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SCHOOL OF MANAGEMENT STUDIES

UNIT – 1 RESEARCH METHODOLOGY - SBAX1023

SYLLABUS - UNIT 1-RESEARCH METHODOLOGY

Definition of Research-Objectives- Characteristics-Methods of Research- Relevance of Research in decision making in various functional areas of management

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RESEARCH MEANING

Research is a serious academic activity with a set of objectives to explain or analyses or understands a problem or finding solution(s) for the problem(s) by adopting a systematic approach in collecting, organizing and analyzing the information relating to the problem.

Research –Definition

"Research" may be defined as the systematic and objective analyze and recording of controlled observation that may lead to the developments or generalizations, principles or theories, resulting in prediction and possibility ultimate control of events". Sometimes research is defined as a movement, a movement from the known to the unknown. It is an effort to discover something. Some people say that research is a on effort to know "more and more about less and less".

According to CLIFFORD WOODY, research comprises, defining and redefining problems formulating hypothesis or suggested solutions; collecting organizing and evaluating data making deductions and reaching conclusions; and at as carefully testing the conclusions to determine whether they fit the formulating a hypothesis. Research may also be defined." Any organized enquirydiscussed and carried out to provide information for solving a problem".

OBJECTIVES OF RESEARCH:

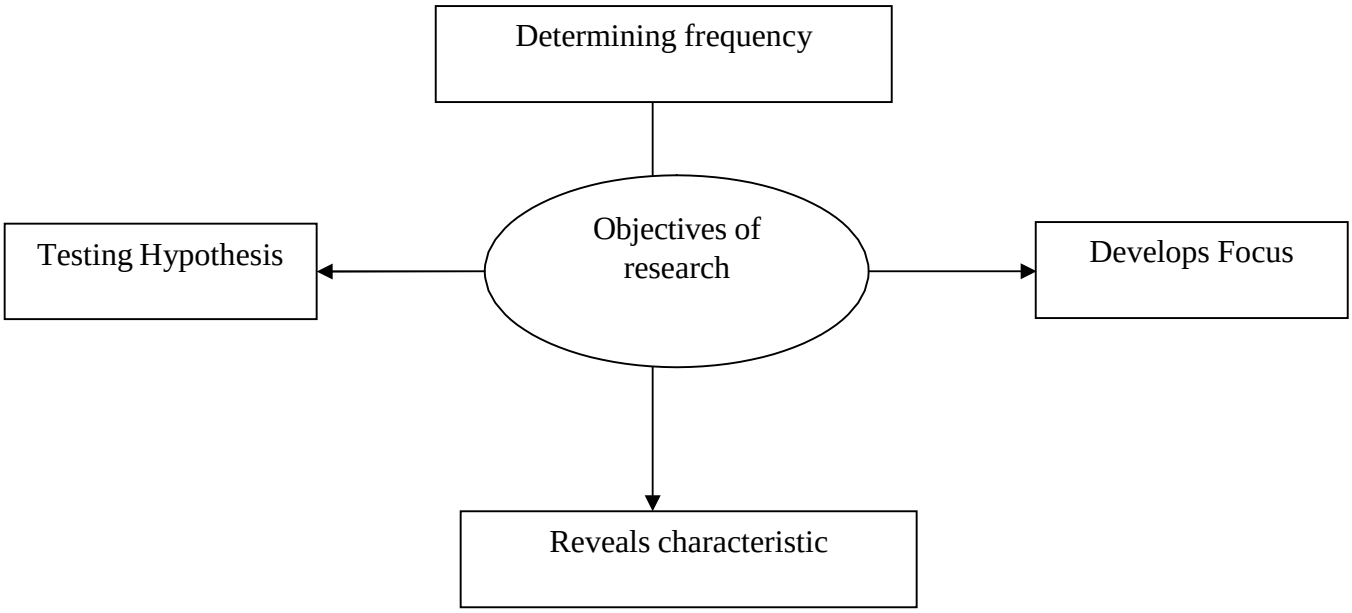
Research is a conscious approach to find out the truth which is hidden and which has not been discovered by applying scientific procedure.

It develops Focus: The research may be to understand for become familiar with some phenomena or to get to know more in depth it. For example, since the days of steam engine, the research continued to come up with more powerful locomotive which could be operated with alternative sources of energy like diesel, electricity etc.

It reveals characteristics: To clearly reveal the characteristics of an individual or a situation or a group like a society is another type of research objective. For example in these days before a criminal is sentenced efforts are taken to study why he had turned criminal. This helps develops an approach to create opportunities for criminals to cha ge themselves and join the main stream of life

It determines frequency of occurrence: To determine the frequency with which something occurs or with which it associated with something else. In social research one of the major areas of repeated and continuous research is analysis of poverty and unemployment.

It tests hypothesis: To test a hypothesis about the casual relationship between variable being studied. This type of research is mainly to determine the relationship between various factors so that necessary policy options could be framed. For example, the reasons for several malpractices adopted in public distribution outlets include low salary and absence of regulation of service of the staff in such outlets. This is turn make them to feel insecure and they resort to mal practices. Having found this the Govt., had taken a policy to improve the salary structure of these staff ad regularize their services. Hence the study of casual relationship might help in formulation The research should be honest in reporting the facts and revealing the flaws in the work.



Criteria of Good Research (characteristics)

1. Research is half complete, when objective or purposes of it are clearly spelt out.
2. It is necessary that every step followed in the process of research is explained fully.
3. The research design adopted for the study should be clear and match with objectives.
4. Research work should be based on carefully selected analytical tools.
5. The research work is incomplete without acknowledging the various data (or) facts.
6. Limitations should be frankly revealed.

TYPES OF RESEARCH

FUNDAMENTAL (OR) BASIC RESEARCH:

Pure or Basic research is a search for broad principles and synthesis without and immediate utilization objectives. It is not concerned with solving any practical problems of policy but with designing and fascinating tools of analysis and with discovering underlying and if possible universal laws and theories.

Eg. John Robinson's imperfect competition and chamber lains monopolistic competition.

Applied (or)Action Research: Applied research also known as action research is associated with particular project and problem. Such research, being of practical value may release to current activity (or) immediate practical situation it aims at finding a solution for an immediate problems facing a society practically all social science research undertaken in India is of the applied variety and more particularly of the type which helps formulation of policy.

Descriptive Research: It is designed to describe something such as demographic characteristics of consumers who use the product. It is designed to describe something, such as demographic characteristics of consumers who use the product. It deals with determining frequency with which something occurs or how two variables vary together. This study is also guided by a initial hypothesis. For example an investigation of the trends in consumption of soft drinks in relation to ration economic characteristics as age, sex, ethnic group, family income, education level, geographic location, and so on would be descriptive study.

Merits:

- This approach helps to test the conclusion and findings arrived at on the basis of laboratory

studies. By using this approach, it is possible to substantiate existing theories and conclusions on modifying them.

- Direct contact between the researcher and the respondent is brought about in this approach. This is very significant because, the researcher would be able to understand himself clearly the problem to be studied.
- With the possibility of direct contract with the respondent, the researcher is able to elicit all the relevant information and eliminate irrelevant facts.

Limitations:

- Unless the researcher is experienced there is every possibility of the approach being misused. Hurried conclusions and generalizations may be formed based on the inaccurate field data.
- As this approach involves collection of field data enormous time and efforts are required to plan and execute the field survey
- This approach also involves incurring heavy cost on data collection.
- Unless the respondents are co-operative. It is not possible to collect data through this approach.

HISTORICAL RESEARCH: As the name suggests in this approach historical data is given importance to undertake analysis and interpret the results. Following this approach a researcher would collect past data for his research. A scholar using this approach has to depend on libraries for referring to the magazines or periodicals for collecting data.

Merits:

- This approach alone is relevant in certain types of research work. For examples to understand the trend in India's exports. One has to collect the export data for a period of say 20 years and them analyze it similarly to study the impact of the liberalizations policy one has to collect information from 1991 till date.
- Historical approach makes research possible as it is firmly believed that once we understand the past, our understanding of the present and expectations of the future could be predicted to some extent. Hence historical research provides the insight into the past and facilitates looking into the future.

Limitations:

- Personal bias of the people who had written about historical events or incidents cannotbe to mislead.

- Researchers tend to over generalize their results using historical approach.
- Persons using this approach should be conscious of the fact that historical data can be taken be give and indication about the past, but formulation of solutions on that basis and applying them in the current period is not correct.

EXPLORATORY RESEARCH:

Most of the marketing research projects begin with exploratory. It is conducted to explore the possibilities of doing a particular project. The major emphasis is on the discovery of ideas and insights. For example, a soft drinks firm might conduct an exploratory study to generate possible explanations. The exploratory study is used to spilt the broad and vague problem into smaller, more precise sub problem statements, in the form of specific hypothesis. An exploratory study is conducted in the following situations.

- To design a problem for investigations and to formulate the hypothesis.
- To determine the priorities for further research.
- To gather data about the practical problems for carrying out research on particular conjectural statements.
- To increase the interest of the analyst towards the problems and
- To explain the basic concepts.

Exploratory study is more flexible and highly informal. There is no formal approach in exploratory studies. Exploratory studies do not employ detailed questionnaire. These studies will not involve probability sampling plans. The following are the usual methods of conducting exploratory research

- Literature Survey
- Experience Survey and
- Analysis of insight stimulating cases.

LITERATURE SURVEY;

The literature search in fast and economic way for researchers to develop a better understanding of a problem area in which they have limited experience. In this regard, a

large volume of published and unpublished data are collected and scanned in a relatively small period of time. Generally sources includes books, newspapers, Government documents trade journals, professional journals and soon. These are available in libraries, company records such as these kept for accounting sales analysis purposes; reports of previous research projects conducted problems incompletely but will be of great help to provide a director to further research.

EXPERIENCE SURVEYS;

In this method, the persons who have expertise knowledge and ideas about research subject may be questioned. Generally the company executives, sales managers, other relevant people of the company salesman, wholesalers, retailers who handle the product or related products and consumers are concentrated. It does not involve scientific ally conducted statistical survey, rather it reflects an attempt to get available information from people who have some particular knowledge of subject under investigation.

ANALYSIS OF INSIGHT STIMULATING CASES:(Case Study Approach).

Case study approach to research is recent development. In this approach the focus is on a single organization or unit or an institution or a district or a community. As the focus is on a single unit, it is possible to undertake an in depth analysis of the single unit. It is basically a problem solving approach, **The following are the characteristics of case study method.**

The study of the whole unit: It this study a large variety of units are selected for study and the size of the unit may be quite large to cover an entire community in a word this method treats an individual an institution or a group of persons as a whole.

Intensive study: It aims at deep and through study of a unit. It deals with every aspect of a unit and studies at intensively. The following methods are undertaken in case study;

- Determination of Factors: First of all the collection of materials about each of the units or aspects is very essential. The determination of factors may be of two types,(u)particular factors and General factors. Statement of the problem: In this process the defined problem is studied intensively and the data are classified into various classes.
- Analysis and conclusion: After classifying and studying the factors an analysis is made

Advantages:

• As this approach involves a focused study there is lot of scope for generating new ideas and suggestions.

• It may provide the basis for developing sound hypothesis.

• As the researcher studies the problem from his own point of view, very useful andreliable findings may be obtained.

Limitations:

• A significant limitation of this approach is that unless the researcher is experienced he might ignore very important aspects.

• This approach also depends on the infirm furnished by the respondents unless the infirm is accurate the conclusions are bound to be irrelevant.

• It is often said that case studies are based on the observations of the researcher

EXPERIMENTAL RESEARCH:

This is a very scientific approach. In this approach the researcher first determines the problem to be studied. Then he identifies the factors that cause the problem. The problem to be probed is quantified and taken as the dependent variable. The factors causing to the problem will be taken as independent variable. Then the researcher studies the casual relationship between the dependent and independent variable. He is also able to specify to what extent the dependent variable. He is also able to specify to what extent the dependent variable is influenced by each independent variable.

For examples suppose food production is taken as the problem for a research study. then the scholar would determine the factors that will affect food production. Viz size of the land cultivated(x) rainfall (y) quantity of fertilizer applied (z) etc. These factors x,y and z are called independent variable,. Food production [A] is called dependent variable. Then by collecting data regarding all the four [A,x,y and z]. The researcher is able to state what percentage change in the final food (A) is explained by x,y and z. The effect of x on A, y on A and z on A is also studied. In this manner the researcher is able to successfully indicate to what extent various factors included in the study are important.

Merits of Experimental Approach (Research)

• This approach provides the social scientists a reliable method it observe under given conditions to evaluate various social programmes. • This is one of the best methods of measuring the relationship between variables.

• This approach is more logical and consistent that the conclusions drawn but of research based on this approach is well received.

• It helps to determine the cause – effect relationship very precisely and clearly.

• Following this approach researchers could indicate clearly the areas of future research

Limitations of Experimental Approach (Research)

• Unless a researcher is well experienced and trained in model building this approach cannot be easily followed.

• By relying more on models this approach may not add anything significant to knowledge

• A serious limitation of this approach is that it relies on sampling and collection of data. Unless these are properly planned and executed. the outcome of analysis will not be accurate..**DIAGNOSTIC STUDY**;

This is similar to descriptive study but with a different focus. It is directed towards discovering what is happening, why it is happening and what can be done about. It aims at identifying the causes of a problem and the possible solutions for it. A diagnostic study may also be concerned with discovering and testing whether certain variables are associated. E.g., are persons having from rural areas more suitable for manning rural branches of banks? (or) Do more villagers than city voters vote for a particular party.

EVALUATION STUDIES;

Evaluation study is one type of applied research it is made for assessing the effectiveness of social or economic programmes implemented (e.g. family planning scheme) or for assessing he impact of developmental projects (e.g., irrigation project) on the development of the area. Evaluation study may be defined as "determination of the results attained by some activity (whether a program me, a drug or a therapy or an approach) designed to accomplish some valued goal or objective".

ANALYTICAL STUDY:

Analytical study is system of procedures and techniques of analysis applied to quantitative data. It may consist of a system of mathematical models (or) statistical techniques applicable to numerical data. Hence it is also known as the statistical method. This method is extensively used in business and other fields in which quantitative numerical data are generated. It is used for measuring variables, comparing groups and examine association between factors. Data may be collected from either primary sources or secondary sources.

SURVEYS RESEARCH:

Survey is a fact finding study. It is a method of research involving collection of data directly from a population or a sample there of at particular time. It must not confused with the more clerical routine of gathering and tabulating figures. It requires expertise and careful analytical

knowledge. The analysis of data may be made by using simple or complex statistical techniques depending upon the objectives of the study This type of research has the advantage of greater scope in the sense that a larger volume of information can be collected from a very large population

.**OTHER TYPES OF RESEARCH**

Ex-post Facto Research;

Ex-post Fact research is based on observation made by inquiry in which the researcher does not have direct control of independent variables because their outcome have already occurred. This kind of research based on a scientific and analytical examination of dependent and independent variables. The ex-post facto research findings may become riskier by improper interpretations.

Panel Research:

Generally the survey research is valid for one time period which is known as „study period" and they do not reflect changes occurring time. The consumer attitudes toward purchasing a particular product are not static and hence changing. For example, it is not possible to study the changes occurring in these attitudes over a period in response to changes in the particular products marketing min. measuring change over time is known as longitudinal analysis which is done by the use of panels. This methods are generally used in sales forecasting by consumer preferences for various products measuring audience size and characteristics for media programmes testing new products.

Advantages;

o It considers the changes in the time.

o It provides more control

o It has greater co-operation

o It offers more analytical Data from respondents.

ERRORS IN RESEARCH

The errors in research will be happened in so many stages. Some of them are discussed below:

1. **Questionnaire Studies**
    - Using a questionnaire to work with problems that lend themselves better to other researchtechniques.
    - Not giving enough care to the development of the questionnaire and not pretesting it.
    - Asking too many questions, thus making unreasonable demands on the respondents. Time.

- Overlooking details of format, grammar, printing, and so on that can influence respondents.first impression.
- Not checking a sample of non-responding subjects for possible bias in the questionnaire.

2. Interview Studies

- Not adequately planning the interview or developing the interview guide.
- Not conducting sufficient practice interviews to acquire needed skills.
- Failing to establish safeguards against interviewer bias.
- Not making provisions for calculating the reliability of the interview data.
- Using language in the interview that the respondents wont understand.
- Asking for information that the respondents cannot be expected to have.

3. Experimental Studies

- Inadvertently or otherwise treating the experimental and control groups differently, thus leading to biased findings.
- Using too few cases, leading to large sampling errors and in significant results.
- Failing to divide the main groups into subgroups in situations where subgroup analysis mayproduce worthwhile knowledge.
- Matching the subjects in the experimental and control groups on criteria that have little to dowith the variables being studied.
- Attempting to match control and experimental groups on so many criteria that in the process you lose a large number of subjects who cannot be matched.

4. Content Analysis Studies

- Selecting content that is easily available but is not an unbiased sample.
- Selecting some content that is not really related to the research objectives.
- Failing to determine the reliability of the content-analysis procedures.
- Using classification categories that are not specific yet comprehensive.

5. Observational Studies

- Not sufficiently training observers and thus obtaining unreliable data.
- Using an observation procedure that demands too much of the observer.
- Failing to safeguard against the observers disturbing or changing the situation being observed.
- Attempting to evaluate behavior that occurs so infrequently that reliable data cannot be obtained through observations.

- **Relationship (Correlation) Studies**
- Assuming that a correlation between pieces of data is proof of a cause-and effect relationship.
- Using a sample in correlation research that differs on so many variables that comparisons of groups are not interpretable.
- Putting the cart before the horse: trying to build a correlational study around conveniently available data instead of collecting the data needed to do a worthwhile study.
- Selecting variables for correlation that have been found unproductive in previous studies.
- Failing to use appropriate disciplinary theory in selecting variables to study.
- Using simple correlation techniques in studies where partial correlation or multiple correlation is needed to obtain a clear picture of the way the variables are operating.

RELEVANCE OF RESEARCH IN DECISION MAKING IN VARIOUS FUNCTIONAL AREAS OF MANAGEMENT

Generally a manager has to take a course of action which is most effective in attaining the goals of the organization Research provides facts and figures in support of such business decisions. It helps the manager to choose a measuring rod to judge the effectiveness of each decision. This may be the reason why executives and business professionals consider research and research findings as a boon in their problem solving process.

• Any research on management will have the following general objectives:
• The objective of decision making
• The objectives of decision making
• The objective of controlling the managerial activities
• The object of studying the economic and business environment
• The object of studying the market
• The object of studying the new product development
• The object of studying innovation
• The object of studying customer satisfaction

For management the research helps the management in the following ways:

- Research provides „decision alternatives in decision making"

- Research stimulates thinking analysis evaluation and interpretation of the business environment
- Research leads to innovation Research facilitates the development of new products and modification of the existing products
- Research easily locates the problem areas' Research establishes the relationship not only between variables in each functional area, but also between the various functional area.
- Research facilitates business forecasting
- Market and Marketing analysis may be based on research
- Research is an aid to management information system and
  Research helps to re-design corporate policy and strategy.

Functional areas of any business cover production personnel marketing finance and organizational. They scope of research on these areas are listed below

Research for Marketing decisions: New product development research – Research to brand equity and preference – Research on pricing strategies – Research on distribution channels – Research on salesman qualities and effectiveness – Research on media effectiveness – Research on marketing information system etc.

Research for personnel Decisions: Research on effectiveness of different sources of recruitment and training – Research on leadership style and effectiveness – Research of personnel information system etc.

Research for capital market decisions: Research on issues, like climate culture creativity change design etc.,

Research for Financial decisions: Research on cost of capital and capital structure – Research on working capital management research on inventory management – etc.

Research on Business Strategies: Strategic alliances and divorces – Mergers and acquisitions – Disinvestment –Reorganizations – Reengineering etc.

To sum up research is an ingredient in all the functional areas of commerce and economics production and materials management extensively make use of research. However a close observation of management practices I India would determine whether research receives its due importance.

QUESTION BANK

	PART – A
1	Define research.
2	Distinguish between research methods and research methodology.
3	Write any two characteristics of good research.
4	List the objectives of research.
5	What is descriptive research?
6	Criticize the role of ethics in research.
7	What is historical research?
8	"Literature review is essential for any research". Comment.
9	Distinguish between causal research and basic research.
10	Write short note on Ex-post facto research.

	PART-B
1	Explain different types of research.
2	Discuss the techniques involved in defining a research problem.
3	Summarize and criticize the problems faced by researchers in India.
4	Explain the significance of research in modern times.
5	Describe the relevance of ethics in research.
6	Is research required for decision making in various functional areas of management. Justify.
7	How the research helps in decision making in various functional areas of management. Justify.
8	"Literature review is essential for any research". Comment
9	List and explain the different types of research
10.	Discuss the techniques involved in defining a research problem.

TEXT / REFERENCE BOOKS

1. Ackoff, Russell L., The Design of Social Research, Chicago: University of Chicago Press, 1961.

2. Ackoff, Russell L., Scientific Method, New York: John Wiley & Sons, 1962.

3. Allen, T. Harrell, New Methods in Social Science Research, New York: Praeger Publishers, 1978.

4. Anderson, H.H., and Anderson, G.L., An Introduction to Projective Techniques and Other Devices for Understanding the Dynamics of Human Behaviour, New York: Prentice Hall, 1951.

5. Anderson, T.W., An Introduction to Multivariate Analysis, New York: John Wiley & Sons, 1958.

6. Bailey, Kenneth D., "Methods of Social Research," New York, 1978.

7. Baker, R.P., and Howell, A.C., The Preparation of Reports, New York: Ronald Press, 1938.

8. Bartee, T.C., "Digital Computer Fundamentals," 5th Ed., McGraw-Hill, International Book Co., 1981.

9. Barzun, Jacques, and Graff, Henery, F., The Modern Researcher, rev. ed., New York: Harcourt, Brace & World, Inc., 1970.

10. Bell, J.E., Projective Techniques: A. Dynamic Approach to the Study of Personality, New York: Longmans Green, 1948.

11. C.R. Kothari, New Age International Publishers, Research Methodology, 2nd Edition, 2004

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SCHOOL OF MANAGEMENT STUDIES

UNIT – 2 - RESEARCH METHODOLOGY - SBAX1023

Formulation of Research problem- literature survey developing Hypothesis- Research Design and Types- Determination of sampling plan- collection of Data-Analysis of Data-Testing of Hypothesis

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Research Process

Research is a process. A process is a set of advices that are performed to achieve a targeted outcome. That is a process involves a number of activities which are carried out either sequentially or simultaneously. So research process would refer to various steps and stages involved in research activity.

The various stages are listed below;

1. Formulating the Research problem
2. Extensive literature survey
3. Developing the hypothesis
4. Preparing the research design
5. Determining the sample design
6. Collecting the data
7. Analysis of data
8. Hypothesis testing and
9. Preparation of report

Formulating the Research Problem;

In research process the first and foremost step is selecting and defining a research problem. A researcher should at first find the problem. Then he should formulate it so that it becomes susceptible to research. To define a problem correctly, a researcher must know what a problem is? What is a Research problem a problem can be called a research problem if it satisfies the following condition;

- It must be worth studying

- The study of the problem must be socially useful
- It should be a problem untouched by other researchers or even if touched must be in need of further research possibility.
- A research problem should come out with solutions to the issue.
- It should be up to date and relevant to the current social happenings.
- All the special terms that are used in the statement of the problem should be clearly defined.

In selection of the problem the researcher should take into consideration of the following factors:

- Researchers‟ Interest
- Topic of significance
- Researcher's resource
- Time availability
- Availability of data
- Feasibility of the study
- Benefits of the research

Review of Literature:

After defining the problem the researcher should undertake an extensive literature survey connected with the problem. In this context he can refer previous studies magazines journals and dissertations published, academic journals etc., In this process, oit should be remembered that one source will lead to another. The earlier studies if any which are similar to the study in hand should be carefully studied.

Developing the Hypothesis:

This is the next stage to the review. Here the researcher should state in clear terms the hypothesis. Hypothesis is an assumption to be proved or disproved. A research hypothesis is a predictive statement capable of being tested by scientific methods. That relates an independent variable to some dependent variable.

Features:

- It should be clear and precise

- It should be capable of being tested
- It should state the relation between variables
- It should be limited in scope and must be specific
- It should be stated in simple terms

Normally a hypothesis will be developed in the following ways:

1. The researcher has to consult and deliberate with colleagues and experts about the problem.
2. He has to examine the existing data, concerning the problem for possible trends and clues and
3. He has to review studies on similar problems

Preparing the Research Design:

After developing hypothesis the researcher has prepare a research design. A research design could be defined as the blue print specifying every stage of action in the course of research. Such a design would indicate whether the course of action planned will minimize the use of resources and maximize the outcome. Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine research purpose and economy in procedure.

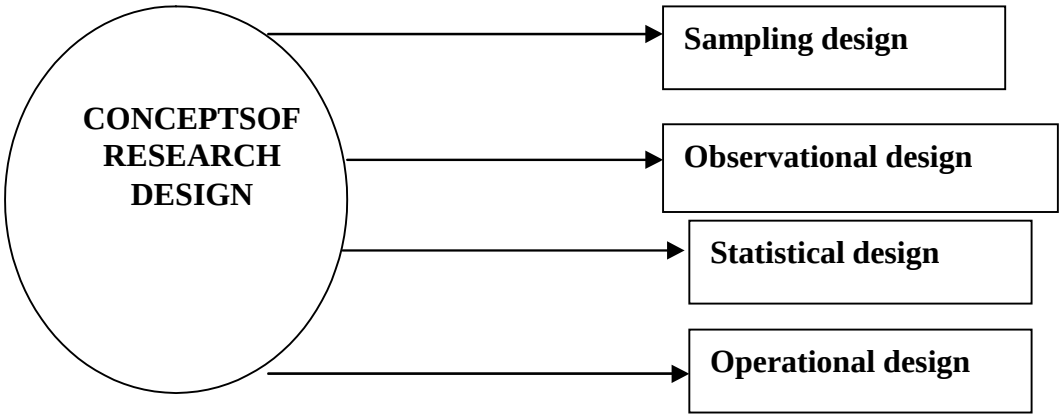
Research design would answer the following questions.

1. What is the study about?
2. Why is the study being made?
3. Where will be the study should be carried out?
4. What type of data and where it would be collected?
5. What is the period of study?
6. Whether any sample would be used and if so what type of sample will be sued?
7. What type of tools to be used?

A good research design should possess the folly features. However the qualities of agood research would differ from study to study:

- It should be flexible
- It should help to minimize bias at every stage
- It should facilitate collection and analysis
- It should be closely linked with objectives of the study
- It is a plan that specifies the sources and type of inform relevant to the research problem.
- It should specifically mention the type of approach to the study
- It should also include the time and cost budget since most studies are suffered bythese two constraints:

Broadly there could be four different types of research design: viz., (Contents of Research design)



1. **Sampling design:** all the details connected with the sampling process from the determination of sample size down to the collection of data, would be spelt out.
2. **Observational design:** If the study makes use of observational technique then what type of observation technique would be used, conditions under which the observations will be made would be indicated.
3. **Statistical design:** This part of research design would spell out the type of analysis that would be carried out.
4. **Operational design:** This design would lay down the steps that would be taken at each stage as the design is executed

Research design may be classified as:

- Exploratory Research design
- Descriptive and Diagnostic Research Design
- Experimental Research design
- Conclusive Research Design

Determining the sample Design:

A sample, as the name implies is a smaller representation of a large whole simple speaking the method of selecting for the a study portion of the universe with a view to draw conclusion about the universe is known as sampling. The researcher must decide the way of selecting a sample or what is popularly known as the sample design, In other words a sample design is a definite plan determined before any data are actually collected for obtaining a sample from given population samples can be either probability samples or non-probability samples.

Collecting the Data:

Collection of data is on important stage in research. In fact the quality of data collected determine the quality of research. A researcher has several ways of collecting the appropriate data which offer considerably I the context of money, time and other resources as per its sources the data may be classified as primary data and secondary data.

Primary data is known as the data collected for the first time through field survey. Such data are collected with specific set of objectives to assess the current status of any variables studied. By survey methods data can be collected by anyone or more of the following ways:

- Observation Method
- Personal Interviews
- Telephone survey
- Questionnaires
- Schedules

Secondary data refers to the information or facts already collected such data are collected with the objective of understanding the past status of any variable.

Processing and analysis of Data:

Processing refers to the subjecting the data collected to a process in which the accuracy, completeness, uniformity of entries and consistency of information gathered are examined. Most commonly processing is understand as editing, coding, classification and tabulation of the data collected. After processing in research a scholar explains the tools that he has adopted for analyzing the data. The scholar should select the tools of analysis by considering the objectives set for the study. He should examine the type of analysis required for accomplishing each objectives set. Based on that this he must explain the features of the tool and how is it applied.

Testing the Hypothesis:

The researcher after analyzing the data will test the type of /Hypothesis while testing the hypothesis various tests such as chi-square, test, t-test, F-test will be used depending upon the nature and object of research. Hypothesis – testing will result in either accepting the Hypothesis or rejecting it.

Preparation of the Report:

After the analysis and interpretations are over, the research has to prepare the report. The body of the report includes – introduction review of literature, methodology result and discussions and summary and conclusions.

SOURCES FOR RESEARCH PROBLEM

Reading study book, academic experience, daily experience, field situations, and consultation with experts, brain storming, previous research and Intuition.

CRITERIA OF SELECTION OF RESEARCH PROBLEM

- Internal criteria:
- Researchers own interest
- Researcher's competence
- Researcher's own resource: finance and time
- External Factors:
- Research ability of the problem Its importance and urgency Novelty of the problem Feasibility

Facilities

- Usefulness and social relevance Research personnel.

DIFFERENT TYPES (Sources) OF LITERATURE

BOOKS

- Year Books e.g., published as supplements to Encyclopedias.
- Text Books.
- Reference Books.

JOURNALS:

Published monthly, Quarterly, Half yearly or Annually.

REPORTS:

- Reports of Committees/Commissions appointed by Governments and Public institutions.
- Seminar Reports and Conference proceedings.
- Bibliography of Doctoral Dissertations.
- Research Dissertations and theses
- Newspapers
- Micro Forms: Audio and Video tapes

PURPOSES (NEED) OF LITERATURE REVIEW

The reasons for review of related literature are:

- To gain a background knowledge of the research topic.
- To identify the concepts relating to it, potential relationships between them and to formulate researchable hypotheses.
- To identify appropriate methodology, research design, methods, of measuring concepts and techniques of analysis.
- To identify data sources used by other researchers and To learn how others structuredtheir reports.

Hypothesis Testing

Hypothesis is an assumption or some supposition to be proved or disproved. A research. Hypothesis is a predictive statement incapable of being tested by scientific methods that relates an independent variable with some variable. Hypothesis is usually considered as the principal instrument for research. Its main function is to suggest new experiments and observations.

Definition of Hypothesis:

A research hypothesis is a predictive statement capable of being tested by scientific methods that relates an independent variable to some dependent variable. The feature of a hypothesis statement is as follows:

- It should be clear and precise
- It should be capable of tested
- It should state the relationship between variables
- It should be limited in scope and must be specific
- It should be stated in simple terms

The Role of the Hypothesis

In research, a hypothesis serves several important functions:

1. It guides the direction of the study:

Quite frequently one comes across a situation when the researcher tries to collect all possible information on which he could lay his hands on. Later on he may find that only part of it he could utilize. Hence there was an unnecessary use of resources on trivial concerns. In such a situation, hypothesis limits what shall be studied and what shall not be.

2. It identifies facts that are relevant and those that are not:

Who shall be studied (married couples), in what context they shall be studied (their consumer decision making), and what shall be studied (their individual perceptions of their roles).

3. It suggests which form of research design is likely to be the most appropriate:

Depending upon the type of hypothesis a decision is made about the relative appropriateness ofdifferent research designs for the study under consideration. The design could be a survey

design, experimental design, content analysis, case study participation observation study and/or Focus Group Discussions.

- It provides a framework for organizing the conclusions of the findings:
- It offers explanations for the relationships between those variables that can be empiricallytested.
- It furnishes proof that the researcher has sufficient background knowledge to enable him/herto make suggestions in order to extend existing knowledge.
- It gives direction to an investigation.
- It structures the next phase in the investigation and therefore furnishes continuity to the examination of the problem.

The Characteristics of a Testable Hypothesis

1. Hypothesis must be conceptually clear. The concepts used in the hypothesis should be clearly defined, operationally if possible. Such definitions should be commonly accepted and easily communicable among the research scholars.
2. Hypothesis should have empirical referents. The variables contained in the hypothesis should be empirical realities. In case these are not empirical realities then it will not be possible to make the observations. Being handicapped by the data collection, it may not be possible to test the hypothesis. Watch for words like ought, should, bad.
3. Hypothesis must be specific. The hypothesis should not only be specific to a place and situation but also these should be narrowed down with respect to its operation. Let there be no global use of concepts whereby the researcher is using such a broad concept which may all inclusive and may not be able to tell anything. For example somebody may try to propose the relationship between urbanization and family size. Yes urbanization influences in declining the size of families. But urbanization is such comprehensive
4. Variable which hide the operation of so many other factor which emerge as part of the urbanization process. These factors could be the rise in education levels, women's levels of education, women empowerment, emergence of dual earner families, decline in patriarchy, accessibility to health services, role of mass media, and could be more. Therefore the global use of the word „urbanization" may not tell much. Hence it is suggested to that the hypothesis

should be specific.

5. Hypothesis should be related to available techniques of research. Hypothesis may have empirical reality; still we are looking for tools and techniques that could be used for the collection of data. If the techniques are not there then the researcher is handicapped. Therefore, either the techniques are already available or the researcher is in a position to develop suitable techniques for the study.

6. Hypothesis should be related to a body of theory. Hypothesis has to be supported by theoretical argumentation. For this purpose the research may develop his/her theoretical framework which could help in the generation of relevant hypothesis. For the development of a framework the researcher shall depend on the existing body of knowledge. In such an effort a connection between the study in hand and the existing body of knowledge can be established. That is how the study could benefit from the existing knowledge and later on through testing the hypothesis could contribute to the reservoir of knowledge.

7. Hypothesis should be logically consistent. Two or more propositions logically derived from the same theory must not be mutually contradictory.

8. A hypothesis should be a simple one requiring fewer conditions or assumptions. But Simple does not mean obvious. Simplicity demands insight. The more insight the researcher has into a problem, the simpler will be his hypothesis about it.

TYPES OF HYPOTHESES

Hypotheses are classified in several ways. They are

1. **Descriptive Hypotheses**: These are propositions that describe the characteristics of a variable. The variable may be an object, person, organization, situation or event. Example: The rate of unemployment among arts graduates is higher than that of commerce graduates.
2. **Relational Hypotheses:** These are propositions, which describe the relationship between two variables. The relationship suggested may be positive or negative correlation or causal relationship. Example: Families with higher incomes spend more for recreation.
3. **Casual Hypotheses** state that the existence of, or a change in, one variable causes or leads to an effect on another variable. The first variable is called the independent variable and the latter the dependent variable. When dealing with causal relationships between variables the researcher must consider the direction in which such relationships flow, i.e.,which is cause and

which is effect.

4. **Working Hypotheses:** While planning the study of a problem, hypotheses are formed. Initially they may not be very specific. In such cases, they are referred to as „Working Hypothesis‟ which are subject to modification as the investigation proceeds.
5. **Null and Alternate Hypotheses**: These are the important hypotheses normally used in academic research. Null hypotheses always start with negation. I.e. the hypotheses will be framed with way that as there is no association between variables. The hypotheses which are opposite and alternate to null hypotheses are called as Alternate Hypotheses.

SOURCES OF HYPOTHESES:

Hypotheses can be derived from various sources:

i. **Theory:** This is one of the main sources of hypotheses. It gives direction to research by stating what is known. Logical deduction from theory leads to new hypotheses. For example, profit/wealth maximization is considered as the goal of private enterprises. From this assumption, various hypotheses are derived, for example. "the rate of return on capital employed is an index of business success"

ii. **Observation:** Hypotheses can be derived from observation. From the observation of price behavior in a market. For example, the relationship between the price and demand for an article is hypothesized.

iii. **Intuition:** Intuition and personal experience may also contribute to the formulation of hypotheses. Personal life and experiences of persons determine their perception and conception. They may, in turn, direct a person to certain hypotheses more quickly.

iv. **Findings of studies:** Hypotheses may be developed out of the findings of other studies in order to replicate and test.

v. **Continuity of research**: The continuity of research in a field itself constitutes an important

source of hypotheses. The rejection of some hypotheses leads to the formulation of new ones capable of explaining dependent variables in subsequent researches on the same subject.

TYPE I ERROR AND TYPE II ERROR:

In the process of testing a hypothesis, a researcher may commit two type of errors namely type I error and Type II error.

Type I error: We commit this error when we reject a null hypothesis which is true.

Type II error: This error is committed when we accept the null hypothesis which is false.

	Accept Ho	**Reject Ho**
H(true)	**Correct Decision**	**Type I Error**
H(false)	**Type II error**	**Correct Decision**

PROCEDURE FOR HYPOTHESIS TESTING

1. **Making a formal statement:**

   It consists of making a formal statement of the null hypothesis Ho and also of thealternative hypothesis Ha

2. **Selecting a significance level:**

   Generally the hypothesis is tested on a pre-determined level of significance and as such the same should be specified. Generally in practice either 5% level or 1% level is adopted for thepurpose.

3. **Deciding the distribution to use:**

   After deciding the level of significance the researcher has to determine the appropriate sampling distribution.

4. **Selecting a random sample and computing an appropriate value:**

   The researcher has to select a random sample(s) and compute an appropriate value from the sample data.

5. **Calculation of the probability**

The researcher has to calculate the probability that the sample result would diverge as widely as it has from expectations.

6. **Comparing the probability**

Afterwards, the researcher has to compare the probability thus calculated with the specified value for α significance level.

RESEARCH DESIGN

After developing hypothesis the researcher has to prepare a research design. A research design could be defined as he blue print specifying every stage of action in the course of research. Such a design would indicate whether the course of action planned will minimize the use of resources and maximize the outcome. Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine research purpose and economy in procedure.

Types or research design

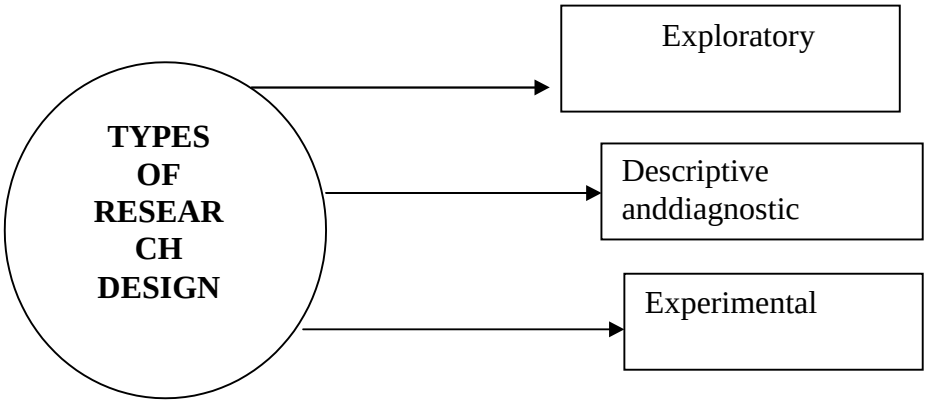
1.Exploratory research design:

This is also called formulative research design. This aims of formulating a problem for more precise idea or hypothesis, Based on this the subsequent stages of research could be planned. As this design is only of formulate type it should be highly flexible. While applying this design. Three different methods are followed:

Survey of related literature – by studying intensively the past studies and contributions relating to the field of study, the research problem could be easily formulated.

Conducting experience survey –this refers to undertaking collection of details and discussion with the experienced people in the chosen field of research. This would help the researcher to determine the extent to which he is original and can avoid duplication.

Analysis of insight-stimulating examples is yet another method in which depending upon the study on hand. In this method, the experience of people would be used as guide to develop or formulate a hypothesis.



2.Descriptive and diagnostic research design:

Descriptive research design is concerned with research studies with a focus on the portrayal of the characteristics of a group or individual or a situation. The main objective such studies is to acquire knowledge. For example, to identify the use of a product to various groups,. a research study may be undertaken to question whether the use varies with income age sex or any other characteristics of population. On the other hand the diagnostic studies aim at identifying the relationship of any existing problem. Based on the diagnosis, it would also help to suggest methods to solve the

problem. In this process it may also evaluate the effectiveness of the suggestions already implemented.

3.Experimental research design

The experimental research studies are mainly focused on finding out the cause and effect relationship of the problem under study. Actually when observation is arranged and controlled it becomes experimental study. An experiment is a test or trial or an act or operation for the purpose of discovering something unknown or of testing principle, supposition etc., it is a process in which one or more variables are manipulate under conditions that permit the collection of data that show the effects of any of such variables is a unconfused fashion.

The experimental design is broadly classified as a) informal experimental design and b)formal experimental design. The formal includes after only design, after only with control design before and after without control design before and after control and expost facto design. The formal experimental design would include completely randomized design randomized block

design; Latin squares design and factorial design.

Issues in research design

The **richness of the research** in the discipline is evaluated depending on whether the discipline is in the initial stages of exploration and classification or a mature subject leading to considerable amounts of application in practice.

The degree of clarity of the problem should be judged. The higher the degree of clarity, the more rigorous the research designs, tending towards experimental research.

The degree of control that can be obtained over a variable should be evaluated. If this is negligible, then field studies are preferred and the relationships or hypotheses tend to become somewhat weak.

The time scale with respect to phenomenon to be studied should be determined.

The objectives set forth should be related to the units of study.

QUESTION BANK

	PART - A
1	What is research design?
2	Define hypothesis.
3	Differentiate type I and type II error.
4	Write any two reasons for review of related literature.
5	How does a researcher collect data?
6	What is causal hypothesis?
7	Differentiate personal interview and telephonic interview.
8	List the sources of literature.
9	What is null hypothesis?
10	Write short note on experimental design.

	PART-B
1	Explain research process with various steps and stages.
2	How are research design classified? Discuss with distinguishing features of each.
3	Examine the sources of hypothesis and procedure for testing hypothesis.
4	Hypothesis is a guiding force in any research study. Justify and explain.
5	Explain the factors that influence research design and discuss on the components of research design.
6	Explain descriptive and exploratory research design with examples.
7	Discuss the techniques involved in defining a research problem.
8	Discuss the factors that influence research design and explain the concepts of research design.

TEXT / REFERENCE BOOKS

1. Ackoff, Russell L., The Design of Social Research, Chicago: University of Chicago Press, 1961.

2. Ackoff, Russell L., Scientific Method, New York: John Wiley & Sons, 1962.

3. Allen, T. Harrell, New Methods in Social Science Research, New York: Praeger Publishers, 1978.

4. Anderson, H.H., and Anderson, G.L., An Introduction to Projective Techniques and Other Devices for Understanding the Dynamics of Human Behaviour, New York: Prentice Hall, 1951.

5. Anderson, T.W., An Introduction to Multivariate Analysis, New York: John Wiley & Sons, 1958.

6. Bailey, Kenneth D., "Methods of Social Research," New York, 1978.

7. Baker, R.P., and Howell, A.C., The Preparation of Reports, New York: Ronald Press, 1938.

8. Bartee, T.C., "Digital Computer Fundamentals," 5th Ed., McGraw-Hill, International Book Co., 1981.

9. Barzun, Jacques, and Graff, Henery, F., The Modern Researcher, rev. ed., New York: Harcourt, Brace & World, Inc., 1970.

10. Bell, J.E., Projective Techniques: A. Dynamic Approach to the Study of Personality, New York: Longmans Green, 1948.

11. C.R. Kothari, New Age International Publishers, Research Methodology, 2nd Edition, 2004

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SCHOOL OF MANAGEMENT STUDIES

UNIT – 3 - RESEARCH METHODOLOGY- SBAX1023

Methods- merits @Demerits – Sample size determination-Collection of Data (Methods Merits and Limitations-Designing a questionnaire –Types Construction procedure – Questionnaire vs Schedule

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Meaning of Sample:

A sample as the name implies is a smaller representation of a large whole simply speaking the method of selecting a study portion of the universe (total population) is known as sampling.
Sampling is not anything which is followed only in statistics. It is used in everyday life when rice is purchased in provision store a small quantity is initially purchased and tested sometimes the small quantity is cooked and it is found food then the bulk is purchased. Similarly when a patient has to undergo blood test the clinical laboratory takes a few drops test it and them gives the report. Sampling as a method also used in research. By analyzing the sample data, the research gets some findings which he uses for arriving at conclusions.

Essentials (features) of sampling:

Representativeness: The sample selected should fully represent the population from which it is drawn. This means all the characteristics or features of the population should be reflected by the sample.

Adequacy: The size of the sample should be large enough so as to provide accurate results. Though it is difficult to state what the ideal size of sample is, statistically it can be determined.

Randomness: Samples should be selected at random. That is there should be no bias in the selection of sample elements and each item in the population should have equal chance of being selected.

Homogeneity: Any number of samples could be drawn from a population. But all these samples should have similarity in every respect. That is suppose a researcher selects 500 people from Chennai city as a sample to study consumer behavior of the people, them the Sample elements should be all be people living in Chennai city. It should not include people who have come to Chennai city as tourists.

Merits of Sampling:

- Sampling method requires lesser time as only a part of the universe is included for data collection.
- Since only a part of the universe is included for the data collection, the cost incurred will also be less.
- By adopting suitable method of sample selection the results could be more reliable. Sampling method is more frequently used for testing the accuracy of information collected through census method.

Limitations of Sampling:

- Unless sampling method is carefully applied it may result in misguiding findings.
- Use of sampling requires the services of experts and specialists. This in turn will reflect on costs.
- Some times when the sample size itself is very large then sampling method would also be done consuming and costly.
- Apart from a detailed process to be followed sampling also calls for application of a number of tests to verify the findings and results. This makes the method more complex.
- While using sampling the investigators have to be fully trained. This will add to the cost.

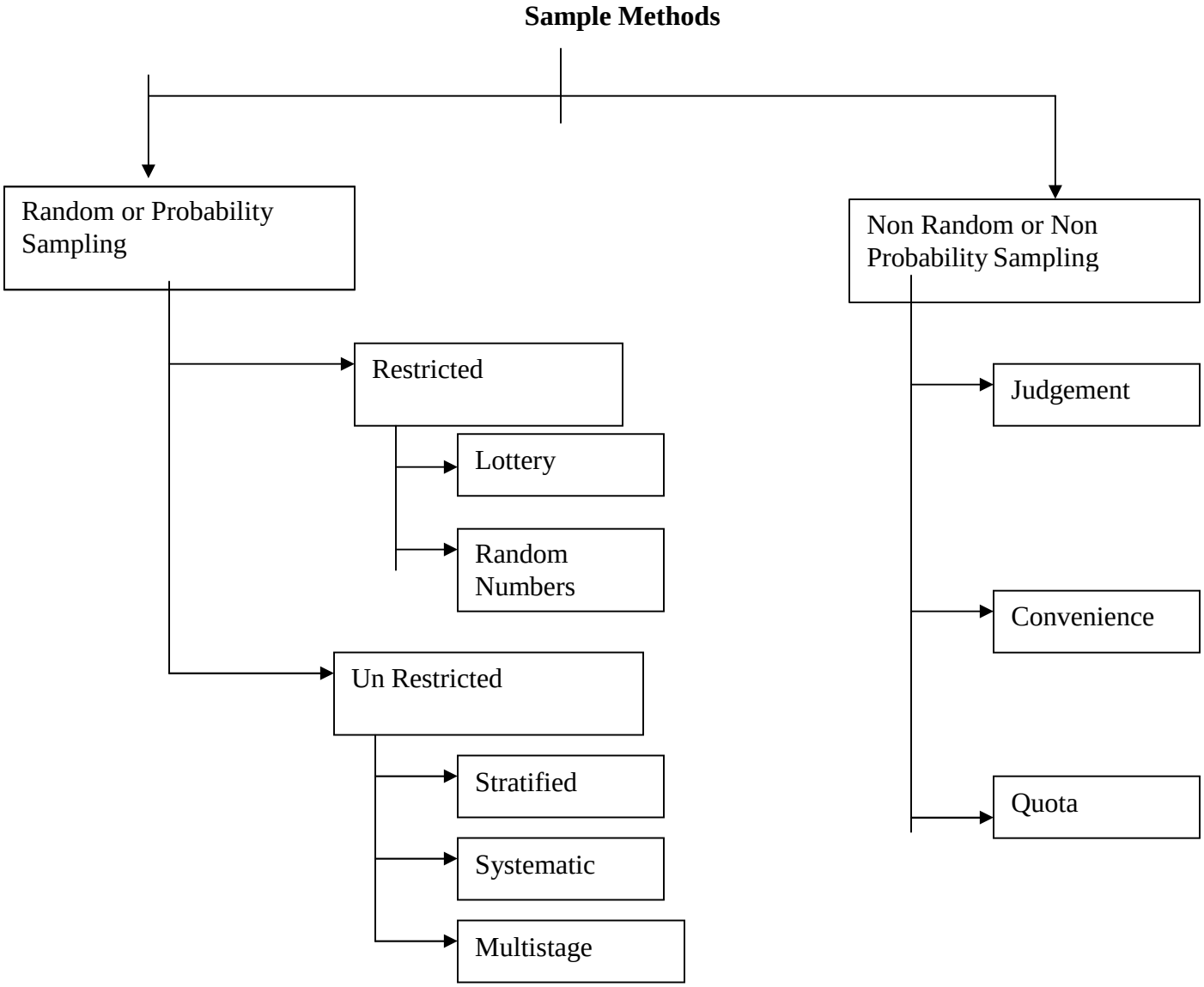
METHODS OF SAMPLING

Sampling method can be broadly classified as

1. Random or probability sampling and

2. Non-random or non-probability sampling.

Under the former every element of the population enjoys equal chance of being selected. While the under the later use elements will have constituting the sample are selected on some basis. For example, suppose from 2000 students in a college, 200 are selected at random then every one of these 2000 students has equal chance of getting selected. On the other hand, in the case of non-random sampling. 200 students out of 2000 may be selected on such a way that there are 50 pure science students. In this case the sample is purposively selected. So it is not random sample.



1. Types of Random (or) Probability Sampling

(a) Simple (or) unrestricted sampling

i) Lottery Method: In this method all the terms in the population are given numbers and These are written on chits of uniform size. Then these chits are placed in a local or a bag and the required number of chits are selected.

ii)Table of Random number: In this method, first the size of the sample is determined. Then using random number table, the required number of items is selected to form the sample.

(b) Restricted Random Sampling;

(i) Stratified Random Sampling: Stratum means a layer, Population from which samples are to be selected may contain a number of layers. From each layer a few samples are selected.. Suppose for a research work on the literacy level in Tamil Nadu data is collected from all places in Tamil Nadu. Adopting stratified random sampling, first the state is divided on to different districts. A few districts are selected at random. Then those districts are divided into Panchayat Unions. From this second stratum a few Panchayat unions are selected. Each Panchayat union divided into Panchayats and a few panchayats are selected at random. Then each panchayats containing a number of villages, a few villages are selected at random.

Merits:

- It has better representative ness
- It also gives more accurate information and there would be better coverage of the population.

Limitations:

- Requires lot of care and pre-planning
- A prior knowledge of the composition of the population is required.
- Method is very expensive in terms of bone of money
- Any bias in selection from each stratum will affect the accuracy of results.

(ii) Systematic Random Sampling: In this method the sample is formed by selecting the first unit at random and them selecting the remaining items at evenly spaced intervals. For example suppose from 2000 college students we have to select a sample of 50 students. First we determine the sampling interval (k). this is obtained by dividing the size of population by sample size (i.e.40; 2000/50) = 40.Them from serial number 0001 to 0040 we selected at random a serial

number. Suppose we have selected with the serial number 15 with that we add 50 for another Sample, so the sample will be as 15, 65, 115,… and soon.

Merits:

- It is very simple to adopt'
- The time and cost involved are relatively less
- With a large population, this method is easy to use
- Random selection of items is ensured once the sampling interval is determined.

Limitations:

It is less representative, as once the first item is selected at random, subsequent items are all lying at uniform interval, So the selected items may lack representative ness. The first item should be strictly selected at random, If there is bias in this first stage this will influence the items selected at subsequent stages.

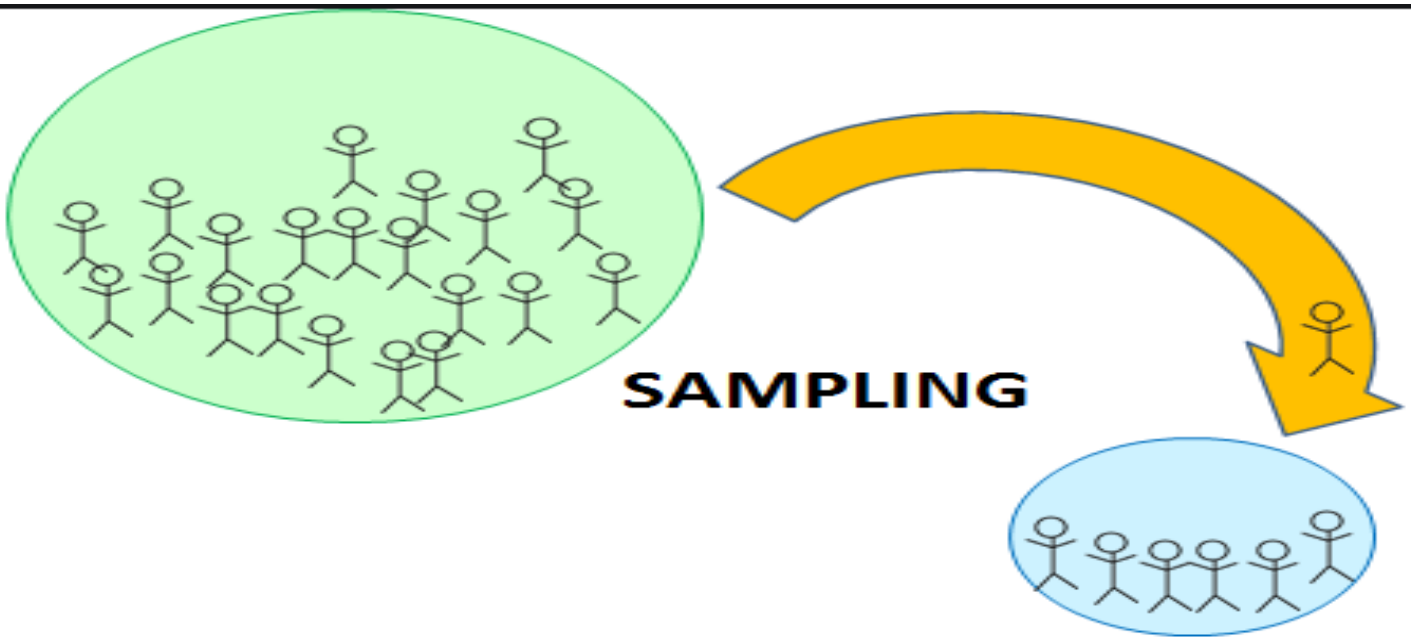
Multistage or Cluster Sampling: As the name suggests, in this method the samples are Selected at different stages here the population is first divided into different stages. All the samples at random at different stages will possess the common characteristics or will be homogeneous on some basis.

Merits:

- It is highly flexible
- It ensures better representative ness
- This type of sampling is very useful either for formulating policy of evaluating animplemented policy.
- Easy to compute.

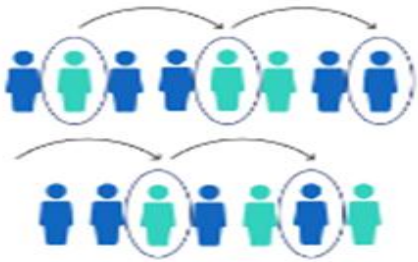
Limitations:

- In practice this method is found to be less accurate compared to other methods because bias atany stage will get accumulated.
- Unless a person is fully aware of the various stages into which the population can be divided,he cannot be effective in selecting the required number of samples.
- The characteristics or feature to be present with samples at all stages may not be fulfilled in all cases. 09/10/2002



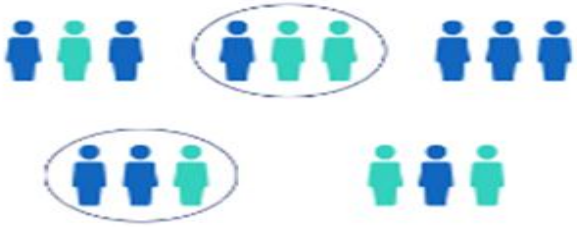
Simple random sample

Systematic sample



Stratified sample

Cluster sample



NON- RANDOM SAMPLING OR NON PROBABILITY SAMPLING

Non random sampling or non-probability sampling refers to the sampling process in which the samples are selected for a specific purpose with pre-determined basis of selection.

This type of sampling is also required at times when random selection may not be possible.

(a)Judgment Sampling: In this method the sample selecting is purely based on the judgment of the researcher. This is because the researcher may lack information regarding the population from which he has to collect the sample. Population characteristics not known in such cases the researcher can use this method. Once the sample size is determined the investigator is free to select any item on the field. For example, suppose 100 boys are to be selected from a college with 1000 boys if nothing is known about the students in this college, then the investigator may visit the college and choose the first 100 boys he met or he may select 100 boys all belonging to III year or he might select 50 boys from commerce and 50 from science.

(b)**Convenience Sampling:** This method of sampling involves selecting the sample elements using some convenient method without going through the rig our of sampling method.' For example, suppose 100 car owners are to be selected. Then we may collect from the RTO's office the list of car owners and then make a selection of 100 from that the form the sample.

(c) Quota Sampling: In this method the sample size is determined first and then quota is fixed for various categories of population, which is followed while selecting the sample, Suppose we want to select 100 students, and it might say that selection oof sample be according to the quota given below. Boys 50% and girls 50% then among the boys 60% college students and 40% from plus two students. A different or the same quota may be fixed for girls.

SAMPLING ERRORS

While using sampling, errors are committed. These errors are broadly classified as sampling errors and non-sampling errors.

(1) Biased Errors:

Biased errors are understood as the inference of the investigators likes and dislikes in the process of sampling. For sample if an investigator has to collect data from a specific group also. This may because of investigator's urge to complete the work early or failure to understand the purpose of the survey. Such a mistake may result in collection of wrong data which eventually will result only in wrong conclusions or inferences about the population.

The following are the reasons for biased errors.

- **Faulty process of selection:** This refers to a situation when the investigator does not apply therandomness in his choice or selection of the sample elements from the population.
- **Faulty collection of information;** Adoption of faulty method of collecting information maycause errors. This will happen if the scope is not clear.
- **Faulty method of analysis:** This will happen when the researcher is not having knowledgeabout the usage of tools.

(2) Un Biased Errors:

- Non-sampling errors are those errors, which are not due to any sampling process. It is due toseveral other causes. Such errors are most due to the following reasons:
- Investigators may collect data without using complete schedules or proper measurement. As aresult data collected may not be relevant at all.
- Faulty method of interview or observations may also contribute to non-sampling errors.Using of UN trained and un skilled investigators.

SAMPLE SIZEAND ITS DETERMINATION

What is the size of the sample? How large should be 'n' when the size (n) is very small the researcher may achieve the objectives and if it is too large, he may incur huge cost and waster resources. Generally, a sample must be of an optimum size i.e., it should not be too large nor too small. Normally the size should be large enough to give a confidence interval of desired width and as such the size of the sample must be chosen by some logical process. How ever the researcher has to key the following points in his mind while deciding the size of the sample.

Nature of the Universe:

When the items of the universe are homogenous, a small sample can serve the purpose, suppose they are heterogeneous, a large sample would be required.

Number of groups:

When a researcher forms class – groups a large sample is necessary as a small sample might not be able to give a reasonable number of items in each class-group.

Nature of study:

When the researcher examines the items very intensively and continuously then the sample should be small. He may prefer general survey when the size of the sample is large but a small sample is considered appropriate in technical surveys.

Sample Technique:

The researcher has to decide the sampling tools while determining the size of the sample A small random sample is better than a larger but badly selected sample.

Accuracy and confidence level:

A researcher requires a large size sample when the accuracy or the level of precision is to be kept high. To get more accuracy for a fixed significance level the samples size has to be increased fourfold.

Resources available:

What amount of time and financial resources are available to the researcher will determine the size of sample, with sufficient time and large volume of funds available the sample size could be large otherwise it should be small.

Miscellaneous factors:

In addition to the above considerations the following points to be considered by a researcher. Nature of units sizes of the population size of questionnaire availability or trained investigators the conditions under which the sample is being conducted the time available for completion of the study. Sometimes the mathematical formula is used to determine the sample size. The

Formula is given below:

$$N = (Z / d)$$

When n is the sample size Z is the degree of accuracy desired (specified level of confidence) is the standard deviation of the population and d is the difference between the population mean and sample mean.

COLLECTION OF DATA

Data refers to information of facts often researchers understand by data only numerical figure. It also includes facts non-numerical information qualitative and quantitative information in a research of the data are available the research is half-complete. Data could be broadly classified as primary data and secondary data they are also mentioned as sources of data.

Primary Data:

Primary Data is known as the data collected for the first time through field survey. Such data are collected with specific set of objectives to assess the current status of any variable studied. By survey methods the data can be collected by any one (or) more of the following ways.

Questionnaire (or) Schedule:

In this method a pre-printed list of questions arranged in sequence is used to elicit response from the respondent

Interview:

This is a method in which the researcher and the respondent meet and questions raised are answered and answered and recorded. This method is adopted when personal opinion or view point are to be gathered as a part of data.

Observation:

In this method the observer applies his sense organs to note down whatever that he could observe in the field and relate these data to explain some phenomena.

Feed Back Form:

In the case of the consumer goods the supplier or the manufacturer send the product along with a pre-paid reply cover in which questions on the product and its usage are raised and the customer

is requested to fill it up and send. Based on this firsthand information about the product from the consuming public is obtained.

Sales Force opinion:

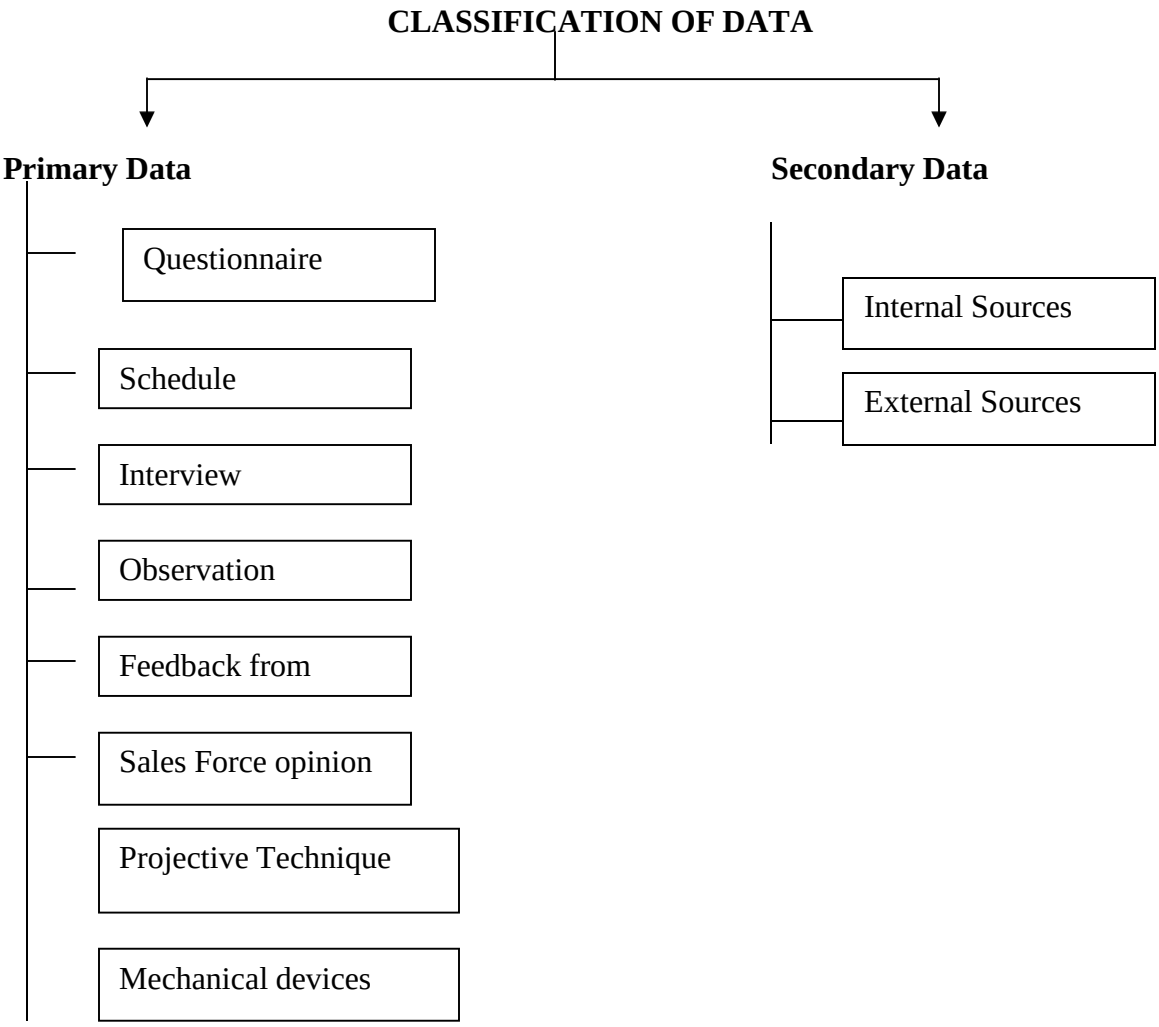
On several occasions the manufacturers or distributors collect information about the movement of the product or market size, market share etc.. Through sales force on the field. The salesman visit the retailer's shop to not down the details of stock movement. Availability of items etc which give valuable information.

Projective techniques:

This technique is adopted to study the consumers though methods like recalling advertisements them story completion tests etc. Through this technique it is possible to
compile information to be used as the basis for projecting the demand for the product at different points of time.

Collection through Mechanical Devices:

There are several shopping establishments where hidden video cameras are positioned at vantage points this are used for observing the public inside the ship. Apart from helping to eliminate pilferage and theft they provide very useful information on the consumers and their preference of products.


CLASSIFICATION OF DATA
Primary Data
Questionnaire
Schedule
Interview
Observation
Feedback from
Sales Force opinion
Projective Technique
Mechanical devices
Secondary Data
Internal Sources
External Sources

PRIMARY (DATA) SOURCES

1. OBSERVATION;

Observation as a method of data collection ois used very frequently whenever collection of data through other methods is difficult for example it is not always possible to conduct interviews with every person to collect required information. There are occasion when no other method can be adopted for data collections. For instance, suppose a scholar wants to study the life style of hill tribe. It is certainly not possible to use a questionnaire or schedule or interview only alternative available is observation as the respondents would not rely any question orally or in written. Observation may be defined as, "sensible application of sense organs in understanding less explained or unexplained phenomena" Whenever a researcher is unable to compile information through any other method then he has to effectively apply his sense organs to observe and explain. So it may be said that observation involves recording of information applying visual understanding backed by alert sense organs.

Types of Observation:

Structured observation:

When observation takes place strictly in accordance with a plan or a design prepared in advance it is called structured observation in such a type the observer decides what to observe what to focus on what type of activity should be given importance who are all to be observed etc in advance.

Unstructured Observation:

In this type of observation there is no advance planning of what how when, who etc., of observation. The observer is given the freedom to decide on the spot to observe everything that is relevant.

Participant Observation:

In this method the observer is very much present in the mindset of what is observed for example, suppose a researcher is studying the life style of a hill tribe, then he might understand the life style of the tribe better only when the stays with them. He is a participant in the sense he is physically present on the spot to observe and not influencing the activities.

Non-participant Observation:

This is a method in which the observer remain detached from whatever is happening around and does not involve himself in any activities tapes place. He is present only to observe and not to take part in the activities. That is the target audience does not know his
presence at all. For example, the police men not in uniform is deputed on observation duty whenever a processing tapes place.

Controlled Observation:

In this method the observer performs his work in on environment or situation, which is very much planned (or) set. For example, sometimes to the effectiveness and alertness of airport security system a mock even (like fire accident) is carried out. Then how the security staff reacts to such mock event is observed. Based on this the weakness on his system are noticed and steps taken to eliminate them.

Merits of Observation Method of Data Collection:

Ø If observation is done correctly, the scope for bias is very much minimized.

Ø Through observation, the current scenario in which anything is happening noticed and explained there is no interpretation of how things would be happened in the past or will happen in future etc.

Ø As there is no need to get any reply or details from the respondents, observation does no require any co-operation of the respondents.

Ø This is fairly reliable method, provided the observer is well experienced trained and sincere.

Ø Whenever respondents are illiterate and incapable of answering any question (due to language barrier (or) cultural background etc.,) observation is the only method of data collection available.

Limitations of Observation:

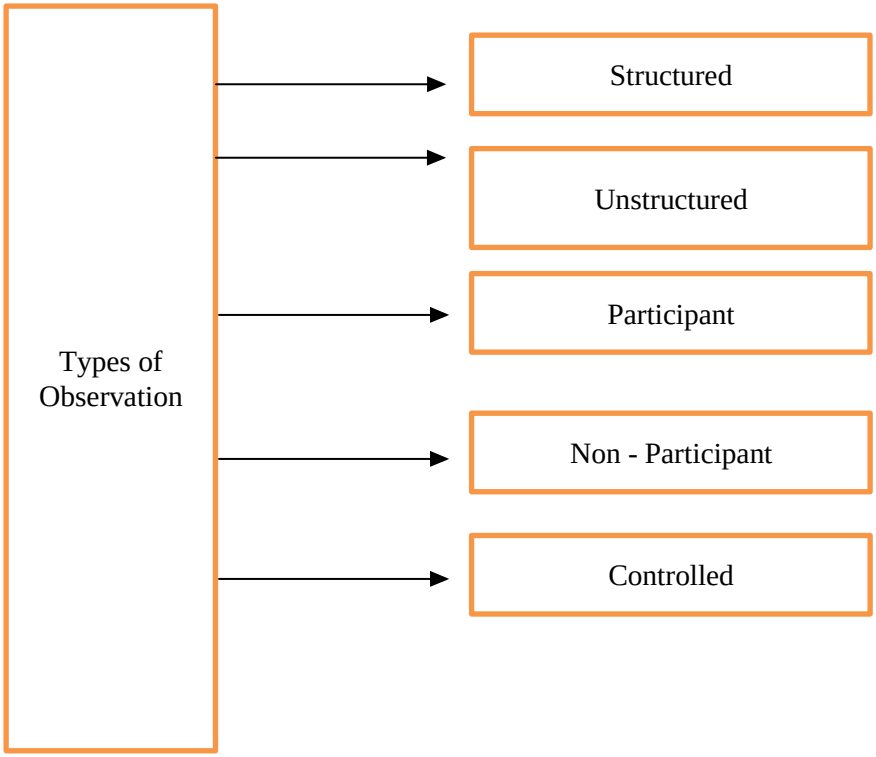
Ø This is a relatively costly method of data collection

Ø It could be noticed that what is observed may bring out only part of the facts. While data collected through questionnaire or interview ensure letter coverage.

Ø There is a lot of scope for the observer to get distracted or influenced by unexpected factors which would affect the accuracy of information collected

How to make observation successful:

- First the researcher should have a clear grasp of what he should observe and itspurpose.
- The person should be gained in adopting observation
- The person should avoid his personal likes & dislikes.
- He might be alert and intelligent
- He should be able to connect all the things observed.



INTERVIEW

One of the very old methods of collecting data is the interview method. Interview method involves direct or indirect meeting of the respondents by the researcher. The researcher determines the questions to be raised at the time of interview and elicit the response for them. The reply given is either written down in a note book or recorded in audio or video cassette. This method has to be necessarily adopted whenever details regarding any confidential matter are to be collected or the research requires data collection directly from the respondents.

Interview may be broadly classified as

1.Direct interview and

2.Indirect interview

Direct Interview:

In this type of interview, the interviewer and the interviewee meet personally either with prior appointment or not. Usually when this technique is adopted the interviewer may brief the respondent about the purpose of interview and its scope in advance. This enables the respondent to be ready with necessary details (or) data. This type of interview may be classified as structure a interview un structured interview focused interview clinical interview and non-directive interview.

(A) Structured Interview:

In this type of interview the person collecting information decides in advance the nature scope questions to be asked, the person to be contacted etc in advance. At the time of interview no deviation is made from the questions to be asked. For example, it is usual for journalist to interview the Finance Minister after the presentation of Budget. In such

occasions, the journalist should be were prepared and decide in advance the questioned to be asked etc., Sometimes even the questions to be asked and other details are to be submitted to the authorities concerned, before conducting the interview. The most important advantages of such interview are below.

- The interview is well prepared and so the interview is conducted in the focused manner'
- Time of both the interviewer and respondents could be saved.

- There is no scope for irrelevant matter to find a place in the course of interview
- If the respondent is informed in advance he could prepare necessary details so that the outcomeis reliable
- But this method of interview has the following limitations
- Since the subject matter is decided in advance there is no scope for extending the intervieweven in case of need.

TYPES OF INTERVIEW

Structured Unstructured Focus Non Directive Telephone

- If the questions are submitted in advance that will tends the respondent to give wrong information's.
- There is a need for the interview to plan the interview properly and so if the plan is not perfect, the interview findings may not be complete.

(B) Un Structured Interview:

In this type of interview, interview is conducted on the spot without any preparations (or) advance information oto the respondent. For example, suppose an organization producing a new health drink wants to know the opinion of the people directly. Then it might send trained field investigators who meet people directly. Then it might send trained field investigators who meet people at random and offer them a cp of that new drink. After they drink, their opinion is asked and the responses are noted down or recorded. Such interviews are also conducted when opinion poll is conducted. For example during election time, the TV channels would meet people moving around and ask them about their opinion about different parties and the one to which they would vote.

(C) Focused Interview:

In this type of interview the object of the interviewer is to focus the attention of the respondent ion a specific issue (or) point /for example suppose a detective is questioning a person regarding a crime committed in an area. The detective has to be very much experienced to make the person interviewed to answer only about the crime and nothing else. In this type ,the interviewer

encourages the respondents to say whatever he likes and feels on a subject matter. There may not me much questing taking place. The respondent is free to express his views or opinions without any direction from the interviewer.. For example suppose in a college strike, an interviewer encourage the students to say whatever they feel above the reasons for the strike.

(E) Telephone Interview:

This is basically a type of direct interview and but there is no scope for physical presence of both the parties to the interview. This method will be useful in the following situations.

§ When the informant and interviewer are geographically separated.

§ When the study requires responses to five (or) six sample questions e.g.

§ Radio, TV program me survey

§ When the survey must be conducted in very short period of time, provided the units are listed in telephone directory.

This method of interview provides following advantages:

-More flexible

-It is a quickest way of obtaining information

-Less cost

-Recall is easy

-The rate of response is more than what we have in mailing method

-Replies can be recorded

-It does not require any field staff

This method is suffered by following reasons:

-The respondents characteristics and environment can not be observed

-It is not suitable for intensive survey where comprehensive answers are required

-This method left the respondents who do not have telephone facilities.

-This method does not provide sufficient time to the respondents to respond

3.Questionnaire Method;

A questionnaire is a sheet(s) of paper containing questions relating to certain specific aspect. Regarding which the researcher collects the data. The questionnaire is given to the inpormant or

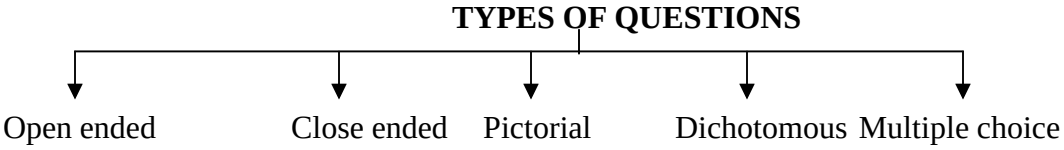
respondent to be filled up. Sometimes questionnaire is also in the form of files generated trough computer. This usually called soft copy of questionnaire. Generally to test the reliability of the questionnaire, it should be tested on a limited scale and this is technically known as Pilot Survey. The objective of a pilot survey is to filter unnecessary questions, and the questions which are difficult to answer.

Mechanics of Questionnaire Construction / Designing a Questionnaire / Features of a Good Questionnaire

The following are the points to be given important while designing a questionnaire:

- Questionnaire should be printed / Cyclostyled / Xeroxed
- The first part of the questionnaire should specify the object or should be constructed usingsimple language and technical terms, concepts should all be avoided.
- Each question should be specific and clear.
- Personal Questions on wealth, habits etc., could be avoided
- Questions needing computation / calculation / consultation should be avoidedQuestions on sentiments / belief/ faith should be avoided
- Repetition of question should be eliminated
- Sufficient space should be given for answering questions
- If any diagram me or map is used then it should be printed clearly
- Instructions regarding how to return the filled questionnaire must be given, it is desirable that a self addressed sufficiently stamped envelope is sent along with the questionnaire to enable to respondents the send the filled up questionnaire

TYPE OF QUESTIONS TO BE INCLUDED



Open – end questions:

In these questions the respondents are given freedom to express their views as there is wide range of choice. E.g.

"How would you describe the use of this soap"?

Closed questions:

These type of questions do not allow the respondents to given answers freely E.g. "Would you describe the smell of this soap is attractive"?

Yes / No

Pictorial Questions:

In this type of questions picture are drawn, and the respondents indicate the answer by selecting the pictures he prefers.

Dichotomous questions:

In this questions two alternatives are given a positive one and a negative one. E.g.

"Do you own a watch"?

Yes.....No .....

Multiple choice questions:

These questions contains more than two alternatives e.g.

"Why have you preferred this brand of two wheeler?"

-Price

-Fuel – efficient

-comfort

-others (please specify)

Type of questions to be avoided:

(a) Leading questions:

A leading questions is one which makes it easier for the respondent to react in a certain way and is not natural. Examples of leading questions are :

"Are you against giving too much power to the trade unions"?

"Don't you that yesterday's T.V. Drama was thrilling?"

(b) Loaded Questions:

Loading means attaching emotional feelings to particular words of concepts which tends to produce automatic approval or disapproval. Here the respondent would react to the word than the

Question. Example:

"Have you tried to get special favours from a business establishment by pressuring them?"

Yes..... No .....

(c)Ambiguous questions:

An ambiguous question is one that does not have a clear meaning. It may mean different things to different people example.

Are you interested in a small house?

What does the word "interested" mean to own or hire?

What does the word "small" mean

QUESTIONNAIRE CONSTRUCTION PROCEDURE

While constructing the questionnaire the following procedure to be followed:

Decide what information is needed.

Determine the type of collecting data

Interview

Questionnaire

Determine the content of individual questions.

Is question necessary

Does respondent have the information

Respondent remembers the same

Several questions needed instead of one

Determine the type of questions

-open ended

-closed

-dichotomous

-pictorial

-multiple choice

Decide on wordings of questions

Decide question sequence

-Physical appearance

-easy to access

-easy to understand

-motivate

Preliminary Draft

Revision and final draft

(4) SCHEDULES

Schedules (contains a set of questions) are being filled in by the enumerators who are specially appointed for the purpose. Enumerators go to respondents, ask them questions from the proforma in the same order inwhich the questions are listed and record the replies on the space given.

Enumerators should be trained

Example: Population census.

DIFFEERENCE BETWEEN QUESTIONNAIRE AND SCHEDULE – Refer Notes

SECONDARY DATA

The secondary data, are those which have already been collected some other agency and which have already been processed. Generally speaking secondary data is collected by some organization to satisfy its own need but it is being used by various departments for different reasons. For example, census figures taken are used by social scientists (economists) for social planning and research.

SOURCES OF SECONDARY DATA:

Doing the research with the secondary data is called as Desk research. The sources for secondary data or the sources for doing desk research will be gathered by the following ways:

Internal Sources: Registers, Documents, Annual Reports, Sales Reports, previous Research papers , Sales records, invoices etc.,

External Sources: Journals on magazines, newspapers, public speeches, state and central govt., departments, reports etc., The information had from any published documents which may documents the researcher should consider the following points:

- Exactly what products are included in the statistical classification
- Who originally collected the data for what purpose, and whether three might any
- motive for misrepresentation'
- From whom the data were collected and how reliable the methodology might havebeen and
- How consistent the data are with other local or international statistics.

Choice between primary and secondary data:

The researcher must decide whether he will use primary data / secondary data in an research process. The choice between the two depends on

- Nature and Scope of Research
  Availability of financial resources
  Availability of time
- Degree of accuracy desired
- Status of the researcher (individual, govt., corprn,, etc)

DIFFERENCES BETWEEN PRIMARY DATA AND SECONDARY DATA

Primary data entails the use of immediate data in determining the survival of the market. The popular ways to collect primary data consist of surveys, interviews and focus groups, which shows that direct relationship between potential customers and the companies. Whereas secondary data means to reprocess and reuse collected information as an indication for

betterments of the service or product. Both primary and secondary data are useful for businesses but both may differ from each other in various aspects.

In secondary data, information relates to a past period. Hence, it lacks aptness and therefore, it has unsatisfactory value. Primary data is more accommodating as it shows latest information. Secondary data is obtained from some other organization than the one instantaneously interested with current research project. Secondary data was collected and analyzed by the organization to convene the requirements of various research objectives. Primary data is accumulated by the researcher particularly to meet up the research objective of the subsisting project. Secondary data though old may be the only possible source of the desired data on the subjects, which cannot have primary data at all. For example, survey reports or secret records already collected by a business group can offer information that cannot be obtained from original sources.

Firm in which secondary data are accumulated and delivered may not accommodate the exact needs and particular requirements of the current research study. Many a time, alteration or modifications to the exact needs of the investigator may not be sufficient. To that amount usefulness of secondary data will be lost. Primary data is completely tailor-made and there is no problem of adjustments. Secondary data is available effortlessly, rapidly and inexpensively. Primary data takes a lot oftime and the unit cost of such data is relatively high.

MEASUREMENT AND SCALING TECHNIQUES

MEASUREMENT:

Measurement may be defined as the assignment of numeral to characteristics of object, persons events according to rules.

SCALES:

The instrument with the help of which a concept is measured is called a scale. A scale ha a wide range of application is social science research. It is used in all types of data collection techniques such as observation, interview, projective techniques etc/. Scaling provides the procedures if

assigning numbers to various degrees of opinion, attitude and other concepts. Normally this takes place in two ways:

Making judgment about some characteristics of an individual are then directly placing him on a scale. Constructing a questionnaire in such a way that the score of individual responses assign him a place on a scale.

IMPORTANT SCALING TECHNIQUES

RATING METHOD:

In rating scale, the rater makes a judgment about some characteristics of a subject and places him directly on some point on the scale. These scales can be either discrete or continuous.

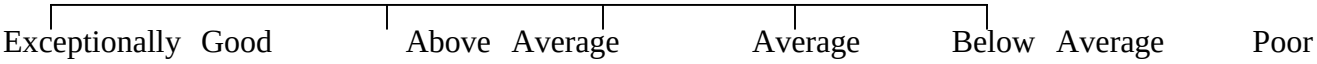
(a) Discrete Scales:

These scales are used for raising ordinal data about on object. In these scales two or more categories are provided representing discrete amount of some characteristics. The rater can tick the category which he feels best describes the person of object being rated. Thus for examples, the characteristics job knowledge may be divided into five categories on a discrete scale thus

Exceptionally good
Above average
Average
Below average
Poor

(b) Continuous graphic scales:

These scales are used for raising interval data about an object. In these scales just above the category notation, an uninterrupted line is provided. The rate can tick anywhere along its length as shown below. Both these types of rating scales can use three kinds of standards for measuring a characteristic or alphabetical, descriptive and behavior.

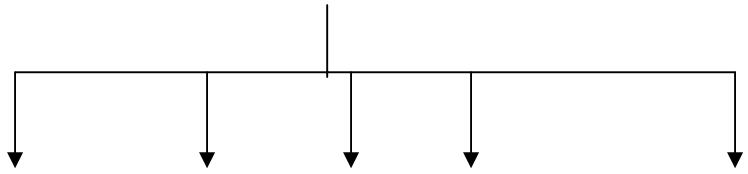


ATTITUDE SCALE:

Attitude scale are carefully constructed set of rating scales designed to measure one or more aspects of an individual's group's attitude some object. The individual's responses to the various scales may be aggregated or summed to provide a single attitude for the individual the following are the four types of Attitude scales.

LIKER'T SUMMATED SCALE;

Summated scales consist of a number of statements which express either a favorable or unfavorable attitude towards the given object to which the respondent is asked to react. The respondent will tick his opinion, either favorable or unfavorable the each statement in the instrument. The responses will give a numerical score indicating its favorableness or un favorableness' and he scores are totaled to measure the respondent's attitude. In other words the overall score represents the respondent's positions. In a Likert scale, normally a respondent will be asked to respond to each of the statements in terms of several degrees. Usually five degrees (but at time 3 to 7 may also be used) of agreement or disagreement. Suppose a researcher wants to examine whether one considers His job quiet pleasant, the respondent may respond in any of the following ways:



Strongly agree – agree – undecided – disagree – strongly disagree.

In the above scale, each points carries score, the response will be given weight or scores. The least score will be given to the least favorable degree of job satisfaction and the most Favorable is given to the highest score.

Advantage:

- The Likert Type scale is easy to develop in comparison to Thurston type scale it can be performed without a panel judges.

- It is more reliable because under it. Respondents can answer each statements included in the instrument
- The Likert type scale permits the use of statements that are not manifestly related to theattitude being studied.
- It can be used in a respondent-centered and stimulus centered studies I.e., it shows how response differs between people and also between stimuli.
- It requires less time to construct, it is frequently used by the students of opinion research

Limitations:

These scales will indicate whether respondents are more or less favorable to a topic and they cannot tell how much more or less they are.

The interval between strongly agree and agree may not be equal to the interval between agree and undecided.

Thurstone Type Scale(differential scales)

Here, the selection of items is made by a panel of judges who evaluate the items in terms of whether they are relevant to the topic area and unambiguous in application. Here, the researcher adopts the following procedures:

The researcher collects more differential statements, usually 20 or more, that express various points of view toward a group institution idea or practice.

A panel of judges, will arrange them in 11 groups or piles ranging from one extreme to another in position. The judges will be asked to arrange generally in the first pile of the statements which he thinks are most unfavourable to the issue, in the second pile to place those statements which he thinks are next most unfavorable and he goes on doing so in this manner till in the eleventh pile he puts the statements which he considers to be the most favourable.

The judges will sort out the items and when there is disagreement between the judges in assigning a position to an item that item will be left out.

The panel will establish the median scale value between one and eleven'

Then, the researcher makes a final selection of statements, a sample of statements whose median scores are spread evenly from one extreme to other is taken. The statements so selected constitute the final scale to be administered to respondents.

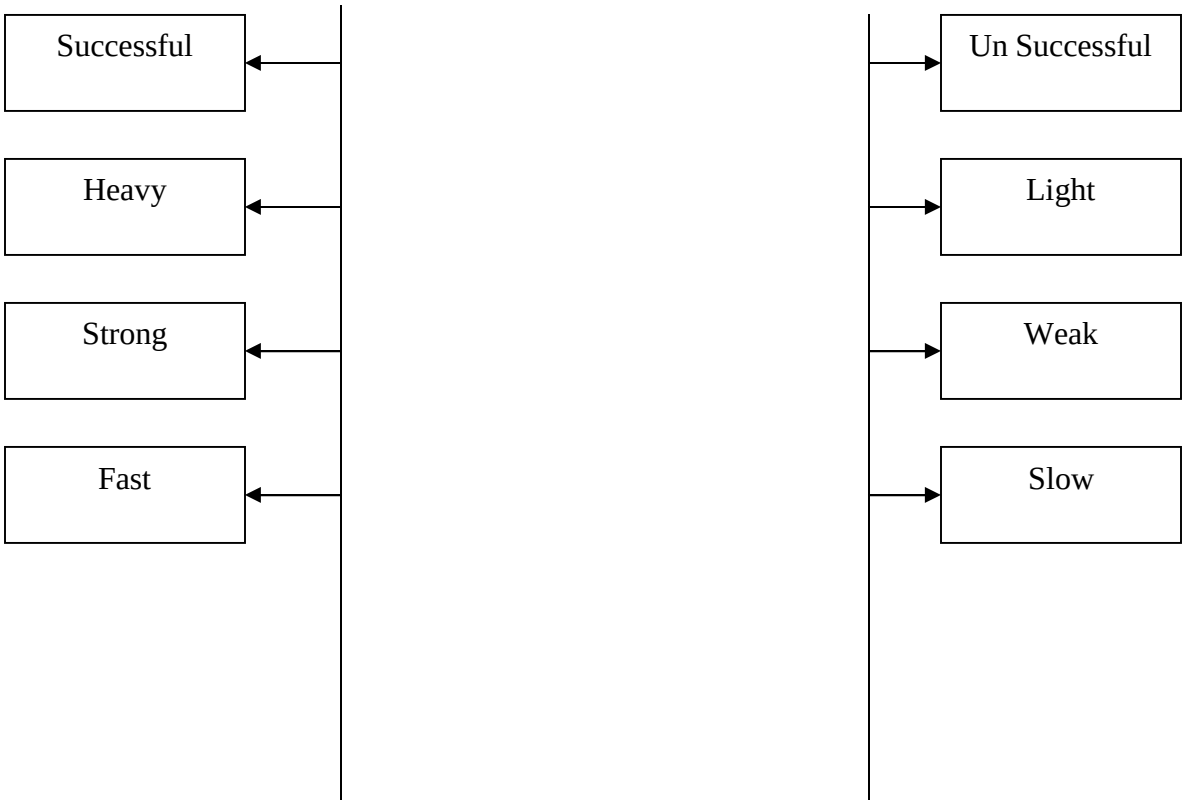
The respondents will be asked to check the statements with which they agree.. The median value is worked out and this establishes their score or quantifies their opinion. It may be noted that is the actual instrument the statements are arranged in random order of scale value.

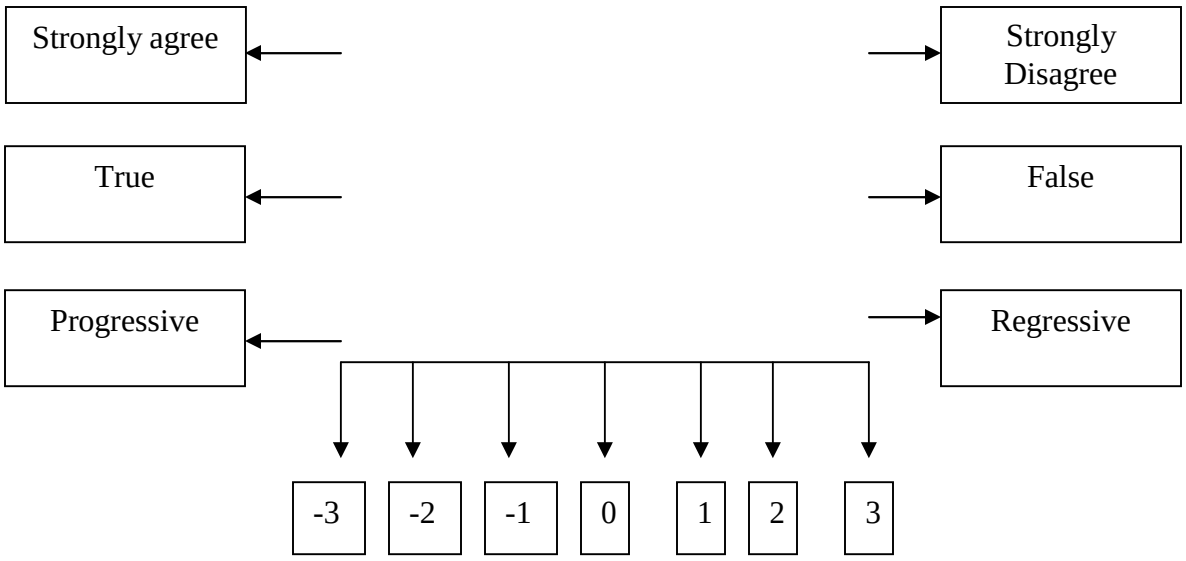
CUMULATIVE SCALES:

It consists of series of statements to which a respondents express high agreement or dis agreement. The statements are related to one another in such a way that an individual who replies favorable to item no.3 also replied favorable to no.2 & 3. The individual score is worked out by counting the number of points concerning the number of statements he answered favorable

SEMANTIC DIFFERFENTIAL SCALES:

It is an attempt to measure the psychological meaning of an object to an individual.
It consists of a set of bipolar rating scales, usually 7 points by which one or more respondents rate one or more concept on each scale item.





RATING SCALE

Rating scale is a widely adopted technique. In this for each statement alternatives are given in such a way that the entire range of response is presented. The rater is asked to indicate his option. Then based on this he is rated. There are different types of rating scales used.

Graphic rating scale: - In this type of rating scale a statement is given alternatives. These alternatives are specific and unambiguous. The rater is asked to mark one of them. As the marking is clear, the category of response is easily understood and applied.

For eg: Is the worker productive

Highly Productive Productive Neutral Not Productive Never Productive

Itemized rating scale: In this type of rating scale, numerical values are given along with the alternatives. The alternatives for any statements are constructed in such a way that all possible answers are specified. Normally the number of responses for a statement is 5 or 7 so that the neutral option can be specified. To the left and the right of the neutral options equal options would be available.

For eg: Indicate below your degree of Optimism and Pessimism regarding the youth in politics

Increasing Pessimism			Neutral	Increasing Optimism		
-3	-2	-1	0	1	2	3

Comparative rating scale: In this method, the ratings given are relative. The rater knows the alternatives given and these alternatives are comparable. Such comparisons could be for any number of products or statements. For example, if there are three brands of soaps A, B, C, then thre could be the following number of comparisons – A and B, B and C and A and C. The more the number of products, more will be the number of comparisons. To determine the number of comparison the formula [(n(n-1)]/2 is used.

Rank order scale: This is a very simple rating scale. In this, the rater is asked to rank the given alternatives according to his view point. From this it is easy to identify the most preferred and least preferred alternative.

PILOT STUDY

It is the rehearsal of the main study. It covers process of research. Preparation of a broad plan of the study, construction of tools, collection of data, processing and analysis of data and report-writing.

Functions of Pilot study:

- It provides better knowledge of the problem under study and its dimensions.
- It provides guidance on conceptualization – identification and operationalization of concepts relating to the study.
- It assists in discovering the nature of relationship between variables and in formulating hypothesis.
- It assists in developing better approaches to target population.
- A pilot study shows whether the available sampling frame from which sampling is to be drawn is adequate, complete, accurate, up to data and convenient.
- It helps the researcher to develop an appropriate plan of analysis.
- It provides information for estimating the probable cost and duration of the main study and of its various stages.

PRE-TEST

Pretest is a trial test of a specific aspect of the study such as method of data collection or data collection instrument- interview schedule, mailed questionnaire of measurement scale.

Functions of Pre-Test:

- Test whether the instrument would elicit responses required to achieve the research objectives.
- To test whether the content of the instrument is relevant and adequate.
- Test whether wording of questions is clear and suited to the understanding of the respondents.
- Test the other qualitative aspects of the instrument like question structure and question sequence.
- Develops appropriate procedure for administering the instrument with reference to field conditions.

Types of Market Research - Desk and Field Research

There are two main **types of market research.** These are *desk market research* and *field market* research. Market Research is very important for a business and its power should not be under-estimated. Without doing a sufficient amount of both types of market research a business can easily spend a lot of money without getting any benefits back! Market analysis is very important for a marketing campaign and can help you market your business to the right people -- who are interested in your product or service -- and not the wrong people. Market research should be an on-going task and you want to get feedback from your customers all of the time! Things to ask your customers are; where they heard about you and your product/service; what they thought about your product/service; and what could be done to improve it.

Desk Market Research

Desk Research is where you collect and analyze information that already exists but has not already been collected together. This information can be found in a variety of informative sources such as the yellow pages. The main purposes of doing *desk research* are to find out:

- **Competitors** - Who they are, where they are, and how many of them there are.
- **Businesses** - How many there are, whether there competition, and where they are.
- **Economic trends** - Are people buying the products/services you provide?
- **Householders** - How many of a particular type of householder are there in the area ofyour business?
- **Market trends** - Is the market/industry growing or shrinking?

Field Market Research

Field research is done by direct conversation with a -- or group of -- potential customers. This form of research is all about getting out and speaking to you target buyer; you may be able to make a questionnaire for the target buyer to fill in and answer the questions you need to know. The main purposes of doing *field research* are to find out information such as:

- **How often** do customers purchase the product/service you offer.
- **How likey** they are to purchase the product/service from you.
- **Market price** they expect?
- **How they decide** on a supplier.
- **A big enough market**; with enough customer, to build a successful business?

Differences between the questionnaire and schedule

Questionnaire	Schedule
The questionnaire is one of the methods used for data collection. The questionnaire will have many questions, with each question having multiple choices.	The schedule is also one of the methods of data collection. It will have a set of statements, questions and space given to note down the answers.
Questionnaire method of data collection is preferred when the respondents are willing to cooperate. In addition, to deploy this method the respondents need to be literate.	The Schedule method of data collection can be utilised irrespective of the respondent‟s literacy. It can be used when the respondents are literate and can be used even when the respondents are illiterate.
The type of technique used in the Questionnaire method is Quantitative.	The type of technique used in the Schedule method is Qualitative.
In the Questionnaire method, the grouping is made on the basis of different categories like location, age, gender etc.	In the schedule method of data collection, the grouping may exist or may not exist.

Informants receive questionnaires through emails, posts and the answers will be given as per instructions given in the cover letter.	Answers in the Schedule method of data collection are filled by research workers/enumerators.
In the Questionnaire method, there is no scope for direct personal contact with the respondents.	In the Schedule method, there is direct personal contact of the respondents with the enumerators.
The cost incurred in the questionnaire method of data collection is economical in comparison with the schedule. The cost is less even if the sample size used is very large. Predominantly the money is spent on preparing questionnaires only.	The cost incurred in the Schedule method of data collection is very expensive since there is the cost involved in preparing the schedule, cost incurred on enumerators in addition to the training imparted to them.
The coverage of Questionnaire method is large as the questionnaires can even be sent to respondents who are not easily accessible.	The coverage of this method is relatively small as there are constraints in sending enumerators to larger areas.
In the questionnaire, there is a higher possibility of collecting wrong or incomplete information when respondents are unable to have a clear understanding of the given question.	The possibility of receiving inaccurate answers or incomplete answers due to difficulties in understanding the question can be ruled out in this method of data collection as the enumerators will be present and they can resolve any doubts and queries of respondents.
In the Questionnaire method, respondents will get sufficient time to think before answering questions.	The time available for respondents while answering questions is limited in the Schedule method when compared to the Questionnaire method.
In Questionnaires, responses are filled by the respondents.	In Schedule, method responses are filled by the enumerators themselves.
In the Questionnaire method, there is no scope for bias or the answers getting influenced by the interviewers thought process as the answers are filled by the respondents themselves.	In the Schedule method of data collection, there is scope for bias or the answers getting influenced by the enumerator as the answers to the questions are filled by enumerators although the answers are given by the respondents.

The response rate of the Questionnaire method is low compared to the Schedule method.	The response rate in the Schedule method of data collection is high.
In the Questionnaire method, the identity of the respondent is not known.	In the Schedule method, the identity of the respondent is known.
The Questionnaire quality determines the success of the questionnaire method of data collection.	The success of the Schedule method of data collection is dependent on the efficiency, integrity and honesty of the Schedule method of data collection.

QUESTION BANK

S.No	**PART - A**
1	Define sampling.
2	Differentiate primary data and secondary data.
3	What is sample size?
4	List any two merits of survey technique.
5	Interpret the meaning of pilot study.
6	Differentiate nominal scale and ordinal scale.
7	Define measurement.
8	What is a rating scale?
9	Write the limitations of systematic random sampling.
10	How is field research conducted?

S.No	**PART – B**
1	Compare and contrast questionnaire and Interview schedule.
2	Explain different types of sampling techniques.
3	Discuss on various data collection methods available for a researcher.
4	Identify and summarize the factors to be considered while constructing a questionnaire.
5	Describe scaling techniques with examples.
6	Questionnaire is an effective tool for data collection. Justify with relevant points.
7	Explain research process with various steps and stages.
8	Explain different types of sampling techniques.
9	List and explain the various types of questions which the researcher can include in a questionnaire?

TEXT / REFERENCE BOOKS

1. Ackoff, Russell L., The Design of Social Research, Chicago: University of Chicago Press, 1961.

2. Ackoff, Russell L., Scientific Method, New York: John Wiley & Sons, 1962.

3. Allen, T. Harrell, New Methods in Social Science Research, New York: Praeger Publishers, 1978.

4. Anderson, H.H., and Anderson, G.L., An Introduction to Projective Techniques and Other Devices for Understanding the Dynamics of Human Behaviour, New York: Prentice Hall, 1951.

5. Anderson, T.W., An Introduction to Multivariate Analysis, New York: John Wiley & Sons, 1958.

6. Bailey, Kenneth D., "Methods of Social Research," New York, 1978.

7. Baker, R.P., and Howell, A.C., The Preparation of Reports, New York: Ronald Press, 1938.

8. Bartee, T.C., "Digital Computer Fundamentals," 5th Ed., McGraw-Hill, International Book Co., 1981.

9. Barzun, Jacques, and Graff, Henery, F., The Modern Researcher, rev. ed., New York: Harcourt, Brace & World, Inc., 1970.

10. Bell, J.E., Projective Techniques: A. Dynamic Approach to the Study of Personality, New York: Longmans Green, 1948.

11. C.R. Kothari, New Age International Publishers, Research Methodology, 2nd Edition, 2004

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SCHOOL OF MANAGEMENT STUDIES

UNIT – 4 - RESEARCH METHODOLOGY- SBAX1023

Editing and Coding Data- classification and usefulness of Statistical tools- Hypothesis testing – Tabulation Significance and guidelines- types of tables and diagrams used in research

DATA EDITING

Once the data collection is completed, it is examined carefully to eliminate any errors ormistakes. For that purpose of editing of data becomes mandatory. **Editing means to rectify or to set to order or to correct or to establish sequence.** Persons with editing responsibility should be trained and experienced in this job.

Editing is performed at two stages and depending on that it could be two types.

1. Field editing
2. centralized editing.

1. **Field Editing:** Field editing refers to the performance of the editing immediately in the field where data is collected. For example if the data is collected through questionnaire or schedule, then whether all the questions are answered or not whether writing is legible or not etc should be checked out after the collecting the questionnaire from the respondent in the field itself.
2. **Centralized Editing:** In this type of editing, editing is done by a person or a team after all the recorded questionnaires ' schedules are collected. So clearly it is not carried out on the field itself or immediately after the data are collected. In such editing normally the instructions regarding editing are printed and circulated to the person or the team doing the editing. This is only to ensure that there is uniformity in editing.

CODING

Coding is a practice which simplifies recording of answers. When standard answers for a question could be indicated, each answer is assigned a code. So instead of writing the answers in full, the investigator simply writes the code. This is not only saves times but alsoavoid confusing answers.

CLASSIFICATION

Classification of data means grouping the data on the basis of some common characteristics. Classified data can be used for specified purposes with ease. Further classification adds to clarity and helps to maintain consistency. Classification can be made on the basis of a) common characteristics like sex, literacy, colour, height, and weight etc. b) geographical regions like north, south, east west etc c) time oriented classification like monthly data, weekly data, yearly data, d) value based classification in which collected data are grouped e) reply based classification like noof people who answered yes to a question, no to a question etc.

USEFULNESS OF STATISTICAL TOOLS (ANALYSIS)

Statistical analysis of data serves several major purposes.

1. First it summarizes large mass of data into understandable and meaningful form. The reduction of data facilitates further analysis.
2. Second, statistics makes exact descriptions possible. For example when we say that the educational level of people in X district is very high. The description is not specific; but when statistical measures like the percentages of literate among males and females. The percentage of degree holders among males and females and the like are available the description becomes exact.
3. Third, statistical analysis facilitates identification of the casual factors underlying the complex phenomena. What are the factors which determine a variable like labour productivity of academic performance of students? What are the relative contributions of the causative factors? Answers to such questions can be obtained from statistical multivariate analysis
4. Fourth statistical analysis aids the drawing of reliable inferences from observational data.
5. Fifth statistical analysis is useful for assessing the significance of specific sample results under assumed population conditions. This is type of analysis is called hypothesis testing

TABULATION

Tabulation is the arrangement of classified in an orderly manner, In other words, it isa method of presenting the summarized data tabulation is very important because

- It conserves space.
- It avoid need for explanation’
- Computation of data is made easier
- Comparison of data becomes very simple
- Adequacy or inadequacy of the data is clearly visible

A table contains columns and row, these columns and rows create small boxes. Which arecalled cells. Tabulation has several rules and the most important ones are listed below:

- Every table should be numbered numbering could be in alphabet., Arabic or Roman
- Each table should have a distinct title
- Unit of measurement of the values in the table must be specified i.e. Rs. Crores, tones etc
- Each column should be titled.
- Each row must be titled
- Rows and columns are to be numbered
- Footnotes of the table should indicate the explanatory notes on the data in thetable and the footnotes must be positioned below the table
- Data to be compared must be placed in adjacent columns

SIGNIFICANCE OF TABLES

1. **It reduces the complexity of data and provides simplicity of presentations:**
   Generally the table removes unnecessary details and repetitions. They provide data systematically in columns and rows. It presents a very clear idea of what the table presents. Table provides a considerable saving in time taken in understandings what is represented by the data and hence all confusion is avoided.
2. **It facilitates comparison:**
   Tables provide comparison. Generally table is divided into various parts and for each part there are totals and subtotals, the relationship between different parts of data can be studied much more easily with the help of a table than without it.
3. **It gives identity to the data:**
   When the data are arranged in a table with a title and number they can be distinctly identified and can be used as a source reference in the interpretation of a problem.
4. **It provides patterns**
   Tabulation reveals patterns with the figures which cannot be seen in the narrative form. It also facilitates the summation of the figures if the reader desires to check the totals.

5. **Part of a table**

1. Table number 2. Title of the table 3. Caption (Heading) 4.body of the table 5.Head note and 6. Foot note.

Types of diagrams and Graphs:

One of the most effective and interesting alternative way in which a statistical data may be presented is through diagrams and graphs. There are several ways in which statistical data may be displayed pictorially such as different types of graphs and diagrams. The commonly used diagrams and graphs to be discussed in subsequent paragraphs are given as under.

Types of Diagrams/Charts:

1. Simple Bar Chart
2. Multiple Bar Chart or Cluster Chart
3. Staked Bar Chart or Sub-Divided Bar Chart or Component Bar Chart
4. Simple Component Bar Chart
5. Percentage Component Bar Chart
6. Sub-Divided Rectangular Bar Chart
7. Pie Chart

Types of Diagrams/Charts:

1. Histogram
2. Frequency Curve and Polygon
3. Lorenz Curve
4. Histogram

Difference between Diagrams and Graphs

There is no clear-cut line of demarcation between a diagram and a graph yet:

- A graph needs a graph paper but a diagram can be drawn on a plain paper. In the technical way we can say that a graph is a mathematical relation between two variables. This however is not the case of a diagram
- As diagrams are attractive to look at, they are used for publicity and propaganda. Graphs on the other hand are more useful to statisticians and research workers for the purpose of further analysis.
- For representing frequency distribution, diagrams are rarely used when compared with graphs. For example, for the time series graphs are more appropriate than diagrams.

Uses of Diagrams and Graphs:

- Diagrams and graphs are extremely useful due to the following reasons:
- Information presented though diagrams and graphs can be understood easily just in a bird's eye view
- These are appealing and fascinating to the eyes; Scholars take greater interest in presenting data through these devices.
- Diagrams and graphs produce a greater lasting impression on the mind of the readers than the figures presented in a table.
- They facilitate ready comparison of data over time and space. Graphs study economic relationship between two variables.
- However, graphic and diagrammatic presentation has some limitations. For example, unlike a table a diagram or a graph does not show the exact value of a variable. Further, a limited set of facts can be presented through such devices like diagram and graph.

General Rules for Drawing Graphs and Diagrams

Following points must be kept in mind while constructing a diagram or graph. Every diagram or graph must have a serial number. It is necessary to distinguish one from the other.

1. Serial number: Every diagram or graph must have a serial number. It is necessary to distinguish one from the other.
2. Title: Title must be given to every diagram or graph. From the title one can know the idea contained in it. The title should be brief and self-explanatory. It is usually placed at the top.
3. Proper size and scale: A diagram or graph should be of normal size and drawn with proper scale. The scale in a graphs specifies the size of the unit.
4. Cleanliness: Diagrams must be as simple as possible. Further they must be quite neat and clean. They should also be descent to look at.
5. Index: Every diagram or graph must be accompanied by an index. This illustrates different types of lines, shades or colors used in the diagram.
6. Footnote: Foot notes may be given at the bottom of a diagram if necessary. It clarifies certain points in the diagram.

TYPES OF TABLES:

Tables can be broadly classified to two categories:

- Simple and complex frequency tables
- General purpose and special purpose frequency tables

SIMPLE AND COMPLEX FREQUENCY TABLES SIMPLE OR ONE WAY TABLE:

Here only characteristics are shown, this is the simple type of table. The following is the illustration of such a table.

Number of Employees in a Bank According to Age Group

Age (in years)	**Number of employees**
Below 25	-
25-35	-
35-45	-
45-55	-
Above 55	-

TWO – WAY TABLE:

It shows two characteristics and is formed when either the sub or the caption is divided into two coordinate parts. The following example illustrates the nature of such a table

Number of employees in a Bank at Different age-groups according to sex

Age (in years)	**Employee**		**Total**
	Males	**Females**	
Below 25	-	-	-
25-35	-	-	-
45-55	-	--	-
Above 55	-	-	-
Total	-	-	-

GENERAL PURPOSE AND SPECIAL PURPOSE FREQUENCY TABLES

These tables are called reference tables. They provide information for general use or reference. They usually contain detailed information and are not constructed for specific discussion

Number of Employees of a Bank according to Age-Groups, Sex and Ranks

Age in years	Rank									Total		
	Supervisors			Assistance			Clerks					
BELOW 25												
25-35												
35-45												
45-55												
55&ABOVE												
TOTAL									-			

TYPES OF DIAGRAMS USED IN IRESEARCH REPORT

Generally, the statistical results are presented through diagrams and graphs, We can see them in newspapers, magazines, journals, advertisements, etc. the statistical data may be displayed pictorially such as different types of diagrams, graphs and maps significance of Diagrams and Graphs:

- They provide bird's eye view of the entire data
- They are attractive.
- They provide memorizing effect
- They facilitate comparison of data

CHOICE OF SUITABLE DIAGRAM;

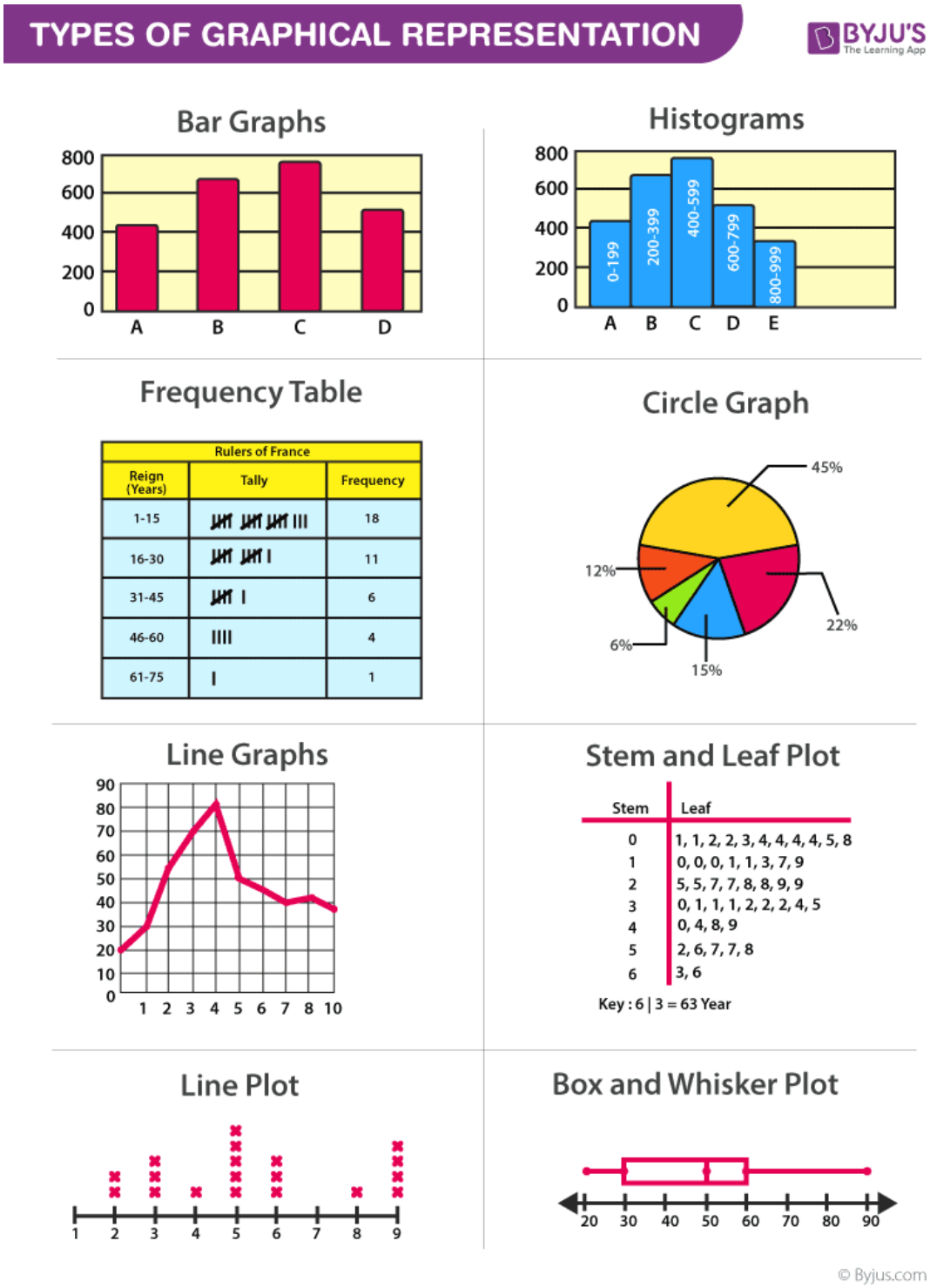
As regards the selection of the diagram to be drawn, several factors determine this.They are 1. Nature of data

1. The target audience for whom the diagram is drawn
2. The volume of communication to be given
3. The facilities available to draw the diagram
4. Purpose of the representation
5. The size of the paper or the sanctioned size for the diagram etc. Based on these factors, the righttype of diagram is selected.

Graphical Representation

Graphical Representation is a way of analyzing numerical data. It exhibits the relation between data, ideas, information and concepts in a diagram. It is easy to understand and it is one of the most important learning strategies. It always depends on the type of information in a particular domain. There are different types of graphical representation. Some of them are as follows:

1. Line Graphs – Line graph or the linear graph is used to display the continuous data and it is useful for predicting future events over time.
2. Bar Graphs – Bar Graph is used to display the category of data and it compares the data using solid bars to represent the quantities.
3. Histograms – The graph that uses bars to represent the frequency of numerical data that are organized into intervals. Since all the intervals are equal and continuous, all the bars have the same width.
4. Line Plot – It shows the frequency of data on a given number line. ‘ x ‘ is placed above a number line each time when that data occurs again.
5. Frequency Table – The table shows the number of pieces of data that falls within the given interval.
6. Circle Graph – Also known as the pie chart that shows the relationships of the parts of the whole. The circle is considered with 100% and the categories occupied is represented with that specific percentage like 15%, 56%, etc.
7. Stem and Leaf Plot – In the stem and leaf plot, the data are organized from least value to the greatest value. The digits of the least place values from the leaves and the next place value digit forms the stems.
8. Box and Whisker Plot – The plot diagram summarizes the data by dividing into four parts. Box and whisker show the range (spread) and the middle (median) of the data.



SOURCE: BYJU'S .COM

Types of Diagram:

- One dimensional diagrams e.g. bar diagrams

- Two dimensional diagrams e.g rectangles, squares circles and pie diagrams
- Three dimensional diagrams

One Dimensional Diagrams or Bar Diagrams

A bar diagram is thick line whose width is shown merely for attention, themerits of such diagrams are as follows

- A reader can easily understand the subject matter
- They are simplest and he easiest to make
- For comparison of large numbers of items they are the only form that can e used effectively

Example for simple bar diagram:

Single bar diagram is the simplest of the bar diagram and is used frequently I practice for the comparative study of two or more items or values of a single variable or a single classification or category of data.

Suppose a simple diagram is to be drawn for the following data:

Country population:	A	B	C	D	E	F	G
(In million)	20	50	68	43	65	25	40

Examples for multiple bar diagram:

If two or more sets of inter related variables are to be presented graphically, multiple bar diagram are used. The technique of drawing multiple bar diagram is basically same as that of drawing simple bar diagram. In this type of diagrammed, the data given for each year is draw together. As a result for each year there will be a number of bars drawn which are attached to each other.

]Suppose a multiple bar diagram is to be drawn for the following data:

Year:	1	2	3	4	5	6
Marks:						
Arts	15	18	22	20	19	14
Science	20	25	21	23	27	28
Commerce	30	35	32	36	34	37

Percentage bars:

This type of diagram in which all the given data for each year is converted into percentage. Then for each year one bar is drawn for 100%. This can be understood from the example given below

Year	Number of Students Admitted					
	Arts	%	Science		Commerce	%
1	15	23			30	46
2	18	23			35	45
3	22	29			32	43
4	20	25			36	46
5	19	24			34	42
6	14	18			37	47

Deviation bars:

Deviation bars are especially useful for graphical presentation of net quantities i.e surplus of deficit e.g., net profit or net loss net of imports and exports which have positive and negative values. This could be explained with the following example.

Rectangles:

A rectangle is a two-dimensional diagram because it is based on the area of principle. Just like bars, the rectangles are placed side by side, proper and equal spacing being given different rectangles, in fact, rectangle diagrams are modified form of bar diagrams and give more detailed information than is furnished by bar diagrams.

Square Diagrams:

Among the two dimensional diagrams, squares are especially useful if it is desired to compare graphically the values or quantities which differ widely from one another.

Circles:

Circle diagrams are alternative to square diagrams and are used for the same purpose.

Pie diagram:

A pie diagram will show how the expenditure of the government is distributed over different heads like agricultural, irrigation, industry, transport etc. A pie diagram can show how the expenditures incurred by an industry under different heads like raw materials, wages and salaries, selling and distribution expenses etc., Pie diagrams are used while making comparison on a percentage basis and not on an absolute basis. When pie diagrams are constructed on a percentage basis percentage can be presented by circles of equal in size.

Sector	Percentage	Angle
Agriculture	12.9	12.9 × 3.6 = 46
Irrigation	12.5	12.5 × 3.6 = 45
Energy	27.2	27.2 × 3.6 = 98
Industry	15.4	15.4 × 3.6= 56
Transport and communication	15.9	15.9 × 3.6= 57
Social services and others	16.1	16.1 × 3.6= 58
TOTAL	**100**	**100 × 3.6 = 360**

YEAR	EXPORTS	IMPORTS	NET EXPORTS [IN Rs.]
1	**230**	**248**	**-18**
2	**305**	**280**	**25**
3	**367**	**322**	**45**
4	**411**	**440**	**-29**
5	**400**	**380**	**20**
6	**366**	**380**	**-14**

(A)TWO DIMENSIONAL DIAGRAMS:

In the one dimensional diagrams only the length of the bar is taken in to account. Whereas in two dimensional diagrams the length as well as the width of the bar is considered, thus the area of the bar represents the given data. Now a circle shall be drawn suited to the size of the paper and divided into 6 parts according to degrees of angles at the center. (The angles have been arranged in descending order)Pictographs are not abstract presentation such as lines or bars but really depict the kind ofdata we are dealing with. Pictures are attractive and easy to comprehend and as such this method is particularly useful in presenting statistics to the layman. Cartograms or statistical maps are used to give quantitative information on a geographical basis. They represent spatial distribution. The quantities on the map can be shown in many ways, such as through shaded or color by dots, by placing pictograms in each geographical unit and by placing the appropriate numerical figure in each geographical unit.

GRAPHICAL REPRESENTATION OF DATA

Diagrams furnish only approximate information and are not much utility to a statistician from analysis point of view. On the other hand, graphs are more obvious, precise and accurate than diagrams and can be effectively used for further statistical analysis. They can broadly classified under the following two heads:

i. Graphs of frequency distributions
ii. Graphs of Time series

GRAPHS OF FREQUENCY DISTRIBUTIONS:

Frequency graphs are designed to reveal clearly the characteristic features of a frequency data. Such graphs are more appealing to the eye than the tabulated data and are readily perceptible, to the mind. They facilitate comparative study of two or more frequency distributions regarding their shape and pattern. The most commonly used graphs for charting a frequency distribution for the general understanding of the detail of the data are

HISTOGRAM: It is one of the most popular and commonly used devices for charting continuous frequency distributions, no matter whether the variable under study is discrete or continuous.

FREQUENCY POLYGON: It is another device of graphic presentation of a frequency distribution. It facilitates comparison of frequency distribution, Frequency polygon is drawn from the histogram or without histogram.

CUMULATIVE FREQUENCY CURVES (OGIVES); This is yet another type of graph representing the cumulative frequency of a distribution. From the given data, two types of arrangement of data are made i.e. 1. More than table and 2. Less than table. The procedure for drawing a cumulative frequency curves could be understood with the example given below:

Marks:	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students:	5	11	14	8	15	19	22	25	11	10

In the above example, mark group-wise the number of students are given. This has to be converted into a less than table and more than table to draw gives. This isexplained below:

Less than Table		More than Table	
Marks	**No. of students**	**Marks**	**No. of students**
Less than 10	5	More than 0	140
Less than 20	16	More than 10	135
Less than 30	30	More than 20	124
Less than 40	38	More than 30	110
Less than 50	53	More than 40	102
Less than 60	72	More than 50	87
Less than 70	94	More than 60	68
Less than 80	119	More than 70	46
Less than 90	130	More than 80	21
Less than 100	140	More than 90	10

Once the above tables are prepared, they can be represented in the same graph For this first the scale for the X axis should be fixed. Let it be 1 cm = 10 marks and for the Y axis, let the scale be 1cm=10 students. Using this scale the diagram,

QUESTIONS

	PART - A
1	What is field editing?
2	How is centralized editing done?
3	List the merits of coding.
4	Differentiate field and centralized editing.
5	What is data classification?
6	Give an example for a two-way table.
7	Write the different types of hypothesis.
8	How are graphs classified?
9	List the components of a table.
10	What is a frequency polygon?

	PART – B
1	Discuss on the various types of tables used in research report.
2	Examine the significance of statistical analysis and the significance of tables.
3	Discuss on the various types of diagrams used in research report.
4	Elaborate on the process of Editing, Coding and classifications of Data.
5	Graphs are accurate and precise than diagrams. Justify.

TEXT / REFERENCE BOOKS

1. Ackoff, Russell L., The Design of Social Research, Chicago: University of Chicago Press, 1961.

2. Ackoff, Russell L., Scientific Method, New York: John Wiley & Sons, 1962.

3. Allen, T. Harrell, New Methods in Social Science Research, New York: Praeger Publishers, 1978.

4. Anderson, H.H., and Anderson, G.L., An Introduction to Projective Techniques and Other Devices for Understanding the Dynamics of Human Behaviour, New York: Prentice Hall, 1951.

5. Anderson, T.W., An Introduction to Multivariate Analysis, New York: John Wiley & Sons, 1958.

6. Bailey, Kenneth D., "Methods of Social Research," New York, 1978.

7. Baker, R.P., and Howell, A.C., The Preparation of Reports, New York: Ronald Press, 1938.

8. Bartee, T.C., "Digital Computer Fundamentals," 5th Ed., McGraw-Hill, International Book Co., 1981.

9. Barzun, Jacques, and Graff, Henery, F., The Modern Researcher, rev. ed., New York: Harcourt, Brace & World, Inc., 1970.

10. Bell, J.E., Projective Techniques: A. Dynamic Approach to the Study of Personality, New York: Longmans Green, 1948.

11. C.R. Kothari, New Age International Publishers, Research Methodology, 2nd Edition, 2004

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SCHOOL OF MANAGEMENT STUDIES

UNIT – 5 - RESEARCH METHODOLOGY- SBAX1023

SYLLABUS - UNIT 5 - RESEARCH REPORT

Research report-Types-Mechanics in writing report precautions – Structure of a report-Appendix-bibliography- Executive Summary- Briefing –Evaluation of Research report-Ethics in research

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RESEARCH REPORT

Research report is a written document through, which the researcher intimates to the world the findings of his study, the design of his study, his conclusions, the suggestions and recommendations based on his findings, the details of data collected, the method he has adopted for selecting the sample, the tools he used for analysis the hypothesis he has set, his objectives, the limitations etc.

TYPES OF RESEARCH REPORTS

(A)Technical Report

In the technical report the main emphasis is on (i) the methods employed (ii) assumptions made in the course of the study (iii) the detailed presentations of the findings including their limitations andsupporting data.

A general outline of a technical report can be as follows:

- **Summary of results:** A brief review of the main findings just in two or three pages.
- **Nature of the study:** Description of the general objectives of study, formulation of the problem in operational terms, the working hypothesis, the type of analysis and datarequired etc.
- **Methods employed:** specific methods used in the study and their limitations. For instance in sampling studies we should give details of sample design viz., sample size, sample selection, etc.
- **Data:** Discussion of data collected, their sources, characteristics and limitations, if secondary data are used, their suitability to the problem at hand be fully assessed. In case of a survey the manner in which data were collected should be fully described.
- **Analysis of data and presentation of findings:** The analysis of data and presentation of the findings of the study with supporting data in the form of tables and charts be fully narrated. This in fact happens to be the main body of the report usually extending over several chapters.
- **Conclusions:** A detailed summary of the findings and the policy implications drawn from

the results be explained.

- **Bibliography:** bibliography of various sources consulted be prepared and attached.

1. **Technical appendices:** Appendices be given for all technical matters relating to questionnaire mathematical derivations, elaboration on particular technique of analysis and the like ones
2. **Index:** Index must be prepared and be given invariably in the report at the end.

The order presented above only gives a general idea of the nature of a technical report; the order of presentation may not necessarily be the same in all the technical reports. This in other words means that the presentation may vary in different reports even the different sections outlined above will not always be the same nor will all these sections appear in any particular report. It should however be remembered that even in a technical report simple presentation and ready availability of the findings remain an important consideration and as such the liberal use of charts and diagrams is considered desirable.

(B)Popular Report

The popular report is one which gives emphasis on simplicity and attractiveness, the simplification should be sought through clear writing, minimization of technical, particularly, mathematical, details and liberal use of charts and diagrams. Attractive layout along with large print many subheadings, even an occasional cartoon now and then is another characteristic feature of the popular report, besides in such a report emphasis is given on practical aspects and policy implications.

We give below a general outline of a popular report.

- **The findings and their implications:** Emphasis in the report is given on the findings of most practical interest and on the implications of these findings.
- **Recommendations for action:** Recommendations for action on the basis of the n of the study is made in this section of the report.
- **Objective of the study:** A general review of how the problem arise is presented along with the specific objectives of the project under study.
- **Methods employed:** A brief and non-technical description of the methods and techniques used, including a short review of the data on which the study is based, is given in this part of the report.
- **Results:** This section constitutes the main body of the report wherein the results of the study are presented in clear and non-technical terms with liberal use of all sorts of illustrations such as charts, diagrams and the like ones.

(C)Technical appendices: More detailed information on methods used, forms etc., is presentedin the form of appendices. But the appendices are often not detailed if the report is entirely meant for general public.

There can be several variations of the form in which a popular report can be prepared. The only important thing about such a report is that it gives emphasis on simplicity and policy implications from the operational point of view, avoiding the technical details of all sorts to the extent possible.

ORAL PRESENTATION

At times oral presentation of the results of the study is considered effective, particularly in cases where policy recommendations are indicated by project results. The merit of this approach lies in the fact that it provides an opportunity for give-and-take decisions which generally lead to a better understanding of the findings and their implications. But the main demerit of this sort of presentations is the lack of any permanent record concerning the research details and it may e just possible that the findings may fade away from people‟s memory even before an action is taken. In order to overcome this difficulty a written report may be circulated before the oral presentation and referred to frequently during the discussions. Oral presentation is effective when supplemented by various visual devices. Use of slides, wall charts and blackboards is quite helpful in contributing to clarity and in reducing the boredom, if any. Distributing a board outline with a few important tables and charts concerning the research results, makes the listeners attentivewho have a ready outline on which to focus their thinking. This very often happens in academic institutions where the researcher discusses his research finding and policy implications with others either in a seminar or in a group discussion.

Thus research results can be reported in more than one ways, but the usual practice adopted in academic institutions particularly, is that of writing the technical report and then preparing several research papers to be discussed at various forums in one form or the other. But in practical field and with problems having policy implications the technique followed is that of writing a popular report. Researches done on governmental account or on behalf of some major public or private organizations are usually presented in the form of technical reports.

MECHANICS OF WRITING A RESEARCH REPORT

There are very definite and set rules which should be followed in the actual preparation of the research report or paper. Once the techniques are finally decide, they should be scrupulously adhered to and no deviation permitted. The criteria of format should be decided as soon as the materials for the research paper have been assembled. The following points deserve mention so far as the mechanics of writing a report are concerned.

1. **Size and physical design:** The manuscript should be written on unruled paper **8 ½" × 11"**in size. If it is to be written by hand, then black or blue-black ink should be used. A margin ofat least one and one-half inches should be allowed at the left hand and of at least half an inchat the right hand of the paper. There should also be one-inch margins, top and bottom. The paper should be near and legible. If the manuscript is to be typed, then all typing should be double-spaced on one side of the page only except for the insertion of the long quotations.
2. **Procedure**: Various steps in writing the report should be strictly adhered (All such steps have already been explained earlier in this chapter)
3. **Layout**: keeping in view the objective and nature of the problem. The layout of the report should be thought of and decided and accordingly adopted (The layout of the research report and various types of reports have been described in this chapter earlier which should be taken as a guide for report-writing in case of a particular problem).
4. **Treatment of quotations:** Quotations should be placed in quotation marks and double spaced, forming an immediate part of the text. But if a quotation is of a considerable length (more than four or five type written lines) then it should be single-spaced and indented at least half an inch to the right of the normal text margin.
5. **The footnotes:** Regarding footnotes one should keep in view the followings:

   The foot notes serve two purposes viz, the identification of materials used in quotations in the report and the notice of materials not immediately necessary to the body of the research text but still of supplemental value. In other words footnotes are meant for cross references, citation of authorities and sources, acknowledgement and elucidation or explanation of a point of view. It should always be kept in view that footnote is not an end nor a means of the display of scholarship. The modern tendency is to make the minimum use of footnotes for scholarship does not need to be displayed.
6. Footnotes are placed at the bottom of the page on which the references or quotation which they identify or supplement ends. Footnotes are customarily separated from the textual material by a space of half an inch and a line about one and a half inches long.(©) Footnotes should be numbered consecutively, usually beginning with 1 in each chapter separately. The number should be put slightly above the line, say at the end of a quotation. At the foot of the page, again, the footnote number should be indented and typed a little above the line. Thus consecutive numbers must be used to correlate the reference in the text with its corresponding note at the bottom of the page, exception case of statistical tables and other numerical material, where symbols such as the asterisk(*) or the like one may be used to prevent confusion.
7. Footnotes are always typed in single space though they are divided from one another by double space

DOCUMENTATION STYLE:

Regarding documentation the first footnote reference to any given work should be complete in its documentation, giving all the essential facts about the edition used. Such documentary footnotes follow a general sequence. The common order may be described as under: Regarding the single- volume reference. Author's name in normal order (and not beginning with the last name as in bibliography) followed by a comma;

Title of work, underlined to indicate italics; 3.Place and date of publication; Pagination references (The page number) Example John Gassner, Masters of the Drama, New York; Dover Publications, Inc. 1954, p..315.

1. **Regarding multi volumed reference**

- Author's name in the normal order.
- Title of work, underlined to indicate italics:
- Place and date of publication:
- Number of volume;
- Pagination references (The page number)

2. **Regarding works arranged alphabetically**

For works arranged alphabetically such as encyclopedias and dictionaries, no pagination reference is usually needed. In such cases the order is illustrated as under:

3. **Examples 1**

"Salamanca," Encyclopedia Britannica, 14th edition

4. **Example 2**

"Mary Wollstonecraft Godwin," Dictionary of national biography.

But if there should be a detailed reference to a long encyclopedia article, volume and pagination reference may be found necessary.

5. **Regarding periodicals reference**

- Name of the author in normal order:
- Title of article, in quotation marks;
- Name of periodical, underlined to indicate italics:
- Volume number 5.Date of issuance;6.Pagination.

6. **Regarding anthologies and collections reference**

Quotations from anthologies or collections of literary works must be acknowledged not only by author but also by the name of the collector.

7. **Regarding second-hand quotations reference**
8. In such cases the documentation should be handled as follows; 1.Original author andtitle "quoted or cited in,"; Second author and work

9. **Example**
10. J.F.Jones, Life in Polynesia, p. 16, quoted in History of the Pacific Ocean area, by R.B. Abel,op. 191.

11. **Case of multiple authorship**

If there are more than two authors or editors, then in the documentation the name of only the first is given and the multiple authorship is indicated by "et al." or " and others".

Subsequent references to the same work need not be so detailed as stated above. If the work is cited again without any other work intervening, it may be indicated as ibid, followed by a comma and the page number. A single page should be referred to as p., but more than one page be referred to as pp. if there are several pages referred to at a stretch, the practice is to use often the page number, for example, pp.190 ff, which means page number 190 and the following pages; but only for page 190 and the following page „190f". Roman numerical is generally used to indicate the number of the volume of a book .Op. cit.(opera citato, in the work cited) or (loco citato, in the place cited) are two of the very convenient abbreviations used in the footnotes. Op. cit or Loc. Cit. after the writer's name would suggest that the reference is to work by the writer which has been cited in detail in an earlier footnote but intervened by some other .

12. **Punctuation and abbreviations in footnotes:** The first item after the number in the footnote is the author's name given in the normal signature order. This is followed by a comma. After the comma, the title of the book is given; the article (such as "A", "An", "The" is omitted and only the first word and proper nouns and adjectives are capitalized. The title is followed by a comma. Information concerning the edition is given next. This entry is followed by a comma. The place of publication is then stated it may be mentioned in an abbreviated form, if the place happens to be a famous one such as for London, N, Y for New York, N, D for New Delhi and so on. This entry is followed by a comma. Then the name of the publisher is mentioned and this entry is closed by a comma. Then the name of the publisher is mentioned and this entry is closed by a comma, it is followed by the date of publication if the date is given on the title page. If the date appears in the copyright notice

on the reverse side of the title page or elsewhere in the volume, the comma should be omitted and the date enclosed in square brackets [c 1978], [1978]. The entry is followed by a comma. Then follow the volume and page references and are separated by a comma if both are given. A period closes the complete documentary reference. But one should remember that the documentation regarding acknowledgements from magazine articles and periodical literature follow a different form as stated earlier while explaining the entries in the bibliography.

13. **Use of statistics, charts and graphs:** A judicious use of statistics in research reports is often considered a virtue for it contributes a great deal towards the clarification an and simplification of the material and research results. One may well remember that a good picture is often worth more than a thousand words. Statistics are usually presented in the form of tables, charts, bars and line-graphs and pictograms. Such presentation should be self-explanatory and complete in itself. It should be suitable and appropriate looking to the problem at hand. Finally statistical presentation should be neat and attractive.
14. **The final draft:** Revising and rewriting the rough draft of the reports should be done with great care before writing the final draft. For the purpose, the researcher should put to himself questions like; Are the sentences written in the report clear? Are they grammatically correct? Do they say what meant" is? do the various points incorporated in the report fit together logically? "Having at least one colleague read the report just before the final revision is extremely helpful. Sentences that seem crystal-clear to the writer may prove quite confusing to other people; a connection that had seemed self-evident may strike other as a non-sequitur. A friendly critic, by pointing out passages that seem unclear or illogical and perhaps suggesting ways of remedying the difficulties, can be an invaluable aid in achievingthe goal of adequate communication."
15. **Bibliography**: Bibliography should be prepared and appended to the research report as discussed earlier.
16. **Preparation of the index:** At the end of the report, an index should invariably be given, the value of which lies I the fact that it acts as a good guide, to the reader. Index may be prepared both as subject index and as author index. The former gives the names of the subject-topics or concepts along with the number of pages on which they have appeared or discussed in the report whereas the latter gives the similar information regarding the names of authors. The index should always be arranged alphabetically. Some people prefer to prepare only one index common for names of authors, subject-topics, concepts and the like ones.

STEPS IN WRITING A REPORT (Mechanics)

1. **Introduction of the subject matter in a logical manner:** In this stage, if the researcher would develop his subject matter in a logical manner. He would study the sequence of his subject matter and prepare the draft logically.
2. **Preparation of Research outline:** Having decided the plan of his subject matter, the researcher should prepare an outline of his report, by indicating the chapters to be developed, the chapter content in terms of headings, sub-headings questions to be answeredetc.
3. **Preparation of the rough draft:** Once the outline is ready, it is given a shape through the preparation of rough draft, at this stage the researcher need not impose any restrictions with regard to the style, language, presentation, length of report etc.
4. **Redrafting the report:** In this stage, the rough draft is edited, polished and brought to actual size, by eliminating all that is un wanted in the rough draft.
5. **Bibliography:** Once the body of the report is finalized the bibliography should be planned. The bibliography would give useful information for other researchers. The bibliography should contain a list of books in some way pertinent to the research which has been done.
6. **Preparation of the final draft:** In this stage the scholar should study each statement made. He should avoid contradictory statements, delete questionable and debatable conclusions. Moreover the conclusions should emerge from research study. They must be original and not borrowed. A scholar remember that so long the report is not submitted, he has every scope for polishing it and correcting it. Once it is submitted the scholar should be prepared to accept any critical comments on it.

PRECAUTIONS FOR WRITING A RESEARCH REPORT

1. The length of the report should be decided in accordance with the purpose.
2. The report should be interesting to read and must not be loaded.
3. The tables and figures should be added for further clarity.
4. The report should be free from any type of mistakes.
5. Materials used as reference should be acknowledged and the details should be given through either foot notes or end notes.
6. The report should be logically structured.
7. Repetition should be avoided

8. Appendices, bibliography and index should be integral part of the research report.
9. The technical tools applied in the process of analysis should all be explained in details through the methodology adopted for the study.
10. The physical appearance of the report should be attractive neat and clean.

APPENDIX (ANNEXURE)

It refers the additions behind the body of the report. Normally it consists of various materials the needed to be included in the report but it is not an essential and integral part of the main presentation. It does not find any place in the main body of the thesis and doesn't provide and detailed information but provides a place for inclusion of material for record purposes or for the sake of those readers who may want or need to read it. Normally every appendix will be considered as a separate unit and must be numbered as Appendix A,/Appendix B, etc. The following materials are used enclosed as appendix:

Derivations of equations detailed calculations copies of exhibits, questionnaires, sample of norms, tables, annual reports diagrams and figures etc.

BIBLIOGRAPHY:

It refers to a list of sources consulted. It will be serially numbered and the entries in it are made in the alphabetical order. The details appear in the same sequence as in the list of references. Occasionally a list of works on the same subject suggested for further reading is also termed as bibliography. The following are a few examples of entries as they would appear in the list of

- Reference / Bibliography.
- Books with Authors
- An essay / paper presented / articles published Journals

EXECUTIVE SUMMARY (briefing)

This is the last section of the research report. It is customary to conclude with a brief resume or summary, restating the whole performance all over again briefly. A useful way to organize our conclusion is to begin by referring back to the introduction where we stated the problem and also to the hypothesis. Normally the executive summary contains the followings:

Brief statement of the study Description of procedures used findings and conclusions

Recommendations for further research

INTERPRETATION AND REPORT WRITING

After collecting and analyzing the data the researcher has to accomplish the task of drawing interferences followed by report writing. This has to be done very carefully, \otherwise misleading conclusion may be draw and the whole purpose of doing research may get vitiated. It is only through interpretation that the researcher can expose relations and processes that underlie his findings. In case of hypotheses testing studies, if hypotheses are test and upheld several times, the researcher may arrive at generalizations. But in case the researcher had no hypothesis to start with he would try to explain his findings on the basis of some theory. This may at times result in new questions leading to further researches. All this analytical information and consequential inference(s) may well be communicated, preferably through research report to the consumers of research results who may be either an individual or a group of individuals or some public / private organizations.\\

MEANING OF INTERPRETATION

Interpretation refers to the task of drawing inferences from the collected facts after an analytical and/or experimental study. In fact, it is a search for broader meaning of research findings, the task of interpretation has two major aspects viz.., (i) the effort to establish continuity in research though linking the results of a given study with those of another, and

(ii) the establishment of some explanatory concepts. "In one sense, interpretation is concerned with relationships within the collected data, partially overlapping analysis,

Interpretation also extend beyond the data of the study to include the results of other research, theory and hypothesis." Thus, interpretation is he device through which the factors that seem to explain what has been observed by researcher in the course of the study can be better understood and it also provides a theoretical conception which can serve as a guide for further researchers.

SIGNIFICANCE OF REPORT WRITING

Research report is considered a major component of the research study for the research task remains incomplete till the report has been presented and or written. As a matter of fact even the most brilliant hypothesis highly well designed and conducted research study, and the most striking generalizations and findings are of little value unless they are effectively communicated to others. The purpose of research is not well served unless the findings are made known to other .research results must invariably enter the general store of knowledge. All this explains the significance of

writing research report. There are people who do not consider writing of report as an integral part of the research process. But the general opinions in favor of treating the presentation of research results or the writing of report as part and parcel of the research project. Writing of report is the lastA step in a research study and requires a set of skills somewhat different from those called for in respect of the earlier stages of research. This task should be accomplished by the researcher with utmost care; he may seek the assistance and guidance of experts for the purpose.

LAYOUT OF THE RESERCH REPORT

Anybody, who is reading the research report must necessarily be conveyed enough about the study so that he can place it in its general scientific context, judge the adequacy of its method and thus form an opinion of how seriously the findings are to be taken. For this purpose there is the need of proper layout of the report, the layout of the report means as to what the research report should contain. A comprehensive layout of the research report should comprise (A) preliminary pages; (B)the main text; and (C) the end matter. Let us deal with them separately

A. Preliminary Pages

In its preliminary pages the report should carry a title and date, followed by acknowledgements in the form of „preface" or „Foreword". Then there should be a table of contents followed by list of tables and illustrations so that the decision maker or anybody interested in reading the report can easily locate the required information in the report.

B. Main Text

The main text provides the complete outline of the research report along with all details. Title of theresearch study is repeated at the top of the first page of the main text an then follows the other details on pages numbered consecutively beginning with the second page, each man section of the report should begin on a new page/. The main text of the report should have the following sections; (i) introduction ; (ii) statement of findings and recommendations: (iii) the results; (iv) the implications drawn from the results; (v) the summary.

Introduction: The purpose of introduction is to introduce the research project to the readers. It should contain a clear statement of the objectives of research i.e., enough background should be given to make clear to the reader why the problem was considered worth investigating. A brief summary of other relevant research may also be stated so that the present study can be seen in that context. The hypotheses of study if any and the definitions of the major concepts employed in the

study should explicitly stated in the introduction of the report. The methodology adopted in conducting the conduction the study must be fully explained. The scientific reader would like to know in detail about such things. How was the study carried out? What was its basic design? If the study was an experimental one then what were the experimental manipulation? If the data were collected by means of questionnaires or interviews, then exactly what questions were asked (The questionnaire or interview schedule is usually given in an appendix)? If measurements were based on observation, then what instructions were given to the observers? Regarding the sample used in the study the reader should be told, who were the subjects? How many were there? How were they selected? All these questions are crucial for estimating the probably limits of generalizability of the findings. The statistical analysis adopted must also be clearly stated. In additions to all this, the scope of the study should be stated and the boundary lines be demarcated. The various limitations, under which the research project was completed, must also be narrated.

(ii) **Statement** of findings and recommendations: After introduction the research report must contain a statement of findings and recommendations in non-technical language so that it can be easily understood by all concerned. If the findings happen to be extensive, at this point they should be put in the summarized form.

(iii) **Results:** A detailed presentation of the findings of the study, with supporting data in the form of tables and charts together with a validation of results is the next step in writing the main text of the report. This generally comprises the main body of the report, extending over several chapters. The result section of the report should contain statistical summaries and reductions of the data rather than the raw data. All the results should be presented in logical sequence and splitted into readily identifiable sections,. All relevant results must find a place in the report. But how one is to decide about what is relevant is the basic question. Quite often guidance comes primarily from the research problem and from the hypotheses, if any with which the study was concerned. But ultimately the researcher must rely on his own judgment in deciding the outline of his report. "Nevertheless, it is still necessary that he states clearly the problem with which he was concerned, the procedure by which he worked on the problem, the conclusions at which he arrived and the bases for his conclusions."

(iv) **Implications of the results:** Toward the end of the main text, the researcher should again put down the results of his research clearly and precisely. He should state the implications that flow from the results of the study for the general reader is interested in the implications for understanding the human behavior. Such implications may have three aspects as stated below:

A statement of the inferences drawn from the present study which may be expected to apply in

similar circumstances.

The condition of the present study which may limit the extent of legitimate generalizations of the inferences drawn from the study. The relevant questions that still remain unanswered or new questions raised by the study along with suggestions for the kind of research that would provide answers for them.

It is considered a good practice to finish the report with a short conclusion which summarizes and recapitulates the main points of the study. The conclusions drawn from the study should be clearly related to the hypotheses that were stated in the introductory section. At the same time a forecast of the probably future of the subject and an indication of the kind of research which needs to be done in that particular field is useful and desirable.

(v) Summary: It has become customary to conclude the research report with very brief summary, resting in brief the research problem the methodology the major conclusions drawn from the research results.

C. End Matter:

At the end of the report, appendices should be enlisted in respect of all technical data such as questionnaires, sample information, mathematical derivations and the like ones. Bibliography of sources consulted should also be given, index (an alphabetical listing of names, places and topics along with the numbers of the pages in a book or report on which they are mentioned or discussed) should invariably be given at the end of the report. The value of index lies in the fact that it works as a guide to the reader for the contents in the report.

ETHICAL PRACTICES IN RESEARCH

- Honesty: Strive for honesty in all scientific communications. Honestly report data, results, methods and procedures, and publication status. Do not fabricate, falsify, or misrepresent data. Do not deceive colleagues, research sponsors, or the public.
- Objectivity: Strive to avoid bias in experimental design, data analysis, data interpretation, peer review, personnel decisions, grant writing, expert testimony, and other aspects of research where objectivity is expected or required. Avoid or minimize bias or self-deception. Disclose personal or financial interests that may affect research.
- Integrity: Keep your promises and agreements; act with sincerity; strive for consistency of thought and action.
- Carefulness: Avoid careless errors and negligence; carefully and critically examine your own work and the work of your peers. Keep good records of research activities, such as data collection, research design, and correspondence with agencies or journals.

- Openness: Share data, results, ideas, tools, resources. Be open to criticism and new ideas.
- Respect for Intellectual Property: Honor patents, copyrights, and other forms of intellectual property. Do not use unpublished data, methods, or results without permission. Give proper acknowledgement or credit for all contributions to research. Never plagiarize.
- Confidentiality: Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.
- Responsible Publication: Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.
- Responsible Mentoring: Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.
- Respect for colleagues: Respect your colleagues and treat them fairly.
- Social Responsibility: Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.
- Non-Discrimination :Avoid discrimination against colleagues or students on the basis of sex, race, ethnicity, or other factors not related to scientific competence and integrity
- Competence: Maintain and improve your own professional competence and expertise through lifelong education and learning; take steps to promote competence in science as a whole.
- Legality: Know and obey relevant laws and institutional and governmental policies.
- Animal Care: Show proper respect and care for animals when using them in research. Do not conduct unnecessary or poorly designed animal experiments.
- Human Subjects Protection: When conducting research on human subjects, minimize harms and risks and maximize benefits; respect human dignity, privacy, and autonomy; take special precautions with vulnerable populations; and strive to distribute the benefits and burdens of research fairly.

QUESTION BANK

	PART – A
1	What is a research report?
2	Differentiate technical report and popular report.
3	Why is bibliography important for a research report?
4	What is meant by interpretation?
5	List the significance of foot notes.
6	With an example explain references in a research report.
7	What is appendix?
8	Write short note on oral presentation.
9	What is the significance of report writing?
10	What is redrafting of a report?

	PART – B
1	Describe the steps in writing a report.
2	Explain types of research report with examples.
3	Discuss the layout of a research report.
4	Discuss on the mechanics of writing a report.
5	Explain the precautions to be followed in research writing.
6	"Research is much concerned with proper fact finding, analysis and evaluation." Do you agree with this statement? Why?
7	Discuss on the mechanics of writing a research report.
8	Explain types of research report with examples.
9	Enumerate the layout of a research report

TEXT / REFERENCE BOOKS

1. Ackoff, Russell L., The Design of Social Research, Chicago: University of Chicago Press, 1961.

2. Ackoff, Russell L., Scientific Method, New York: John Wiley & Sons, 1962.

3. Allen, T. Harrell, New Methods in Social Science Research, New York: Praeger Publishers, 1978.

4. Anderson, H.H., and Anderson, G.L., An Introduction to Projective Techniques and Other Devices for Understanding the Dynamics of Human Behaviour, New York: Prentice Hall, 1951.

5. Anderson, T.W., An Introduction to Multivariate Analysis, New York: John Wiley & Sons, 1958.

6. Bailey, Kenneth D., "Methods of Social Research," New York, 1978.

7. Baker, R.P., and Howell, A.C., The Preparation of Reports, New York: Ronald Press, 1938.

8. Bartee, T.C., "Digital Computer Fundamentals," 5th Ed., McGraw-Hill, International Book Co., 1981.

9. Barzun, Jacques, and Graff, Henery, F., The Modern Researcher, rev. ed., New York: Harcourt, Brace & World, Inc., 1970.

10. Bell, J.E., Projective Techniques: A. Dynamic Approach to the Study of Personality, New York: Longmans Green, 1948.

11. C.R. Kothari, New Age International Publishers, Research Methodology, 2nd Edition, 2004

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