what is happening

or what has happened. Majority of the ex post facto research projects are used for descriptive studies in which the researcher attempts to examine phenomena, such as the consumers' preferences, frequency of purchases, shopping, etc.

Meanwhile in the Analytical research, the researcher has to use the already available facts or information, and analyse them to make a critical evaluation of the subject.

2. APPLIED VERSUS FUNDAMENTAL:

Research can also be applied or fundamental in nature. An attempt to find a solution to an immediate problem encountered by a firm, an industry, a business organisation, or the society is known as applied research.

On the other hand, fundamental research mainly concerns generalizations and formulation of a theory. In other words, "Gathering knowledge for knowledge's sake is termed 'pure' or 'basic' research" Researches relating to pure mathematics or concerning some natural phenomenon are instances of Fundamental Research. Likewise, studies focusing on human behaviour also fall under the category of fundamental research. Thus, while the principal objective of applied research is to find a solution to some pressing practical problem, the objective of basic research is to find information with a broad base of application and add to the already existing organized body of scientificknowledge.

3. QUANTITATIVE VERSUS QUALITATIVE

Quantitative research relates to aspects that can be quantified or can be expressed in terms of quantity. It involves the measurement of quantity or amount.

On the other hand, Qualitative research is concerned with qualitative phenomena, or more specifically, the aspects related to or involving quality or kind. For example, an important type of qualitative research is 'Motivation Research', which investigates into the reasonsfor certain human behaviour.

4. CONCEPTUAL VERSUS EMPIRICAL

The research related to some abstract idea or theory is known as Conceptual Research. Generally, philosophers and thinkers use it fordeveloping new concepts or for reinterpreting the existing ones.

Empirical Research, on the other hand, exclusively relies on the observation or experience with hardly any regard for theory and system. Such research is data based, which often comes up with conclusions that can be verified through experiments or observation. Empirical researchis also known as experimental type of research, in which it is important to first collect the facts and their sources, and actively take steps to stimulate the production of desired information. In this type of research, the researcher first formulates a working hypothesis, and then gathers

sufficient facts to prove or disprove the stated hypothesis.

SIGNIFICANCE OF RESEARCH

- Research encourages scientific and inductive thinking. The role ofresearch in applied economics in the context of an economy or business is greatly increasing in modern times.
- Research assumes significant role in the formulation of economic policy for both, the government and business. Government budget formulation, for example, depends particularly on the 11 analysis of needs and desires of people, and the availability of revenues, which requires research.
- Research also helps in the proper allocation of a country's scarce resources.
- Research is also necessary for collecting information on the social and economic structure of an economy to understand the process of change occurring in the country.
- Research also assumes significance in solving various operational and planning problems associated with business and industry. In several ways, operations research, market research and motivational research are vital and their results assist in taking business decisions.
- Market research refers to the investigation of the structure and development of a market for the formulation of efficient policies relating to purchases, production and sales.
- Operational research relates to the application of logical, mathematical, and analytical techniques to find solution to business problems, such as cost minimization or profit maximization, or the optimization problems.
- Motivational research helps to determine why people behave in the manner they do with respect to market characteristics.
- Research is equally important to social scientists for analyzing the social relationships and seeking explanations to various social problems.

RESEARCH PROCESS

Research process consists of a series of steps or actions required foreffectively conducting research.

The following are the steps that provide useful procedural guidelinesregarding the conduct of research:

- Formulating the research problem
- Extensive literature survey
- Developing hypothesis
- Preparing the research design
- Determining sample design
- Collecting data
- Execution of the project
- Analysis of data
- Hypothesis testing
- Generalization and interpretation
- Preparation of the report or presentation of the results.

FORMULATING THE RESEARCH PROBLEM

There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must find out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into.

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.

EXTENSIVE LITERATURE SURVEY

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 reports, books etc., must be tapped depending on the nature of the problem. A good library will be a great help to the researcher at this stage.

DEVELOPMENT OF WORKING HYPOTHESES

- After extensive literature survey, researcher should state in clear termsthe working hypothesis or hypotheses.
- Working hypothesis is tentative assumption made in order to draw outand test its logical or empirical consequences.
- The role of the hypothesis is to guide the researcher by delimiting thearea of research and to keep him on the right track.

PREPARING THE RESEARCH DESIGN

- It refers to the conceptual structure within which research would beconducted.
- The preparation of such a design facilitates research to be as efficient aspossible yielding maximal information.
- The preparation of the research design, appropriate for a particularresearch problem, involves usually the consideration of the following:
  - The means of obtaining the information.

- The availability and skills of the researcher and his staff (if any).
- Explanation of the way in which selected means of obtaining information will be organised and the reasoning leading to the selection.
- The time available for research.
- The cost factor relating to research, i.e., the finance available for the purpose.

DETERMINING 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.

- Census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite oftenwe select only a few items from the universe for our study purposes. Theitems so selected constitute what is technically called a sample.

- The researcher must decide the way of selecting a sample or what ispopularly known as the 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, cluster/area sampling whereas non-probability samples are those based on convenience sampling, judgement sampling and quota sampling techniques. A brief mention of the important sample designs is as follows:

(i) Deliberate sampling:

- ✓ 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 are selected for inclusion in the sample based on the ease of access, it can be called *convenience sampling*.

- ✓ On the other hand, in *judgement sampling* the researcher's judgement issued for selecting items which he considers as representative of the population. For example, a judgement sample of college students might be taken to secure reactions to a new method of teaching. Judgement sampling is used quite frequently in qualitative research where the desire happens to be to develop hypotheses rather than to generalise to larger populations.

(ii) Simple Random Sampling:

- ✓ This type of 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.

- ✓ For example, if we have to select a sample of 300 items from a universe of 15,000 items, then we can put the names or numbers of all the 15,000 items on slips of paper and conduct a lottery.

(iii) Systematic sampling

- ✓ In some instances the most practical way of sampling is to select every 15th name on a list, every 10th house on one side of a street and so on. Sampling of this type is known as systematic sampling.

(iv) Stratified sampling:

- ✓ If the population from which a sample is to be drawn does not constitute a homogeneous group, then stratified sampling technique is applied.

- ✓ In this technique, the population is stratified into a number of non- overlapping subpopulations or strata and sample items are selected from each stratum.

(v) Quota sampling:

- ✓ In stratified sampling the cost of taking random samples 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 judgement. 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 form of non-probability sampling.

(vi) Cluster sampling and area sampling:

- ✓ Cluster sampling involves grouping the population and then selectingthe groups or the clusters rather than individual elements for inclusion in the sample.

- ✓ Suppose some departmental store wishes to sample its credit card holders. It has issued its cards to 15,000 customers. The sample sizeis to be kept say 450. For cluster sampling this list of 15,000 card holders could be formed into 100 clusters of 150 card holders each. Three clusters might then be selected for the sample randomly.

- ✓ *Area sampling* is quite close to cluster sampling and is often talked about when the total geographical area of interest happens to be big one.

- ✓ Under area sampling we first divide the total area into a number of smaller non-overlapping areas, generally called geographical clusters,then a number of these smaller areas are randomly selected, and all units in these small areas are included in the sample.

(vii) Multi-stage sampling:

- ✓ This is a further development of the idea of cluster sampling. This technique is meant for big inquiries extending to a considerably large geographical area like an entire country.

- ✓ Under multi-stage sampling the first stage may be to select large primary sampling units such as states, then districts, then towns and finally certain families within towns.

(viii) Sequential sampling:

- ✓ This is somewhat a complex sample design where the ultimate size of the sample is not fixed in advance but is determined according to mathematical decisions on the basis of information yielded as survey progresses.

- ✓ This design is usually adopted under acceptance sampling plan in the context of statistical quality control.

COLLECTING THE DATA:

- ➢ In dealing with any real life problem it is often found that data at 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 costs, time and other resources at the disposal of the researcher.

- ➢ Primary data can be collected either through experiment or through survey.

- ➢ in the case of a survey, data can be collected by any one or more of the following ways:

(i) By observation:

This method implies the collection of information by way ofinvestigator's own observation, without interviewing the respondents.

(ii) Through personal interview:

The investigator follows a rigid procedure and seeks answers to aset of pre-conceived questions through personal interviews.

(iii) Through telephone interviews:

This method of collecting information involves contacting the respondents on telephone itself.

(iv) By mailing of questionnaires:

The researcher and the respondents do come in contact with eachother if this method of survey is adopted.

Questionnaires are mailed to the respondents 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 is conduced which reveals the weaknesses, if any, of the questionnaire.

(v) 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 the schedules by enumerators on the basis of replies given by respondents

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 becollected would be adequate and dependable.
- The researcher should see that the project is executed in a systematicmanner and in time.

ANALYSIS OF DATA:

- After the data have been collected, the researcher turns to the task ofanalysing them.
- The analysis of data requires a number of closely related operationssuch as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statisticalinferences.

HYPOTHESIS-TESTING:

- After analysing the data as stated above, the researcher is in a positionto test the hypotheses, if any, he had formulated earlier.
- Various tests, such as Chi square test, *t*-test, *F*-test, have beendeveloped by statisticians for the purpose.
- The hypotheses may be tested through the use of one or more of suchtests, depending upon the nature and object of research inquiry.
- Hypothesis-testing will result in either accepting the hypothesisor in rejecting it.

GENERALISATIONS AND INTERPRETATION:

- If a hypothesis is tested and upheld several times, it may be possible forthe researcher to arrive at generalization, i.e., to build a theory.
- As a matter of fact, the real value of research lies in its ability to arriveat certain generalizations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory.It is known as interpretation.

PREPARATION OF THE REPORT OR THE THESIS:

Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care keeping in view the following:

The layout of the report should be as follows:

(i) The Preliminary Pages

(ii) The Main Text

(iii) The End Matter

The Preliminary Pages

In its preliminary pages the report should carry title and date followed by acknowledgements and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts, if any, given in the report.

The Main Text

The main text of the report should have the following parts:

(a) Introduction:

It should contain a clear statement of the objective of the research and an explanation of the methodology adopted in accomplishing the research. The scope of the study along with various limitations should as well be stated in this part.

(b) Summary of findings:

After introduction there would appear a statement of findings and recommendations in non-technical language. If the findings are extensive, they should be summarised.

(c) Main report:

The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections.

(d) Conclusion:

Towards the end of the main text, researcher should again put down the results of his research clearly and precisely. In fact, it is the final summing up.

The End Matter

At the end of the report, appendices should be enlisted in respect of all technical data. Bibliography, i.e., list of books, journals, reports, etc., consulted,should also be given in the end. Index should also be given specially in apublished research report.

RESEARCH DESIGN:

The most important step after defining the research problem is preparing the design of the research project, which is popularly known as the 'research design'.

A research design helps to decide upon issues like what, when, where, how much, by what means etc. with regard to an enquiry or a research study. Infact, research design is the conceptual structure within which research is conducted.

Specifically, the research design highlights decisions which include:

- The nature of the study
- The purpose of the study
- The location where the study would be conducted
- The nature of data required
- From where the required data can be collected
- What time period the study would cover
- The type of sample design that would be used
- The techniques of data collection that would be used
- The methods of data analysis that would be adopted and
- The manner in which the report would be prepared In view of the stated research design decisions, the overall research design may be divided into the following (Kothari 1988):

a. The sampling design that deals with the method of selecting items to be observed for the selected study.

b. The observational design that relates to the conditions under which the observations are to be made.

c. The statistical design that concerns with the question of how many items are to be observed, and how the information and data gathered are to be analysed.

d. The operational design that deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

FEATURES OF RESEARCH DESIGN:

The important features of Research Design may be outlined as follows:

- It constitutes a plan that identifies the types and sources of information required for the research problem
- It constitutes a strategy that specifies the methods of data collection and analysis which would be adopted.
- It also specifies the time period of research and monetary budget involved in conducting the study, which comprise the two major constraints of undertaking any research

CONCEPTS RELATING TO RESEARCH DESIGN:

Some of the important concepts relating to Research Design arediscussed below:

Dependent And Independent Variables:

A magnitude that varies is known as a variable. The concept may assume different quantitative values like height, weight, income etc. Qualitative variables are not quantifiable in the strictest sense of the term. However, the qualitative phenomena may also be quantified in terms of the presence or absence of the attribute(s) considered. The phenomena that assume different values quantitatively even in decimal points are known as 'continuous variables'. But all variables need not be continuous. Values that can be expressed only in integer values are called 'non-continuous variables'. In statistical terms, they are also known as 'discrete variables'.

For example, age is a continuous variable, whereas the number of children is a non-continuous variable. When changes in one variable depend upon the changes in other variable or variables, it is known as a dependent or endogenous variable, and the variables that cause the changes in the dependent variable are known as the independent or explanatory or exogenous variables. For example, if demand depends upon price, then demand is a dependent variable, while price is the independent variable. And, if more variables determine demand, like income and price of the substitute commodity, then demand also depends upon them in addition to the price of original commodity. In other words, demand is a dependent variable which is determined by the independent variables like price of the original commodity, income and price of substitutes.

Extraneous Variables:

The independent variables which are not directly related to the purpose of the study but affect the dependent variables, are known as extraneous variables.

For instance, assume that a researcher wants to test the hypothesis that there is a relationship between children's school performance and their self- confidence, in which case the latter is an independent variable and the former, a dependent variable. In this context, intelligence may also influence the school performance. However, since it is not directly related to the purpose of the study undertaken by the researcher, it would be known as an extraneous variable.

The influence caused by the extraneous variable(s) on the dependent variable is technically called the 'experimental error'.

Control:

One of the most important features of a good research design is to minimize the effect of extraneous variable(s) which is known as control.

Confounded Relationship:

The relationship between the dependent and independent variables is said to be confounded by an extraneous variable, when the dependent variable is not free from its effects.

Research Hypothesis:

When a prediction or a hypothesized relationship is tested by adopting scientific methods, it is known as research hypothesis. Generally, a research hypothesis must consist of at least one dependent variable and one independent variable.

Whereas, the relationships that are assumed but not to be tested are predictive statements that are not to be objectively verified, thus are notclassified as research hypotheses.

Experimental and Non-experimental Hypothesis Testing Research:

When the objective of a research is to test a research hypothesis, it is known as hypothesis-testing research.

Such research may be in the nature of experimental design or non- experimental design.

The research in which the independent variable is manipulated is known as 'experimental hypothesis-testing research', whereas the research in which the independent variable is not manipulated is termed as 'non-experimental hypothesis testing research'.

For example, assume that a researcher wants to examine whether family income influences the school attendance of a group of students, by calculating the coefficient of correlation between the two variables. Such an example is known as a non-experimental hypothesis testing research, because the independent variable - family income is not manipulated here. Again assume that the researcher randomly selects 150 students from a group of students who pay their school fees regularly and then classifies them into two sub-groups by randomly including 75 in Group A, whose parents have regularearning, and 75 in Group B, whose parents do not have regular earning. Assume that at the end of the study, the researcher conducts a test on each group in order to examine the effects of regular earnings of the parents on the school attendance of the student. Such a study is an example of experimental hypothesis-testing research, because in this particular study the independent variable regular earnings of the parents have been manipulated.

Experimental And Control Groups:

When a group is exposed to usual conditions in an experimental hypothesis-testing research, it is known as 'control group'. On the other hand, when the group is exposed to certain new or special condition, it is known as an 'experimental group'. In the afore-mentioned example, Group A can be called as control group and Group B as experimental group. If both the groups, A and B are exposed to some special feature, then both the

groups may be called as 'experimental groups'. A research design may include only the experimental group or both the experimental and control groups together.

Treatments:

Treatments refer to the different conditions to which the experimental and control groups are subject to. In the example considered, the two treatments are the parents with regular earnings and those with no regular earnings.

Likewise, if a research study attempts to examine through an experiment the comparative effect of three different types of fertilizers on the yield of rice crop, then the three types of fertilizers would be treated as the three treatments.

Experiment:

Experiment refers to the process of verifying the truth of a statisticalhypothesis relating to a given research problem.

For instance, an experiment may be conducted to examine the yield of acertain new variety of rice crop developed.

Experimental Unit(s):

Experimental units refer to the pre-determined plots, characteristics or the blocks, to which different treatments are applied. It is worth mentioning here that such experimental units must be selected with great caution.

TYPES OF RESEARCH DESIGN:

There are different types of research designs. They may be broadlycategorized as:

- Exploratory Research Design;
- Descriptive and Diagnostic Research Design
- Hypothesis-Testing Research Design.

Exploratory Research Design:

The Exploratory Research Design is known as formulative research design. The main objective of using such a research design is to formulate a research problem for an in-depth or more precise investigation, or for developing a working hypothesis from an operational aspect.

The major purpose of such studies is the discovery of ideas and insights.

Usually, the following three methods are considered in the context of aresearch design for such studies. They are

(a) A survey of related literature

(b) Experience survey

(c) Analysis of 'insight-stimulating' instances.

Descriptive And Diagnostic Research Design:

A Descriptive Research Design is concerned with describing the characteristics of a particular individual or a group.

Meanwhile, a diagnostic research design determines the frequency with which a variable occurs or its relationship with another variable. In other words, the study analyzing whether a certain variable is associated with another comprises a diagnostic research study.

On the other hand, a study that is concerned with specific predictions or with the narration of facts and characteristics related to an individual, group or situation, are instances of descriptive research studies. Generally, most of the social research design falls under this category.

As a research design, both the descriptive and diagnostic studies share common requirements, hence they are grouped together. However, the procedure to be used and the research design need to planned carefully. The research design must also make appropriate provision for protection against bias and thus maximize reliability, with due regard to the completion of the research study in an economical manner.

The research design in such studies should be rigid and not flexible.
Besides, it must also focus attention on the following:

- Formulation of the objectives of the study,
- Proper designing of the methods of data collection,
- Sample selection,
- Data collection,
- Processing and analysis of the collected data, and
- Reporting the findings.

Hypothesis-Testing or experimental Research Design:

Hypothesis-Testing Research Designs are those in which the researcher tests the hypothesis of causal relationship between two or more variables.

These studies require procedures that would not only decrease bias and enhance reliability, but also facilitate deriving inferences about the causality. Generally, experiments satisfy such requirements. Hence, when research design is discussed in such studies, it often refers to the design of experiments.

BASIC PRINCIPLES OF EXPERIMENTAL DESIGNS

Professor Fisher has enumerated three principles of experimental designs:

(1) The Principle of Replication

(2) The Principle of Randomization

(3) Principle of Local Control.

THE PRINCIPLE OF REPLICATION :

- According to the Principle of Replication, the experiment should be repeated more than once. Thus, each treatment is applied in many experimental units instead of one. By doing so the statistical accuracy of the experiments is increased.
- For example: suppose we are to examine the effect of two varieties of rice. For this purpose we may divide the field into two parts and grow one variety in one part and the other variety in the other part. We can then compare the yield of the two parts and draw conclusion on that basis. But if we are to apply the principle of replication to this experiment, then we first divide the field into several parts, grow one variety in half of these parts and the other variety in the remaining parts. We can then collect the data of yield of the two varieties and draw conclusion by comparing the same. The result so obtained will be more reliable.

The Principle of Randomization:

- It provides protection, when we conduct an experiment, against the effect of extraneous factors by randomization. In other words, this principle indicates that we should design or plan the experiment in such a way that the variations caused by extraneous factors can all be combined under the general heading of "chance."

- For instance, if we grow one variety of rice, say, in the first half of the parts of a field and the other variety is grown in the other half, then it is just possible that the soil fertility may be different in the first half in comparison to the other half. If this is so, our results would not be realistic. In such a situation, we may assign the variety of rice to be grown in different parts of the field on the basis of some random sampling technique i.e., we may apply randomization principle and protect ourselves against the effects of the extraneous factors (soil fertility differences in the given case). As such, through the application of the principle of randomization, we can have a better estimate of theexperimental error.

The Principle of Local Control *:*

- It is another important principle of experimental designs. Under it the extraneous factor, the known source of variability, is made to vary deliberately over as wide a range as necessary and this need to be done in such a way that the variability it causes can be measured and hence eliminated from the experimental error.

- In other words, according to the principle of local control, we first divide the field into several homogeneous parts, known as blocks, and then each such block is divided into parts equal to the number of treatments. Then the treatments are randomly assigned to these parts of a block. Dividing the field into several homogenous parts is known as 'blocking'.

IMPORTANCE OF RESEARCH DESIGN:

- The need for a research design arises out of the fact that it facilitates the smooth conduct of the various stages of research.

- It contributes to making research as efficient as possible, thus yielding the maximum information with minimum effort, time and expenditure.

- A research design helps to plan in advance, the methods to be employed for collecting the relevant data and the techniques to be adopted for their analysis

- This would help in pursuing the objectives of the research in the best possible manner, provided the available staff, time and money are given.

- Hence, the research design should be prepared with utmost care, so as to avoid any error that may disturb the entire project.

- Thus, research design plays a crucial role in attaining the reliability of the results obtained, which forms the strong foundation of the entire process of the research work.

CHARACTERISTICS OF A GOOD RESEARCH DESIGN:

- A good research design often possesses the qualities of being flexible, suitable, efficient, and economical and so on.

- Generally, a research design which minimizes bias and maximizes the reliability of the data collected and analysed is considered a good design

MODULE-2

Methods Of Data Collection

A researcher uses 2 types of data

- Primary Data
- Secondary Data

PRIMARY DATA

- Primary data are the fresh data obtained for first time.
- It is expensive and time consuming.
- These are original in character.

SECONDARY DATA

- Secondary data are second hand data which are already been collected.

COLLECTION OF PRIMARY DATA

- **Questionnaire Method**
  - It is popular in big inquiries.
  - This method is adopted by private individual, research workers,private and public organisation and by govt.
  - In this method a questionnaire is sent to the person with a request toanswer the questions and return it back.
  - A questionnaire contains a number of questions printed in a logicalorder.
  - The questionnaire is mailed to the respondents who are expected toread and understand questions and write down replay in space given,
  - Respondent has to answer the questions as per his own knowledge.

- **Advantages**
  - It is less costly and covers large area.
  - Free from bios.
  - Who are not easily approachable they can be approached through questionnaire.
  - A large sample size can be covered.

- **Disadvantages**
  - Low rate of return (no guaranty of reply).
  - This method can only be used when respondents are educated and cooperative.
  - No control over the questionnaire once it is sent.
  - Not flexible.
  - May not get correct answer.

- **Main aspects of a questionnaire**
  - **General form**
    - It can be either structured or unstructured questionnaire

- **Structured Questionnaire**
  - Structured questionnaire are definite, concrete and predeterminedquestions.
  - Questions are presented with exact wordings to each respondents.
  - Question may be closed (yes or not type) or open (inviting freeresponse i.e., long and descriptive.
  - The questions may have alternative answers.
  - By using the above structure use of own word by the respondent isminimized.

- **Unstructured Questionnaire**

  - Unstructured questionnaire uses open questions.
  - Questionnaire may contain different questions for different respondent.

- **Question Sequence**
  - A proper sequence of questions reduces chances of misunderstanding.
  - The question sequence must be clear and logical.

Example :

✓ What is your name?

✓ What is your qualification?

❖ The first question should be placed first before second question.

❖ If we interchange the sequence, it may not be logical.

❖ The following questions should be avoided during the beginning.

❖ Questions that put great stress on memory Questions of personal character.

❖ Questions related to personal wealth.

❖ Question sequence can be set by use of pilot survey.

- **Question Formulation And Wording**
  - Questions must follow the following standard.

    - It should be easily understand.
    - It should be simple (should have one meaning).
    - It should be concrete.

Example :

❖ How many razor blades do you use annually instead of this question, thequestion may be.

- ❖ How many razor blades did you use last week.
- ❖ Abused words should not be used.

- **Essentials of A Good Questionnaire**
  - Must be short and simple.
  - Question should process in a logical order.
  - Question should be easily understand.
  - Question should move from easy to difficult.
  - Personal questions should be avoided.
  - Highly technical questions should be avoided.
  - Adequate space must be given for answer.
  - Alternatives like – don't know, no preference should be there.
  - Quality of paper and colour must be attractive.

- **Interview Method**
  - **Personal Interview**
    - This interview is based on direct or face to face contact withrespondent.
    - At a point of time questions may be asked to one or more persons.
    - It is a method of direct personal investigation.
    - These are conducted usually in a very structured way.
    - All questions are pre-planned and cross questions may arise.
    - Unstructured interview don not follow any planned format.
    - In unstructured interview question asked arbitrarily.
    - All question and answers are recorded for further analysis.
  - **Focused interview**
    - Interviewer focuses on the experience of interviewee.
    - Interviewer decides the manner and sequence of questions.

    Example
    - ❖ Interview of a political leader, sports person etc.

  - **Clinical Interview**
    - This interview deals with knowing experience and feelings.
    - It is a mixture of observation and interview.

    Example
    - ❖ Doctor's treatment

  - **Non Directive Interview**
    - Here the interviewer encourage the respondent to talk ona topic withbare minimum questions.
    - Few questions are asked and more explanations are desired.

- **Advantages of Personal Interview**
  - More information, greater depth.

- Interviewer uses own skill to get answer.
- Greater flexibility.
- Verbal answers can be recorded (Audio).
- Personal information can be obtained.
- More control over questions.

Disadvantages of Personal Interview

- Expensive.
- Does not cover wide geographical area.
- Possibility of bias of interviewer and respondent.
- Some respondent may not give time.
- Less time for response.
- Some answers can't be spoken but written.
- Time consuming.

Pre-Requisites of a Good Interview

- Interviewer should be carefully selected, trained and educated.
- Technical competency and experience
- Interviewers should be enthusiastic, hardworking honest and polite.
- Interviewer must be interesting
- Questions must not be irritating.
- Respondent should fell that his answers are real, valuable and listencarefully.
- Doubtful or cross questions asked by respondent must be handledcarefully and politely.

- **Telephonic Interview**
  - Respondents should be contacted through telephone.
  - It is mainly used in industrial sector like telecom, financial corporation like LIC, SAHARA etc.

- **Advantages of Telephonic Interview**
  - More flexible
  - Wide coverage
  - Less cost than personal interview
  - High response
  - No fields staff
  - Time saving

- **Disadvantages of Telephonic Interview**
  - Limited time for response
  - Respondent may not have telephone
  - Chances of wrong information is higher.
  - Large geographical area not touched because of more cost andpossibility of bias.

- **Other Methods for Primary Data Collection**
  - **Warranty Cards**
    - It is in postcard sized.
    - It is sent to the customers to fill aspects of product
    - Customers fill-up required field and send it back.
  - **Distributors or Store Audit**
    - Distributors timely send auditors to retailers or stockist.
    - They ask for product information and response of customer.
  - **Free Samples**
    - Some free samples are distributed among the customers, distributors,retailers, doctors etc.
    - After use of the product their feedback is taken.
    - As per information improvement measures are taken.

Feedback

- After use of a particular services or good feedback is taken from consumers.
- Customers have to fill the required filed and send it back to theretailer.
- Mechanical device: it is a popular method of data collection.
- This methods uses camera, audio recording devices, mobile phonesto record data,

Example

- ❖ Journalist

- **Depth Interview**
  - It is used to discover underlying truth, attribute tendency.
  - A large variety of direct and indirect questions are asked.
  - It needs high degree of skill and presence of mind.

- **SCHEDULE**
  - Schedule method is very much similar to questionnaire method.
  - Schedule means proforma containing a set of questions.
  - It is filled by enumerators who are specially appointed.
  - Enumerators along with schedule goes to the respondent ask questionsand record the answers.
  - In some situations schedule is handed over to the respondent andenumerator guides to fill it.
  - Enumerator must be carefully selected and trained.
  - He should verify the answers on the spot.
  - He should be honest, sincere and hardworking.

- It is useful in extensive enquiries and it's very costly.
- It is conducted by government and big industries.
- Population census all over the world made by this method.

Difference Between Questionnaire and Schedule

Questionnaire	Schedule
❖ Questionnaire is sent through mail ❖ It is cheap ❖ Non response chance is higher ❖ Questionnaire method is very slow ❖ Personal contact may no possible ❖ Not helpful if respondent is illiterate ❖ Helpful in large geographical area	❖ Enumerators directly goes to the respondent ❖ It is expensive ❖ Certain response ❖ Schedule method is fast ❖ Personal contact is essential ❖ Literacy never matters. ❖ Not possible in schedule.

SECONDARY DATA

When the researcher used data which are previously collected by some other researcher, institution or agencies for their own purpose are called secondary data.

The researcher can collect secondary data either form internal source of an organization i.e., unpublished source or from the published sources likes reports, journals, magazine, internet etc.,

Difference Between Primary and Secondary Data

Primary Data	Secondary Data
❖ The data is collected by the researcher himself for finding the solution of a particular problem is know as primary data ❖ More costly ❖ It is directly collected from the respondents	❖ When a data which was earlier collected by some researcher or organizations for their own purpose is used in current research for similar purpose is called secondary data. ❖ Less costly ❖ It is collected from some published or unpublished sources (magazine, journal, internet etc.,)

❖ Methods used for primary data collection are interview, mailing questionnaire method, observation and survey. ❖ It is more original, reliable data. ❖ Form of primary data is raw in nature and needs to be processed. ❖ More accuracy of data.	❖ Methods for secondary data collection, include study of journals, reports, census anddifferent data base. ❖ It is less reliable ❖ Secondary data is already processed. It only needs to beanalysed ❖ Less accuracy of data.

FILL IN THE BLANKS

- If the objective of the study is very serious in nature and information is required about each and every item, then census survey is required. But when we study only a subpart of the whole population then sample surveyis required.
- The collection of all the items about which the information is desired is call a population.
- The population is said to be finite, if it consist of a fixed number of elements and the population is said to be infinite, if it don't consist any fixed number of elements.
- Number of stars in the sky will be under infinite population.
- Any characteristic or measure of population unit is called parameter on the other hand any characteristics or measure of sample item is known asstatistic.
- When sample size is less than 30, it is called small sample on the other hand when sample size is more than 30, it is called large sample.
- 't' test is used in case of small sample and 'z' test is used in case of large sample.

SAMPLE DESIGN

- A sample design is a definite plan for obtaining a sample from a givenpopulation.
- It refers to the technique or the procedure which the researcher wouldadopt for selecting the items for the sample.
- Before data collection sample design is done.

Steps of sample design :

- **Objective**
  - Objective of the survey must be clear of concrete.

- Researcher should confirm that the objectives are according tomoney, man power and time limit available for the survey.

- **Population**
  - Population should be clearly defined according to the objective of thesurvey.

Sampling Units and Frame

- Before selecting sample sampling units should be fixed.
- Sampling unit may be geographical one such as state, district, village etc., or a construction unit such as a house, flat etc. it may be a social unit such as family, club, school etc. or it may be an individual.
- The researchers have to decide one or more of such unit that he has to select for his study.
- The list of sampling unit is called as sampling frame.

Size of Sample

- It refers to the number of items to be selected from the universe toconstitute a sample.
- The size of sample should not be excessively large or too small.
- The sample size should be optimum.

Parameters of Interest

- Statistical constant of the population are called as parameters.
  Example
  - Population means population standard deviation.
  - For determining sample design one should specify the populationparameter such as average or proportion.

Data Collection

- Only essential information about the sample should be collected.

- **Non-Respondents**
  - Due to some practical difficulties data may not be collected for all thesample units.
  - Such cases should be handled with care.

- **Selection of Proper Sampling Design**
  - The researcher must decide the technique to the used in selectingthe items for the sample.

- **Organizing Field Work**
  - There should be efficient supervisory staff and trained personnels forthe success the field work.

- **Pilot Survey**
  - It is always helpful to try the sample design on small scale before going to the field to know the practical problems and troubles which is called pilot survey.

- **Budgetary Constraint**
  - Costs have a major impact on decision relating to not only the size of thesample but also the type of sample.
  - For less cost non-probability sampling is used.

- **FUNDAMENTALS OF SAMPLING**
  - Sampling
  - Non sampling error

  - **Sampling Error**
    - This error arises in drawing or selecting sample.
    - It arises because we don't take total elements of population into our study. We choose subpart from population which represents the totalpopulation.
    - This may be due to enumerator bias or by chance.
    - Similarly chance of error rises, when sample size reduces.

    Example 1
    - Suppose your study is fuel efficiency of cars in Bhubaneswar.
    - Population is 50,000/- and sample is 300.
    - By chance in drawing random sample all the Maruti cars areselected, then sampling error arises.

    Example 2
    - If your study is average height of trees in chandaka forest.
    - By chance you selected an area in which all trees are of short height.
    - It may lead to wrong result.
  - **Non Sampling Error**
    - Error may arise in processing of data, interpretation of result, datacollection, hypothesis testing etc.
    - When error arises due to factors other than drawing sample, iscalled non sampling error.

- **Difference between Sampling and Complete Enumeration**

Sampling	Complete Enumeration
❖ It a part of the population selected for researcher. ❖ Less costly ❖ Less time consuming ❖ It can be applied for most of the studies like economy, medicines, market, consumers etc., (scope isbrand) ❖ Helpful for infinite population ❖ Theoretically less accuracy ❖ Sampling error is possible	❖ It is complete study of all elementsof population for research. ❖ More costly ❖ More time consuming ❖ It's scope is very less. It is used onlyof census population calculation. ❖ Not helpful for infinite population. ❖ Practically less accuracy ❖ Sampling error is absent

- **Types of Sample Design**
  - Simple random sampling
  - Deliberate sampling
  - Judgment sampling
  - Systematic sampling
  - Stratified sampling
  - Quota sampling
  - Cluster sampling
  - Area sampling / geographical sampling
  - Multi-stage sampling
  - Sequential sampling

- **Simple Random Sampling**
  - It is a chance or probability sampling
  - Each item of the population has equal chance to be selected.
  - It is based on lottery system and hence bias free.

    Example
    - All students have equal chance to be selected randomly.

- **Deliberate Sampling**
  - It is also called purposive or non-probability sampling.

    Example
    - Suppose researcher enters into some class and select some studentsas per his wish.
    - He may or may not enter into some classes.

- **Judgement Sampling**
  - Researcher chose elements on the basis of his judgement.

    Example
    - He decides which students will be taken for an appropriate research.

- **Systematic Sampling**
  - Entire population is numbered and out of that some specific numbersare selected.

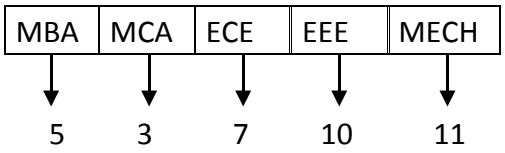
    Example
    - all students are numbered from 1 to 15,00 like

    o 1, 2, 3, 4, 5, ... 1500.
    - Every even number student will be taken for research.

- **Stratified Sampling**
  - If the population is not in a homogenous group the stratified sampling istaken.

Example

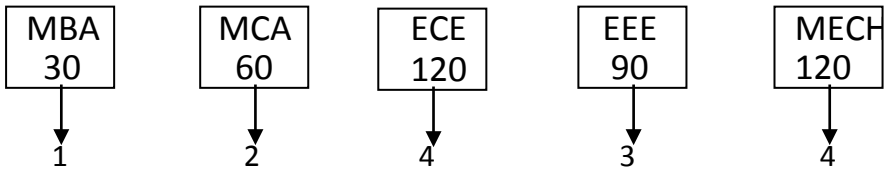
  - Students are stratified into different groups according to their course like MBA, MCA, ECE, EEE, MECH etc, then some samples are taken on random basis.



- **Quota Sampling**
  - It is just like stratified sampling but here some quota is assigned.

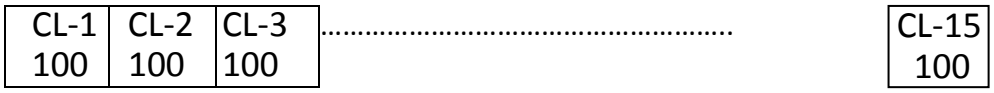
Example

  - 1 student is taken as sample out of each 30 students.



- **Cluster Sampling**
  - Here the entire population is grouped into some clusters.

Some clusters are selected for observation.In the above example sample size = 300 We made 15 cluster of 100 students each



Out of 15 clusters 3 clusters are selected.

- **Area Sampling**
  - Here the entire population is divided into some geographical areas.
  - Then randomly some geographical areas are selected for sample.
- **Multistage Sampling**
  - It is meant for a large geographical area like country.
  - Here some samples are collected from country, then state, then districtthen village etc.

- **Sequential Sampling**
  - In this technique the size of sample is not prefixed.
  - As per the requirement the size is determined.

- Used for statistical quality control.

- **COLLECTING DATA**
  - Collection of data is needed for conducting any type of research.

Data may be of 2 types
- Primary
- Secondary

- **Primary**
  - Primary data can be collected through experiment or through survey.

- **Secondary**
  - Secondary data can be obtained from annual reports, news papers,journals, magazines, internets etc.

The methods for collecting primary data are :

- **By Observation :**
  - By own observation of the researcher data are collected

    Example
    - Doctor's treatment

- **Personal Interview**
  - Questions are asked to the respondents and answers are recorded.
  - Success of this method id dependent on ability of the researcher.

    Example
    - News reporters.
- **Telephonic Interview**
  - In this method interview is taken by telephone.
  - It is suitable where the where the respondent are from wide geographical areas.

- **By Mailing Questionnaire**
  - Here there is no direct contact between researcher and respondent.
  - A questionnaire is sent by post or e-mail with a request to give answer.
  - By filling the relevant answers the respondent sent it back to researcher.

- **Schedule**
  - Here enumerators are appointed and trained.
  - A schedule is prepared with relevant questions.
  - A schedule contains questions I n table format.
  - Enumerator ask questions to respondent and record answer in schedule.

    Example

- Census survey

- **Execution of Project :**
  - Researcher has to supervise the research work.
  - Suitable questionnaire is prepared with probable answers.
  - Answers are recorded properly and stored safely.

- **Data Analysis**
  - The collected data are analysed properly.
  - The data are grouped, tabulated and coded.
  - Bulk data are converted into meaningful groups.
  - Unwanted data are removed from data base.
  - Data analysis involves calculation of correlation, standard deviation,mean etc.

- **Hypothesis Testing**
  - Hypothesis can be tested by chi-square test, t-test, f-test, z-test etc.
  - Hypothesis testing is to know whether hypothesis will be accepted orrejected

- **Measurement and Scaling Technique**
  - We use some yardstick to determine weight, height etc.,
  - We also judge how well we like a song a painting or personality.
  - We measures both physical objects and abstract concepts (ego, attitude,personality etc.)
  - But measuring abstract concepts are more complex and complicated.
  - Properties like weight, height etc., can be measured directly with some standard units of measurement but it is not easy to measure attitude, personality, motivation, feelings.
  - Measurement is made by scale.

    Example
    - Rice, wheat, sugar is measured in kg, height, length is measuredin meter.

- **Measurement is Scales**
  - **Nominal Scale**
    - In nominal scale simply numbers symbols are assigned.

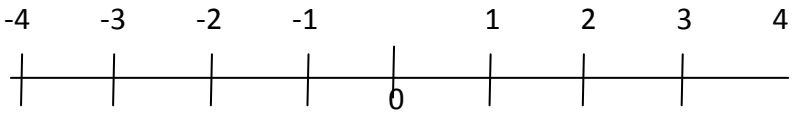
    Example
    - Assigning number to Football players in order to identify them.
    - Such numbers are just for convenient labels.
    - If signifies nothing.
    - Roll number and registration number are also nominal scales.
    - There is no arithmetic origin of this scale.

  - **Ordinal Scale**
    - It places events in order.

    Example

- OJEE rank
- We can say that rank 5 is better than rank 10.
- Ordinal scale means ranking from lowest to highest.
- A particular rank signifies greater than or less than a rank.
- Difference between rank 1 and 2 may not be the exact differencebetween 5 and 6.

- **Internal Scale**
  - In interval scale zero is in interval. It is having an arbitrary zero.
  - Both the ends are open.



  - Better example is Fahrenheit scale or Celsius scale.
  - Here zero is not absolute. Means zero is not the end temperaturegoes in positive side or negative side.
  - In both sides there is no limit.

- **Ratio scale**
  - Ratio scale have an absolute zero.
  - It is having one end closed and one open.

  Example
  - C.M. Scale.
  - 'O" indicates absence of height or length.
  - It represents actual amount of variables.

  Example
  - 10. Cm. is exactly double of 5 Cm.
  - It measures physical dimensions like weight, height distance etc.

- **Errors in Measurement**
  - Measurement should be precise, unambiguous in an ideal research.
  - After lots of care error may occur in measurement.
  - Researchers must be aware of the possible errors in measurement.

Following may be the sources of errors.

- **Response**
  - Respondent may hide information in the field in which researchershas less knowledge.

- **Situation**
  - In the presence of another person he may not say truth.

- **Attitude of enumerator**
  - His behaviours, style, way of talking, looks encourage of discourage respondent in providing information.

- **Instrument**
  - Errors may arise because of the defective measurement tools.

- **Steps of Development of Measurement Tools**
  - **Concepts Development**
    - At first concept should be developed.

    Example
    - Jeans buying behaviours in Bhubaneswar.
    - There are so many brands, outlet and variety available.

  - **Dimension of the Concept**
    - Different dimensions may be price, variety, availability, brands etc.

  - **Selection of Indicator**
    - For each dimension an indicator is fixed.

    Example
    - Price bye Rupees or Dollar, Brands by Rank of Company etc.

- **Scaling**
  - In research more often we face measurement problem.
  - Scaling means describing the procedure of assigning numbers to variousdegrees of opinion and other concepts.

    Example
    - We are going to measure teaching quality of a teacher.

The dimensions may be teaching skill, time management, working (communication), body language, handling students.

Then we assign scale to each dimension.

- Highly good
- Good
- Average
- Below average
- Poor

Or we may assign some points varying from 0 to 10.

- **Scaling Technique**
  - Rating scales
  - Itemized scale : → Likert scale; → semantic differential scale; → Stapled scale
  - Arbitrary scales
  - Differential scale
  - Summarted or likert type scale
  - Cumulative scale
  - Factor scale
  - Multidimensional scaling

- **Rating scale**
  - This scaling technique involves description of a limited number of aspectsof a thing or trait of a person.

The rating may be in the following forms.

→ Like very much	→ Excellent
→ Like somewhat	→ good
→ Neutral	→ Average
→ Dislike somewhat	→ below average
→ Dislike very much	→ Poor

  - There is no specific rule to use 2 point scale, 3 point scale, 5 point scaleor more than that.

- **The Graphic Rating Scale**
  - In this method the various points are usually put along a line.

Like Very much	Like some what	Neutral	Disklike very much	Dislike

- **The itemized rating scale**
  - It presents a series of statements from which respondent select one.

    Example
    - How well a worker mixes with his co-worker.
    - He always makes quarrel with others.
    - He rarely make quarrel with others.
    - He never make quarrel with others.
    - Others are quarrelling with him.
    -

- **Arbitrary scales**
  - It means random.
  - This scale is developed on adhock basis.
  - Researcher arbitrarily selects some statements.
  - Some statements are selected instantly.
  - It is easy and quick.

- **Differential scale (Thurston type scale)**
  - In this method selection of items are made by a panel of judges.
  - Judges evaluate whether items are related to topic or not.

- **Procedure**
  - Researcher gathers a large number of statements regarding a particularthought or group ideas usually 20.

    Example
    - Opinion regarding war.
    - War creates destruction.
    - War raises power.
    - War should be abolished.
    - Nuclear war is harmful.
    - War creates division.
    - War is loss both parties.
    - War should be made by UNO approval.

  ✓ Such statements are given to a panel of judges.
  ✓ A copy is given to each jury.
  ✓ They eliminate some statements which are not relevant.
  ✓ They retain N statements.

  ✓ The N statement are ranked 1^{st} to Nth.
  ✓ 1^{st} is most unfavorable.
  ✓ 2^{nd} is next unfavorable.
  ✓ Nth is most favorable.

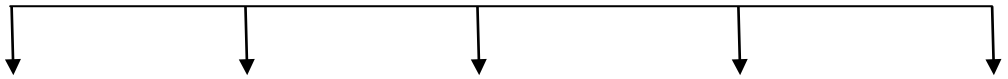
  ✓ When ambiguity arise regarding rank of a statement that is eliminated.
  ✓ Finally 5 to 6 statements are selected for final statements for scale.
  ✓ This is a filtration process.

- **Summated or Liker Type Scale**
  - It consist of a number of statements which express favourableness or unfavourableness of attitude.
  - Respondent indicates his agreement or disagreement in particularsubject matter.
  - Each response is given a numerical score.

- The overall score represents idea about a particular subject matter.

Example

- Job satisfaction in a particular company



Strongly Agree(5) Agree(4) Undecided(3) Disagree(2) Strongly Agree(1)

- ✓ Each point carry some score.
- ✓ Suppose we made a research on 30 people.All give
  (1) ⟶ 30 x 1 = 30
  All give (5) ⟶ 30 x 5 = 150

- ✓ Score varies from 30 to 150
- ✓ A less score represent high job satisfaction.
- ✓ A high score represents less job satisfaction.

- **Procedure for Likert Scale :**
  - Researcher collects large number of statements which are relevant to the attitude being studied. Each statements expresses definite favorableness and un favorableness to a particular point of view or theattitude.

  - After the statement has been gathered a trial test should be administrated to a number of subjects.

  - The response to various statements are scored in such a way that a response indicative of most favorable attitude is given the highest score of 5 and most unfavorable attitude is given the lowest score i.e., 1.

  - Then total score of each respondent is obtained by adding his scores that he received for separate statements.

  - The next step is to array these total scores and find out those statements which have a high discriminatory power.

  - The researcher may select some part of the highest and lowest total score.
  - Only that statement that correlates with the total test should be retained in the final instrument and all others must be discarded from it.

- **Advantages**
  - It is easy to construct the likert type scale because panel judges are notrequired.
  - It is more reliable because under it respondents answer each statementincluded in the instrument.

- It takes very less time.

- **Limitations**
  - In likert type scale we can examine whether response are more or lessfavourable to a topic but we can not measure how much more or less.

- **Cumulative Scale**
  - It is also called luis Gutlaman's scalogeram.
  - It contains a series of statements to which respondent expresses hisagreement or disagreement.
  - Statements are in cumulative form.
  - In this scale who says item (3), then he is agree with 1,2,3 points.
  - Who says item 4, he is agree with 1,2,3,4 points.

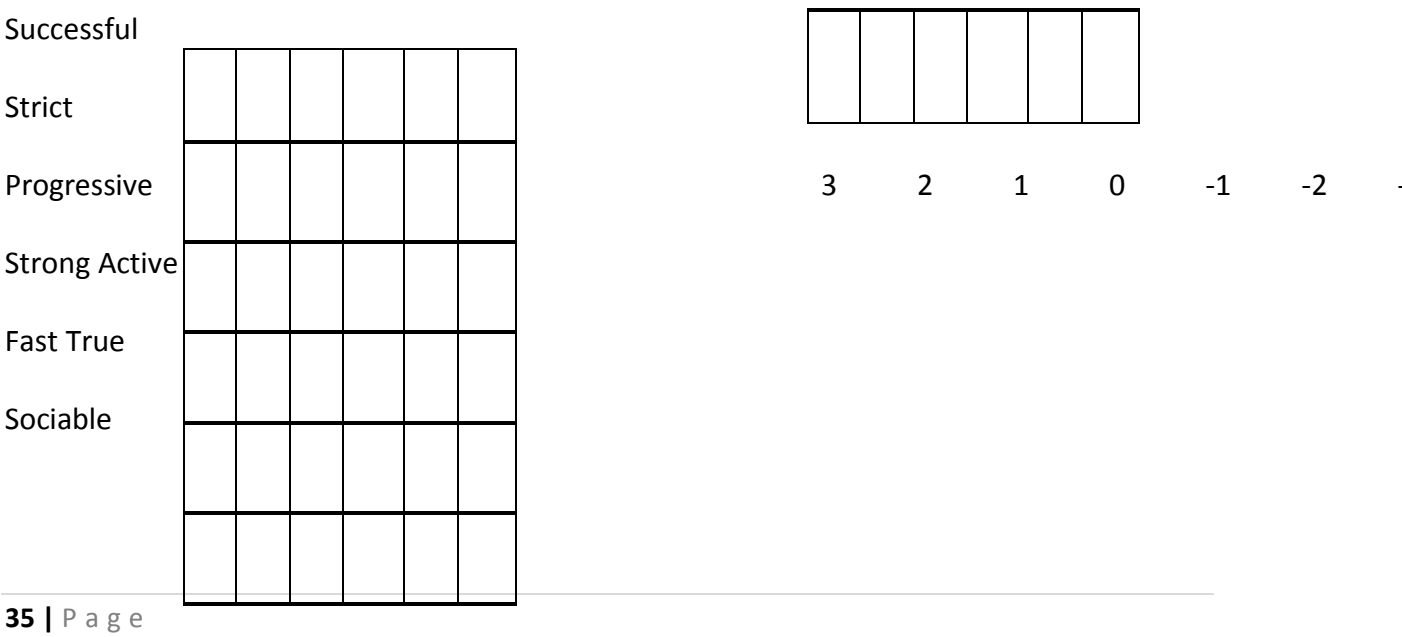
    Example

    Facilities in an outlet.
    - It is having fans.
    - It is having fans and ACs.
    - It is having fans, ACs and lift.
    - It is having Fan, ACs, Lift and cafeteria.
    - Who says point (iv), he is automatically agree with point (i), (ii) and(iii).

- **Semantic Differential Scale**
  - It is developed to measure the psychological meanings of an object to anindividual.
  - This scale is based on the presumption that an object can have different dimensions of lornotative meanings which can be located in multi- dimensional property space.

Leadership Position of Candidate

Example :



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- We have to score the candidates from +3 to -3. On the basis of abovestate scales.
- Numeric values are not written in actual scale

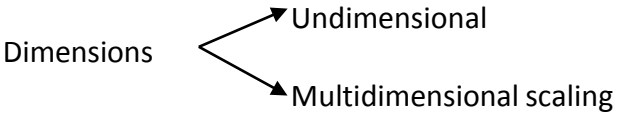
Bipolar adjectives

- **Multidimensional Scaling**
  - When more than one scale is associated with a particular aspect then multidimensional scale is appropriate.
    Example
    - Liquid can be measure in both litre and K.G.

- Both physical and abstract concept may have more than one scaleassociated.

- It is also used when all the variables in a study are to be analysedsimultaneously.
- Through MDS technique one can represent geometrically the locations and interrelationships among the set of points.

- It is not used widely because of complexity of procedure.



- In undimensional scale, only one attribute of the object is measured.
- While in multidimensional scale, the object is described with severaldimensions.

Example

- Popularity of a restaurant can be measured by a single measure Food taste. It can be also defined on multiple dimension like food taste, service, cleanliness, ambience etc.

- **Staple Scale**
  - This scale is developed by John Staple.
  - In this scale 10 categories are numbered from -5 to +5.
  - This scale does not have zero or the neutral point.
  - Respondents rate how each term describes the objects by selectingappropriate number.
  - In this scale positive number means the term describes the objectaccurately.
  - Which negative number implies that the term describes the objectsinaccurately.
  - +5 means highest degree of accuracy while -5 means highest degree ofinaccuracy.

Example

Let 3 phrases (i) Tasty Food
(ii) Fast Service
(iii) Good ambience for a restaurant

A respondent is asked to rate how accurately these terms or phrasesdescribe a specific restaurant.

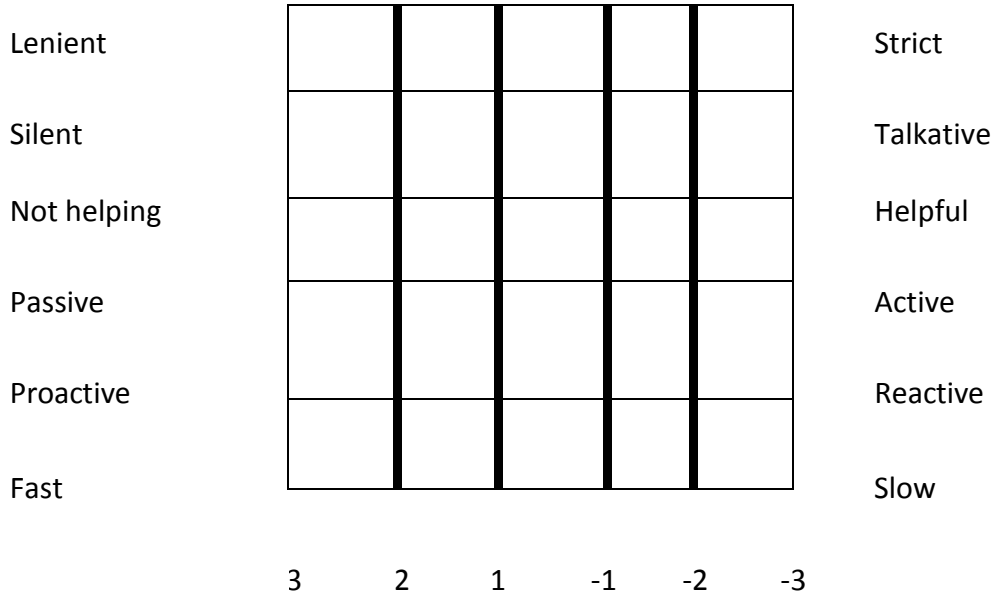
+5	+5	+5
+4	+4	+4
+3	+3	+3
+2	+2	+2
[+1]	+1	+1

Tasty Food	Fast Service	Good Ambience
-1	-1	-1
-2	[-2]	-2
-3	-3	-3
-4	-4	-4
-5	-5	-5

Item Number

4	3	2	1	Respondent ScoreX
	X	X	X	4
-	X	X	X	3
-	-	X	X	2
-	-	-	X	1
-	-	-	-	0

- **Factor Scales**
  - It is like a score card given to each respondent.
  - It contains a series of favourable and unfavourable variables.
  - One side favourable and other side unfavourable.



- **Single/ Multiple Category Scales**
  - Here we have 2 or more mutually exclusive responses.

    Example
    - Yes or No
    - True of false

    The respondent has to choose any one out of the given categories

    - ❖ Do you play cricket?Yes
      No

    - ❖ What is you Marital Status? Unmarried
      Married
      Divorce Widower

    It should be ensured that the provided choice on, should cover almost allpossible answers of the asked question.

- **Verbal Frequency Scale**
  - This scale is used when the respondent is unable or unwilling to give theexact numbers in the answer.

    Example
    - ❖ How often do you eat ext side in a day?

      1. Frequently 2. Sometimes 3.Rarely 4. Never

- **Comparative Scales**
  - In comparative scaling, the respondent is asked to compare one objectwith another.

Common comparative scaling techniques are

- Paired comparisons
- Rank order
- Constant sum scale

- **Paired Comparison Scale**
  - This is a comparative scaling technique in which a respondent is presented with 2 objects at a time and asked to select any oneobject according to some criteria.
  - The data obtained are ordinal in nature.

Example

- There are 4 types of cold drinks
- Coke, Pepsi, sprite and Limca
- The respondents can prefer Pepsi to coke or coke to sprite etc.

Brand	Coke	Pepsi	Sprite	Limca
Coke				
Pepsi				
Sprite				
Limca				
Number of times preferred				

Number of judgments required in paired comparisons is given by formula N = N(n-1) 2

Where, N = Number of judgments

n = number of objects or items to be judged.

$\frac{10\,(10-1)}{2} \quad \frac{10 \times 9}{2} \quad = \frac{90}{4}$

- **Rank Order**
  - Under this method of comparative scaling the respondents areasked to rank their choices.

Example

- To judge 10 times it takes 45 pair comparison to complete thetask.
- Whereas the rank order method simple requires the ranking of10 times only

Constant Sum

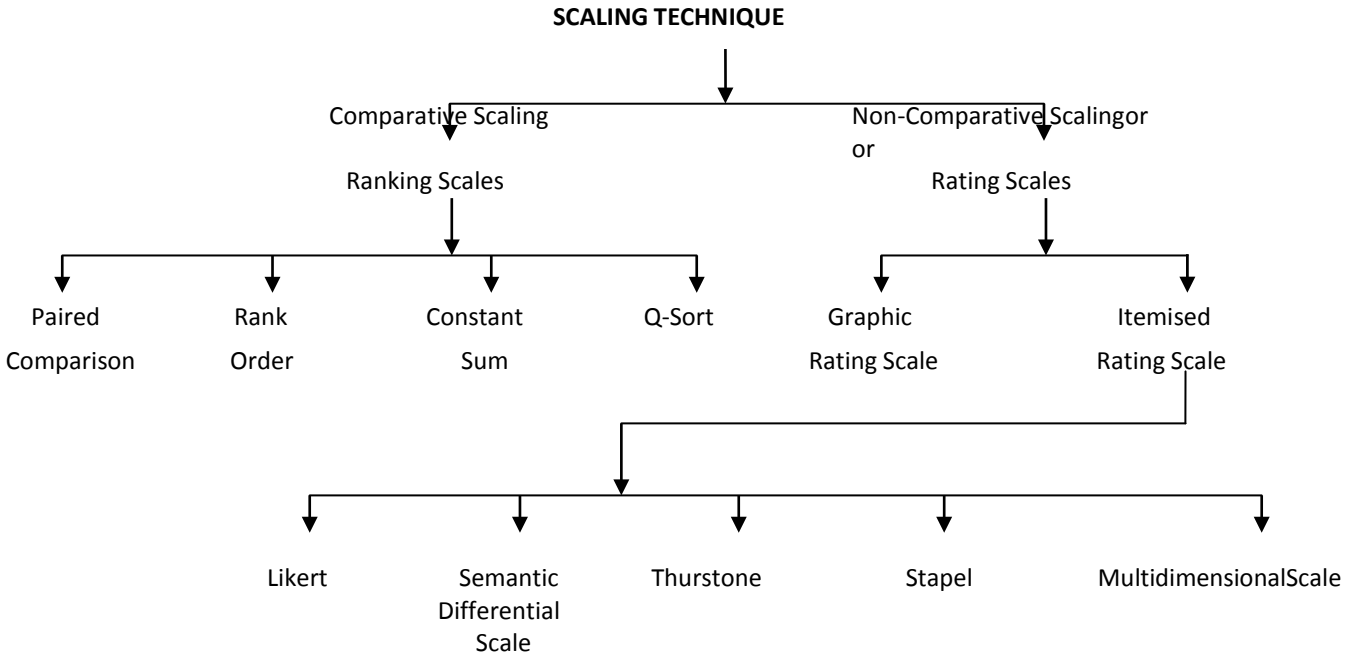
- The respondent gives certain points to each object out of a fixed sum ofpoints.
- This fixed sum is usually taken as 100.

Example

- a family planning for a holiday, fixes the budget of Rs. 50,000/-
- They wish to plan the expenditure on transportation, accommodation, food, drinks and others.
- The constant sum here is 50,000/- which could be divided as

✓ Transportation – 10,000.00
✓ Accommodation – 20,000.00
✓ Food – 12,000.00
✓ Drink – 0.00
✓ Others – 8,000.00

- **Q-Sort Scaling**
  - In this method the participants are asked to sort the objects orstatements in several categories.



- **Data Processing**
  - After data collection, the data are to be analysed.
  - Data processing involves
  - Questionnaire checking
  - Editing
  - Coding
  - Classification
  - Tabulation
  - Graphical representation
  - Data cleaning
  - Data adjusting

- **Questionnaire Checking**
  - This involves the examination of the entire questionnaire for their completeness and interviewing quality.

- **Editing**
  - It is a process of examining the collection raw data to detect errors andcorrect these when possible.
    - Editing is of 2 types
      - ❖ Field editing
      - ❖ Central editing

❖ Field editing
- ✓ It refers to review of the collected data on the spot.
- ✓ This sort of editing should be done as soon as possible after theinterview on the same day or the very next day.

❖ Central editing
- ✓ It is done after collection of all the data.
- ✓ This form of editing is done by a single person in case of small studyand by a group of editors in case of a large study.
- ✓ Editors must keep a view some points during editing.
- ✓ They should be familiar with instructions given to the interviewers,coders as well as the editing instructions given to them.
- ✓ While deleting an appropriate data sufficient reason must be there.
- ✓ Put signature after editing.

- **Coding**
  - It refers to the process of assigning number and symbols to the editeddata to make the data different from other data.
  - Coding is essential in case of large number of heterogeneous data.

Example
- If we will make a study on students of BIITM.

- The registration number starting with OT coded as “A”
- The registration number starting with 10 coded as “B”
- The registration number starting with 11 coded as “C”
- The registration number starting with 12 coded as “D”

- **Classification**
  - Classification means dividing homogenous data into meaningful group.
  - Data having a common characteristic are placed in class one class and inthe way the entire data is classified into number of groups.

  - Classification according to attributes
    - It means classification of data as per common characteristics.
    - Common characteristics may be descriptive (such as literacy, sex, honesty etc.) or numerical such as weight, height, income, etc.) i.e., qualification.

  - Classification according to class interval
    - When classification is done by quantitative characteristics it is called class interval.

    Example
    - People having income from 4000 – 8000 per month falls under oneclass.
    - People having income 8000 – 12000 per month belong to anotherclass.

❖ Each group in class interval are having an upper limit and a lower limitwhich is called class limit.

❖ Entire data can be divided into a number of groups or classes called classinterval.

❖ Difference between 2 class limit is called class magnitude.

❖ We may have classes with equal class magnitude or unequal classesmagnitude.

❖ The number of items which fall in a given class is called frequency of class.

Income Group	**Number of families (Frequency)**
Below 4000	13
4000 – 8000	15
8001 – 12000	07
12001 – 16000	14
16000 above	08
Total	57

- **Tabulation**
  - When a mass of data has been assembly it become necessary for the

researcher to arrange in some kind of concise and logical order which is called tabulation.

- Tabulation is the process of summarising raw data, displaying incompact form (i.e., for of statistical table)
- Tabulation is an orderly arrangement of data in column and rows.

❖ Tabulation is essential because :

- It saves space, reduce description and explanation.
- It facilitates comparison.
- Detection of error.
- It provides a basis for various statistical computations.
- Tabulation can be done by hand or computer.
- Hand tabulation is preferred in small inquiries.

❖ Principles of Tabulation :

- Every table should have a clear and concise title.
- Each table should have a table number.
- Column heading row heading should be brief.
- Unit of measurement should be given.
- Emplanarotry foot notes should be placed.
- Source must be there in case of secondary data.
- Headings should be written in bold letter.
- Thick lines should be used to differentiate data.
- Columns may be numbered.
- Abbreviation should be avoided.
- Table should be logical, clear and accurate.
- Arrangement of items may be chronological, alphabetical, geographicaletc.

▪ **Graphical representation:**

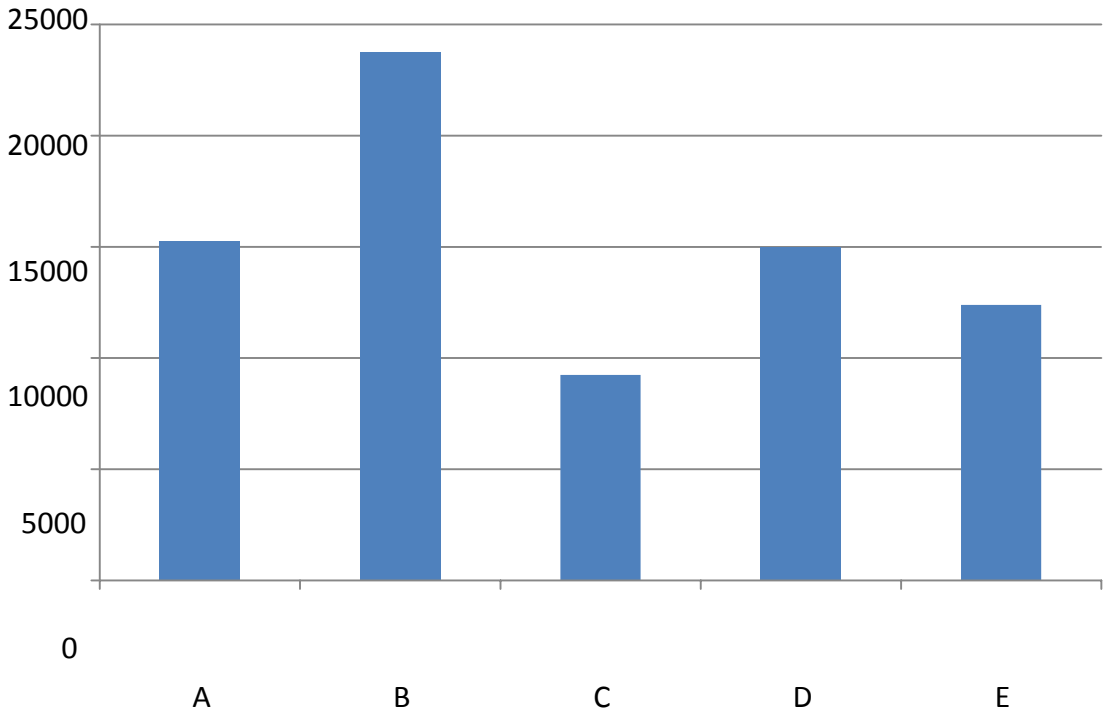
- Graphs helps to understand the data easily.
- Most common graphs are bar chart and pie.

▪ **Bar chart**

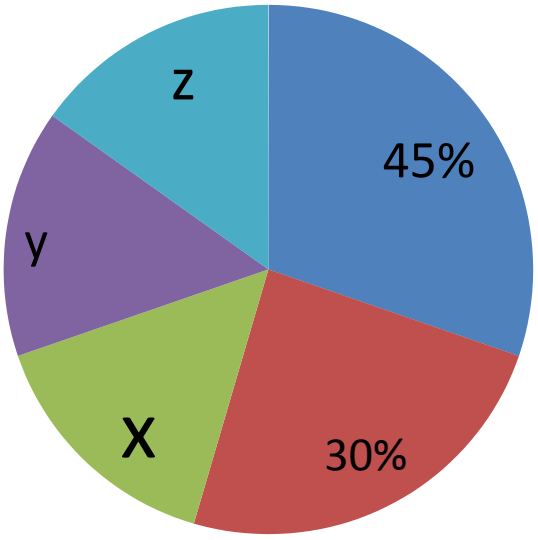
- It consists of a series of rectangles or bars.
- The height of each rectangle is determined by frequency of thatcategory.

Example

- Sales of Pepsi in year 2015-16 is 5 areas of Bhubaneswar i.e., A, B, C,D and E are 15245, 23762, 9231, 14980, 12387. So bar chart will be



- **Pie chart**
  - ✓ It is a circular chart divided into sector which shows relativefrequency.



- **Data Cleaning**
  - It means checking the data for consistency and treatment for missingvalue.
  - Missing value refers to the value which are unknown or not answered bythe respondent.
  - In place of such missing values some neutral value or mean value may beused.

- **Data Adjusting**
  - To improve the quality of data analysis it is needed some times.

- **Weight Assigning**
  - Each respondent is assigned weight to know his importance in comparison to other respondents.

    Example
    - In response of educated people will be given higher weight anduneducated people will be given lower weight.

- **Variable Re-Specification**
  - It means creating new variables or modifying existing variables.

    Example
    - If usefulness of a certain product is measured on 10 point scale thenit may be reduced to 4 point or 5 point.

- **Scale Transformation**
  - It is done to ensure the comparability with other scales.
  - Or to make the data suitable for analysis.
  - The variables which are measured on different scales can not becompared.

- **Laddering**
  - Developed by T.J. Reynolds and J. Gutman.
  - It is an interview technique where simple response to a question is usedby the interviewer to find subconscious motives.
  - It begins with a simple question and then another question is askedabout that response.

    Example

    The interviewer may ask the question
    How come you skipped the class? Response: I
    went out with my friends.

    The next question will be

    Why did you go out with you friends?
    Response: I went for watching movie, or for Pizza.The
    format is
    Q : Why x ?
    Ans : Because Z.

    Q : Why Z?
    Ans : Because b.Q :
    Why b?
  - **Use in Marketing**
    - Laddering technique is used in marketing to judge what valuesinspire the consumer to consume a particular product.
    - The laddering technique allows business to know their customersbetter by asking them simple direct questions.

Laddering framework can be applied to market research by askingfollowing questions.

- ❖ Why did you choose this product/services?
- ❖ Why is it good/bad?
- ❖ Why is this important to you/your business?

Conclusion

- ❖ It is helpful in business decision making.

- **Voice of Customer**
  - VOC is a term used in business and information technology to describe the in-depth process of capturing customer's expectations, preferences and aversions.
  - VOC is a market research technique that produces a detailed set ofcustomer wants and needs, organized into a hierarchical structure.
  - The prioritized in terms of relative importance and satisfaction with current alternatives.
  - It consists of both qualitative and quantitative research studies.
  - VOC is generally conducted at the starting of any new product, processor service design initiative in order to better understand the customer's wants and needs.
  - It involve in-depth interviews which focus on the customer's experienceswith current product or alternatives within the category under consideration.
  - VOC is actual customer description in words for the functions and features customers desire for grids and services.

- ❖ Under liker method a particular item is evaluated on the basis of how well it discriminates between those whose score is low.
- ❖ In S.D. Scale, scaling technique measurement is done by using a set of connotative words.
- ❖ There is no use of 'zero' or rentral in staple scale.
- ❖ When the respondent is unwilling to give the exact number in the answer then verbal frequency scaling technique is used.
- ❖ In MDS scale all the variables in a study are to be analysed simultaneously.

- **Measurement and Scaling Technique**
  - The process of associating number or symbols to observations obtained in research study is known as measurement.
  - Fahrenheit and centigrade scales are the example of interval scale and ration scale is used to measure length, height, weight, area etc.
  - By scaling technique abstract concepts can be measured more accurately.
  - Comparison between brand A and Brand B is under comparative scaling technique on the other hand scoring to only one Brand A is under non comparative scaling technique.
  - When respondent expresses his attitude by making a choice between 2 objects then it is called paired comparison.
  - If 8 objects are to be judged then there are n(n-1)/2 number of judgements under paired comparison.
  - Under rank order method comparative scaling the respondents are asked to rank their choices.
  - Under graphic rating technique of scaling rating is shown in a graph paper.
  - Under itemized rating technique brief description of each category is provided.

- **Preparation of thesis or report**
  - The report is the gist of entire researcher.
  - It should carry the following contains.
    - Preliminary page- title, date, acknowledgement etc.
    - Main page- it should have introduction, summary, findings andsource, conclusion and suggestions.
    - End matter- appendix, bibliography, references and declaration.
- **Sampling and Non-Sampling Error**
  - Sampling error arises due to a part of population is selected and study is made on that and on the basis of that sample we draw conclusion about total population, sampling error is absent in census survey.
  - Non sampling error arises at the stage of collection and preparation of data and present both in sample survey and census survey.

- Lottery method is under probability sampling.

FILL IN THE BLANKS

- Series of actions or steps necessary to carry out research effectively isknown as research process.
- Study of journals, internet, govt. report, book helps in literature review.
- Literature review must be done before developing a Hypothesis.
- The conceptual structure within which research would be conducted isknown as research design.
- A suitable research design is one which minimises bias and maximisesreliability of the data collected and analysed.
- In simple random sampling each element has a known probability of beingselected.
- In judgement sampling researcher's judgement is used for selecting sample.
- When the population is not in homogenous group then stratified samplingis used.
- When total area is divided into number of small areas, then it is known asArea sampling.
- In sequential sampling ultimate size of sample is determined according to mathematical decision or statistical quality control.
- Sequential Sampling is used for statistical quality control.
- A Pilot survey is conducted to find the weakness of the questionnaire.
- Under schedule method enumerators are appointed and given training.Under coding the data is transformed into symbols.

Basic terms of Research methodology:

- **What is research** – Systematic search for collecting information (nothaphazard).
- **Population/ Universe:** Example:

Research in XYZ University.10 colleges
under university.

1 college = 100 students.
Total = 10,000 students.

I have to study out of 10,000 students how many males and how many female.

Out of 10 college we can take 3 colleges and 300 students from each collegewe study total students we take for study = 900

So, instead of 10,000 students we are studying 900So,
10,000 = universe/ population
900 = sample

Types of Population: (2 types)

i) Finite(Countable)
ii)Infinite(Uncountable)

Small &large sample:
When sample size(n) is less than 30,then it is called small sample and whensample size(n)is more than 30,then it is called large sample.

Parameter and statistic:
Statistical value calculated related to population is called parameter.Statistical

value calculated related to sample is called statistic.

Example: in the above example our population = 10,000 suppose they aregiving exam. When we are calculating average mark of 10,000 students then we arecalculating statistical value (mean) of population so, it will be called parameter.
On the other hand when we are taking sample = 900
And we are calculating average mark of 900 students, then we are calculatingstatistical value of sample, which is called statistic.

Parameter is not generally calculated, calculation of statistic is done generallyin research.

Parametric test and non parametric test: when we have some assumption(idea) about the population then parametric test is used.

When we don't have any idea (we can't assume anything about thepopulation) then non parametric test is used.

Hypothesis : it is an assumption yet to be tested.
We are assume something before doing research, we have to test whether it istrue of not.

Example: before doing research when we are assuming that out of 10,000students 50% may be girls, 50% may be boys. Which is called Hypothesis.

By doing research we will try to the hypothesis whether its true or not.

Level of confidence and level of significance.

Level of confidence refers to how much confident (%) you are about yourresult (correct result)

Error is possible every where. Level of confidence can be 99%.(1% error is possible)

1% = error level of significance.

Precision limit

Limit between which the research results are expected to lie.

Example: suppose we have expected that our research result will be liebetween 40% to 60%.

So, the upper limit and lower limit is called precision limit.

MODULE-1

BUSINESS RESEARCH METHODS

FILL IN THE BLANKS

1. Surveys and fact finding enquiries are known_____type of research and where researcher uses information which are already available are known as _____ type of research.
2. Finding a solution for an immediate problem is known as_____research.
3. Fundamental research is known as_____research.
4. Research based on general economics or basic social problem is known as _____ research.
5. The research which aims at finding a new concept or approach is known as _____ research.
6. The research which is based on empirical observations or primary data is known as _____ research.
7. The conceptual structure within which research would be conducted is known as _____ .
8. Tentative assumption made in order to draw out and test logical and empirical consequences is known as_____.
9. A suitable research design will be one that minimises_____and maximises _____ of the data collected and analysed.

10. A complete enumeration of all the items in population is known as_____.

11. When we select only a few items from the universe for our study purpose then it is called_____.

12. The way of selecting a sample is known as_____.

13. When each element has a known probability of being included in sample is known as _____ sampling.

14. The deliberate selection of particular units of universe is called_____sampling.

15. Where every item in the population has an equal chance of being selected is known as _____ sampling.

16. If the population from which a sample is to be drawn does not constitute a homogenous group then it is known as_____sampling.

17. When grouping of the population and selecting the groups for inclusion in the sample is done then it is known as_____sampling.

18. When several methods of sampling is used in one study then it is called _____ sampling.

19. _____ data can be collected by experiment and survey.

20. Through which the categories of data is transformed into symbols is known as _____.

21. The procedure which improves the quality of the data for coding is known as _____.

22. Putting the classified data in the form of table is known as_____.

23. The statistical technique_____helps us in analysing whether 3 or more varieties of seeds grown on certain fields yield significantly different results or not.

24. Explanation of findings on the basis of some theory without any hypothesis is known as _____.

25. Difficulty which a researcher experiences in the context of a theoretical or practical situation and wants to obtain a solution is known as_____.

26. Preliminary survey or field survey done by the researcher in case of social research is known as_____survey.

27. _____ help a researcher to know if there are gaps in the theories or not.

28. Developing the ideas through discussions is also known as_____.

29. The conceptual structure whining which research is conducted is known as _____.

30. Concept which can be quantified in values called_____.

31. The variable which can be quantified into decimal points are known as_____.

32. The variables which can only be expressed in integer values is known as_____.

33. When age increases it leads to increase in height then_____is independent and_____is dependant variable.

34. The independent variables which affect the dependant variable but not coming under the scope of research is called_____variables.

35. In research design control refers to minimise the impact of_____.

36. _____ research design are flexible enough to be changed with requirement.

37. _____ type of research don't use population or sample.

38. Survey and analysis of the previous work is known as_____in research.

39. _____studies casual relationship between variables.

40. Experimental research design is propounded by_____.

41. The experiment should be repeated more than once according to _____ principle.

42. By_____principle of research design extraneous factors can be minimised.

43. Influence of extraneous variables is called_____error.

44. To reduce the effect of experimental error the_____are divided into some treatments.

45. The design which concerns the question of how many items are to be observed and how the information and data gathered is to be analysed is known as _____ design.

46. The technique by which the procedures specified in the sampling statistical and observational designed can be carried out is known as_____design.

47. The conditions under which the observations are to be made are known as _____ Design.

MODULE-2

MEASUREMENT AND DATA COLLECTION

FILL IN THE BLANKS

1. In_____method subjective bias is eliminated.

2. _____ method is independent of respondents.

3. When observation is characterised by a careful definition of the units to be observed the style of recording then observed information ,standardised condition of observation and the selection of pertinent data of observation then the observation is called _____.

4. When observation is to take place without these characteristics to be thought of in advance is called as_____.

5. _____ observation is considered appropriate in descriptive studies where as in exploratory study_____observation is most appropriate.

6. If the observer observes by making himself more or less a member of the group he is observing then the observation is called_____observation.

7. When observer observes as a detached emissary without any attempt on his part to experience through participation then the type of observation is called_____.

8. When the observers presence is unknown to the people he is observing then it is called _____ observation.

9. If the observation takes place in the natural setting it is termed as _____

observation but when observation takes place according to pre arranged plans, experimental procedure then it is called as_____observation.

10. Experiments done in a laboratory or under controlled conditions are known as _____ observation.

11. In case of exploratory researches_____observation is used.

12. Collection of data through presentation of oral-verbal stimuli and reply in terms of oral-verbal responses is known as_____method of data collection.

13. Personal interview may be in the form of _____ investigation or _____investigation.

14. In_____method a person called interviewer asks face to face question.

15. _____ method of data collection is suitable for intensive investigation.

16. Personal interviews are also called_____interviews.

17. _____ technique of data collection involve the use of a set of predetermined questions and highly standardised techniques of recording.

18. In_____interview method the interviewer is allowed much greater freedom to ask questions according to the situation.

19. _____ interviews demand deep knowledge and greater skill on the part of the interviewer.

20. _____ interviews are the central technique of collecting information in case of exploratory or formulative research studies.

21. In case of descriptive studies_____technique of interview is used.

22. In_____method of data collection every effort should be made to create friendly atmosphere of trust and confidence.

23. In_____ method of data collection consist of contacting respondents on telephone itself.

24. In _____ method of data collection a questionnaire is sent to the person concerned with a request to answer the questions and return the questionnaire.

25. _____ method of data collection is most extensively employed method in various economic and business surveys.

26. _____ method of data collection is used when respondents are educated and cooperating.

27. _____ survey brings to the light the weakness of the questionnaires and also in survey technique.

28. In_____method of data collection schedules are being filled in by the enumerators who are specially appointed for the purpose.

29. _____ technique of data collection is used to estimate consumption of the basket of goods at the consumer level.

30. In_____method of data collection distributers get the retail stores audited through salesman and use the information to estimate market size, market share etc.

31. In_____method of data collection postal sized cards are used by dealers of consumer durables to collect information regarding their products.

32. An extension of the pantry audit approach where a set of consumers are arranged to maintain detailed daily records of their consumption is known_____.

33. Eye camera, pupilometric camera are used for collecting data in_____method.

34. _____ technique is developed by psychologists to collect data.

35. The data which have already been collected and analysed by some one else is known as _____ data.

36. _____ method is a form of qualitative analysis and involves a careful and complete observation of a social unit.

37. _____ is a process of obtaining information about the entire population by examining only a part of it.

38. Total items about which information is desired is called_____.

39. Total of items in any field or inquiry is called_____.

40. _____ symbol is used for population.

41. A complete enumeration of all items in the population is known as a _____ survey.

42. Census survey is impossible in the situation when population is_____.

43. _____ refers to a definite plan for obtaining a sample from a given population.

44. The technique or procedure the researcher would adopt in selecting the items for a sample is known as_____.

45. The list of sampling unit is called_____.

46. The no. Of items to be selected from the universe to constitute a sample is known as _____.

47. Statistical constants of the of the population are called as_____.

48. Sampling errors are absent in_____survey.

49. _____ errors arise due to only a part of the population has been used to estimate population parameters.

50. The measurement of sampling error is called_____.

51. _____ error is present both in sample survey and the census survey.

52. _____ error arises at the stage of collection and preparation of data.

53. In_____sampling items for the sample are selected deliberately by the researcher.

54. Under_____sampling interviewer are given quotas to be filled from different strata with some restrictions on how they are to be filled.

55. Under_____sampling design every item of the universe had an equal chance of inclusion in the sample.

56. In_____sampling each element in the population has an equal probability of getting into the sample and all choices are independent of one another.

PROBABLE LONG QUESTIONS FOR BUSINESS RESEARCH

Module-1

1. The task of defining the research problem often follows a sequential pattern. Explain.(07)

2. Define research and discuss its nature and scope in the field of management.(10)

3. Briefly describe the different steps involved in a research process.(07,08,10)

4. Research is much concerned with proper fact finding, analysis and evaluation. Do youagree with this statement? Give reasons in support of your answer.(11)

5. Define business research and state its significance in modern times.(09)

6. Give your understanding of a good research design. Is single research design suitable inall research studies? If not, why? (07,10,13)

7. Define research design and how does formulating a research design differ from developingan approach to a problem.(12)

8. State the objectives of research design. Explain descriptive research design withone example.(08)

9. The main importance of the experimental design for the business researcher is thatit represents a model of how to infer causal connections between variables. Discuss.(11)

10. What are the primary differences between qualitative and quantitativeresearch techniques?(12)

11. What is research design? Briefly discuss about exploratory and descriptive researchdesigns.(2015-16)

12. What do you mean by research? Explain its characteristics. Describe different types ofresearch.(2015)

13. What is research design? Explain its meaning and significance. Describe briefly the differenttypes of research designs available.(15)

14. Do you agree with the statement “Research is much concerned with fact finding, analysisand evaluation’’? Give reason in support of your answer.(14)

15. How do exploratory, descriptive and experimental studies differ from each other.(14)

Module-2

16. Define a questionnaire? What are the essential characteristics of a good questionnaire?(07)

17. What are the guiding considerations in the construction of questionnaire? State thevarious types of questions that can be incorporated in it.(09,13)

18. Is there any difference between interview schedule and questionnaire? If yes, what arethey? (08,13)

19. Explain the difference between collection of data through the questionnaire methodand schedules methods.(10)

20. Distinguish between in experimental and survey. Explain fully the survey method ofresearch. (07)

21. How do primary data differ from secondary data? (08)

22. What steps are to be taken in designing appropriate sample? Which size of a sample willgive a better result? (08)

23. What is personal interview? Precisely discuss about focused, repetitive and standardizedinterviews.(2015-16

24. What are the guiding considerations in the construction of questionnaire? Explain.(15)

25. What is measurement? What are the scales of measurement? What information do theyprovide?(14)

26. What factors would you take into account in deciding how large your sample should bewhen devising a probability sample?(11)

27. Under what circumstances stratified random sampling design is considered appropriate?How would you select such sample? Illustrate with a suitable example. (07)

28. Why probability sampling is generally preferred over non probability sampling? Explainthe procedure of selecting a simple random sample.(10)

29. Distinguish among multidimensional scaling, cluster analysis and factor analysis.(07)

30. What are the techniques for attitude measurement? Explain.(08)

31. Give an example of relative frequency distribution.(08)

32. Processing of data implies editing, coding, classification and tabulation. Describe.(11)

Module-3

33. What is hypothesis? Write the characteristics of a good hypothesis and steps ofhypothesis testing.(10)

34. What is ANOVA? Explain factor, treatment and replication with an example.Differentiate between a fixed factor and random factor.(08)

Module-4

35. Write a brief easy on factor analysis particularly painting out its merits and limitations. (07,08,12)

36. Describe how you could create a conjoint analysis study of off-road vehicles. Restrict your brands to three, and suggest possible factors and levels. The full concept should not exceed 256 decision options. (07)

37. Define and classify multivariate techniques.(10)

38. Research report often contains statistical materials of great importance that are presented poorly. Discuss ways to improve statistical presentation.(07,11)

39. Explain the significance of a research report and narrate the various steps involved in writing such a report.(08)

40. What should be the ideal structure of a research report? What are the elements of structure defined by you?(13)

41. What are the items under the text of a research report? Explain all of them briefly.(08,10)

42. Explain the significance of research reports differentiate between a technical report anda popular report.(10,12)

43. What is reporting? Explain the significance of reporting and briefly reflect about technical reporting.(16)

44. Explain the significance of a research report and narrate the various steps.(15)

45. What is factor analysis? Point out its essential features and applications.(14)

46. How does the oral presentation of research results differ from the written research report?(14)

47. Write short notes on :

a. Multidimensional scaling.(07,10,15)

b. Motivational research technique. (07)

c. The physical presentation of a report.(09)

d. Pace in your writing a report.(09)

e. Research problem.

f. Acceptance region and rejection region.(10)

g. Types of measurement scales.(10)

h. Attitude measurement.(16)

i. Cluster sampling.(16)

j. Likert type scale.(15)

k. Bibliography and its importance in context of research report.(15)