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SCHOOL OF MANAGEMENT STUDIES

UNIT 1 – RESEARCH METHODS - SBAA1601

UNIT 1

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 analyse or understand 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 isdefined 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 todetermine whether they fit the formulating a hypothesis. Research may also be defined "Any organized enquiry discussed and carried out to provide information for solving a problem".

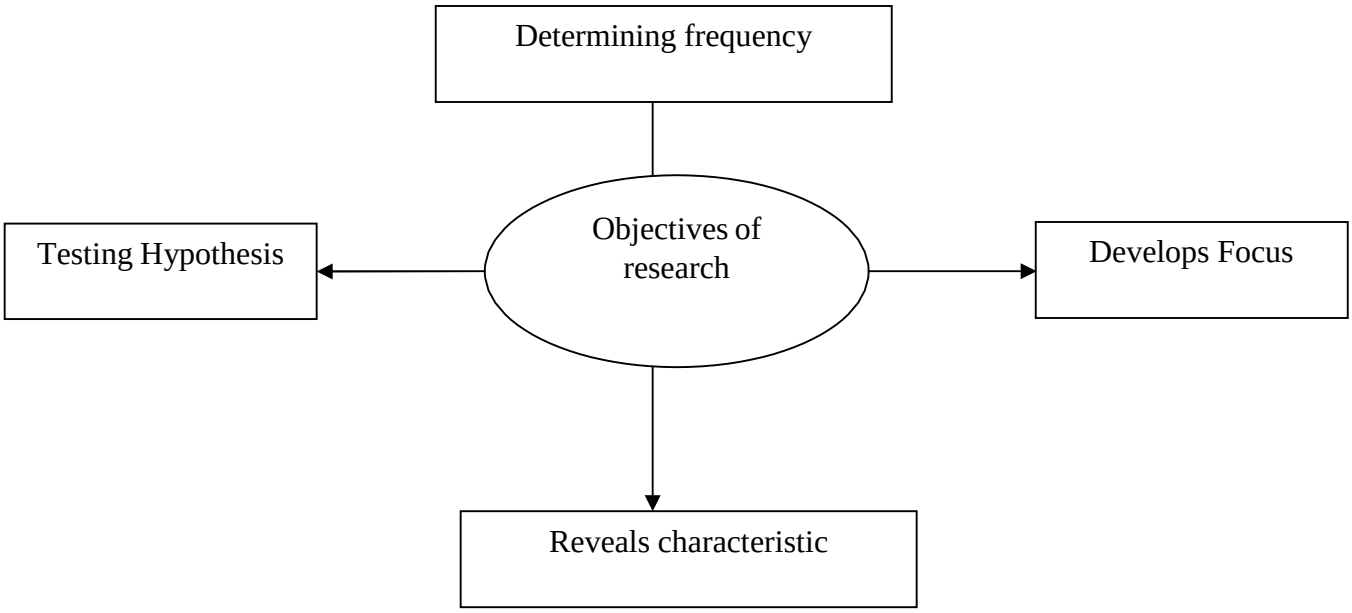
OBJECTIVES OF RESEARCH:

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

1. **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.
2. **It reveals characteristics:** To clearly reveal the characteristics of an individual or a situation ora 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

3. **It determines frequency of occurrence: T**o 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.
4. **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.

PROBLEMS FACED BY RESEARCHERS

Research requires several ingredients**;** some difficult to manage, while others are difficult to arrange. It is done by a single individual, but requires the acceptance/approval of several others; guides, supervisors, defense committee members, interviewees, focus group members, etc. In developing nations, research is in its incessant stage. Researchers face challenges in choosing a research topic, statement etc. In addition, researchers are faced with challenges associated with growth, infrastructural deficiencies, financial crunches, etc. Here's a list of top 10 challenges that we found intimidating for budding researchers:

1. **Lack of Scientific Training:** The research methodology is not systematic. Many researchers undertake research work without having actual knowledge of the research methods. Even the guides do not have a thorough knowledge of the various methodologies. Before undertaking research projects, researchers should be well equipped with all the methodological aspects.
2. **Lack of communication with the supervisor:** A university professor is a busy person. It is important to have guidance on a research project. Poor communication gets on the way of the progress of the research. It is important to communicate with the supervisor to clarify the doubts regarding the research topic, to know what the supervisor expects from you and to learn more about your research topic.
3. **Time management:** Spending ample time in learning the skills and practical implementation consumes a lot of time. In such a scenario, taking out time for intense research and to draft a top-notch research paper becomes impossible.
4. **Not having a definite deadline:** Deadlines are stressful. But not having a deadline can be troublesome during the Ph.D. journey. Deadlines help you get closer to your goals. Many times, Universities fail to implement a due date to submit the research paper, leading to confusion and improper time management among the scholars.
5. **A quantity of literature:** It can be difficult to deal with the quantity of literature that one might have accessed. The literature review is iterative. This involves managing the literature,

accessing data that supports the framework of the research, identifying keywords and alternative keywords, as well as constantly looking for new sources.

6. **Implementing quality of writing within the literature review:** A literature review has to go beyond being a series of references and citations. You need to interpret the literature and be able to position it within the context of your study. This requires careful and measured interpretation and writing in which you synthesize and bring together the materials that you have read.
7. **Insufficient data:** Insufficiency of data is a potential problem. Most of the business establishments are of the opinion that researchers may misuse the data provided by them. This affects the purpose of research studies for which that particular data may be of utmost importance.

TYPES OF RESEARCH

I.FUNDAMENTAL (OR) BASIC RESEARCH:

1. **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 chamberlains monopolistic competition.
2. **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.
3. **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 inaccuratefield data.
- As this approach involves collection of field data enormous time and efforts arerequired 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.

II.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, out 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 cannot be 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.

III.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.

IV.LITERATURE SURVEY

The literature search in fast and economic way for researchers to develop a better understanding of a problem area in which othey 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.

V.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, ratherit reflects an attempt to get available information from people who have some particular knowledge of subject under investigation.

VI. CASE STUDY APPROACH (ANALYSIS OF INSIGHT STIMULATING CASES).

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 andsuggestions.

• It may provide the basis for developing sound hypothesis.

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

Limitations:

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

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

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

VII.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 calledindependent 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 can not beeasily 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..

VIII.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 concernedwith 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.

IX.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 valuedgoal or objective”.

X-ANALYTICAL STUDY:

Analytical study is system of procedures and techniques of analysis applied to uantitative 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.

XI-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;

Expost 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 toother research techniques.
    - Not giving enough care to the development of the questionnaire and notpretesting it.
    - Asking too many questions, thus making unreasonable demands on therespondents. time.
    - Overlooking details of format, grammar, printing, and so on that caninfluence respondents. first impression.
    - Not checking a sample of non-responding subjects for possible bias in thequestionnaire.
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 insignificantresults.
    - Failing to divide the main groups into subgroups in situations wheresubgroup analysis may produce worthwhile knowledge.
    - Matching the subjects in the experimental and control groups on criteria thathave little to do with the variables being studied.
    - Attempting to match control and experimental groups on so many criteriathat 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 observer's disturbing or changing the situation being observed.
    - Attempting to evaluate behavior that occurs so infrequently that reliable datacannot be obtained through observations.
    - **Relationship (Correlation) Studies**
    - Assuming that a correlation between pieces of data is proof of a cause- and effectrelationship.
    - Using a sample in correlation research that differs on so many variablesthat 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 doa 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 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 andmodification of the existing products
- Research easily locates the problem areas.ü 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.

RESEARCH IN VARIOUS FUNCTIONAL AREAS OF MANAGEMENT

Research plays an major role in the various functional areas. It is mainly used for taking important decisions in their respective areas. The following are the role of research in each functional areas.

Research plays a n important role in the following areas in Management

1. Marketing
2. Finance
3. HR
4. Production
5. Entrepreneurship

Application of Research in Marketing:

- Decision making
- Market research
- Survey on demand
- Product research
- Customer research
- Sales research
- Promotional research
- Risk management on collaboration
- Research for market development
- Research on marketing and reach of competitors
- Research on formation of marketing strategy
- Research to build up competitive advantage

Application of Research in Finance:

- Break even analysis
- Capital Budgeting
- Ratio analysis
- Portfolio management
- Financial crisis management
- Decision making
- Risk perception
- Investment analysis
- Financial planning for salaried employees
- Strategies for tax savings
- Research to assess the perception of mutual fund investors
- Research on investment pattern and preference of retail investors

Application of Research in HR:

- Training and development
- Recruitment

- Manpower planning
- Labor welfare study
- Administrative roles
- Performance appraisal system
- Leadership style
- Problem identification
- Conflict management
- Research on MBO
- Research on statistical approach
- Comparative approach

Application of Research in Production:

- Supply chain management
- Planning
- Testing new products
- Prototype development
- Guaranteeing adequate distribution
- In-house research is required for professional and self development of the workers through training and mentoring
- Undertaking research can help a company avoid future failure ⏐ Studying the competition
- New technology approach
- Strategic module for overall production and distribution
- Operational module for production and sales synchronization ⏐ R&D for fully utilization of the machines

Application of Research in Entrepreneurship:

- Proper planning
- Market situation
- Barriers in startup
- Diversification and reverse strategy
- Existing competitors or substitutes
- Competitive advantage

- Differentiation from others
- Investment decisions
- Govt. rules and regulations
- Social culture and practices to utilize the opportunities

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- https://www.researchgate

UNIT 1- QUESTION BANK

PART- A

1. Define research.
2. State the need of research
3. Describe any two criteria's of a good research.
4. List the objectives of research.
5. What is mean by organizing data in research?
6. Define pure research.
7. What is meant by action research?
8. Give the meaning of descriptive research
9. What is meant by historical research/
10. Give two advantages of applied research.
11. What do you mean by diagnostic study?
12. Give an example of survey research.
13. What is longitudinal research?
14. List out the errors in research
15. Give any two uses of research in marketing function in a business.

PART- B

1. Define Research. State the characteristics of a good research
2. Comment on the objectives and significance of research to society.
3. Elucidate the problems faced by researcher in the journey of carrying out an academic research.
4. Explain in details on any five types of research used by researchers with exapmles..
5. What are the various types of research?
6. Differentiate between applied research an pure research.
7. Bring out the difference between experimental research and exploratory research .
8. Examine the role of research in the various department functions in a business.

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SCHOOL OF MANAGEMENT STUDIES

UNIT 2 – RESEARCH METHODS - SBAA1601

UNIT 2

RESEARCH PROCESS

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

1. 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 problemis? 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 offurther 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.

2.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.

3.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. **T**he 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.

- What is the study about?
- Why is the study being made?
- Where will be the study should be carried out?
- What type of data and where it would be collected?
- What is the period of study?
- Whether any sample would be used and if so what type of sample will be sued?
- What type of tools to be used?

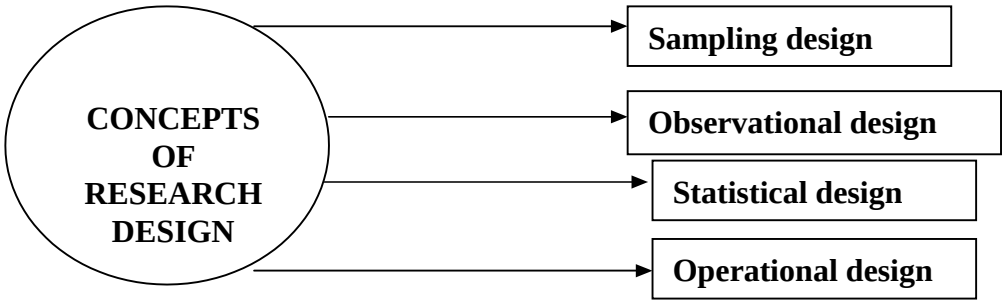
Characteristics / qualities of a good research design

1. It should be flexible
2. It should help to minimize bias at every stage
3. It should facilitate collection and analysis
4. It should be closely linked with objectives of the study
5. It is a plan that specifies the sources and type of inform relevant to the research problem.
6. It should specifically mention the type of approach to the study
7. It should also includes the time and cost budget since most studies are suffered by these twoconstraints:

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

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.

1. **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 b e madewould be indicated.



2. **Statistical design:** This part of research design would spell out the type of analysis that would becarried out.
3. **Operational design:** This design would lay down the steps that would be taken at each stage asthe 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 ofobjectives to assess the current status of any variables studied. By survey methods data can becollected 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 withthe

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 thehypothesis 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:

fter the analysis and interpretations are over, the research has to prepare the report. The body ofthe 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, andconsultation 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 available

- Usefulness and social relevanceResearch personnel.

DIFFERENT TYPES (Sources) OF LITERATURE

1.BOOKS

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

2.JOURNALS:

Published monthly, Quarterly, Half yearly or Annually.

3.REPORTS:

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

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. Sucha 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

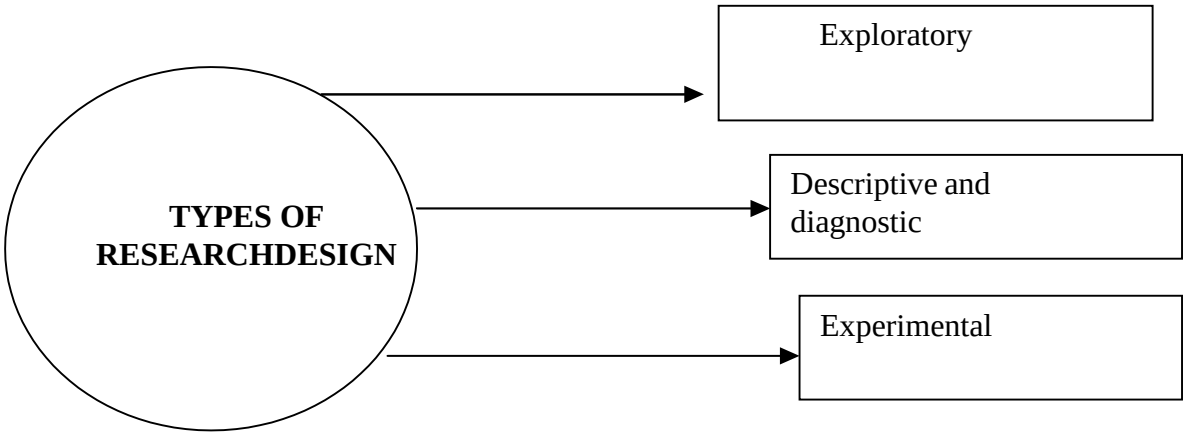
1.Exploratory research design:

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 relatingto 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 xistingproblem. 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.Experimenatal research design

The experimental research studies are mainly focused on finding out the cause and effectrelationship 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 beforeand 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.

SAMPLE SIZE DETERMINATION

Sample size determination is the act of choosing the number of observations or replicates to include in a statistical sample. The sample size is an important feature of any empirical study in which the goal is to make inferences about a population from a sample. In practice, the sample size used in a study is usually determined based on the cost, time, or convenience of collecting the data, and the need for it to offer sufficient statistical power. In complicated studies there may be several different sample sizes: for example, in a stratified survey there would be different sizes for each stratum. In a census, data is sought for an entire population, hence the intended sample size is equal to the population. In experimental design, where a study may be divided into different treatment groups, there may be different sample sizes for each group.

Sample sizes may be chosen in several ways:

- **Using experience** – small samples, though sometimes unavoidable, can result in wide confidence intervals and risk of errors in statistical hypothesis testing.
- **Using a target variance** for an estimate to be derived from the sample eventually obtained, i.e. if a high precision is required (narrow confidence interval) this translates to a low target variance of the estimator.
- **Using a target for the power** of a statistical test to be applied once the sample is collected.
- **Using a confidence level**, i.e. the larger the required confidence level, the larger the sample size (given a constant precision requirement).

SAMPLE SIZEAND ITS DETERMINATION

What is the size of the sample?

Sample size is denoted with 'n'. A sample size must be of an optimum size meaning it should not be too large nor too small. When the sample size (n) is very small the researcher may achieve the objectives and if it is too large, he may incur huge cost and waste resources 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.

1. **Nature of the Universe:**
2. 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.
3. **Number of groups:**
4. 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.
5. **Nature of study:**
6. 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.
7. **Sample Technique:**
8. The researcher has to decide the sampling tools while determining the size of the sample A smallrandom sample is better than a larger but badly selected sample.
9. **Accuracy and confidence level:**
10. A researcher requires a large size sample when the accuracy or the level of precision is to be kepthigh. To get more accuracy for a fixed significance level the samples size has to be increased fourfold.
11. **Resources available:**
12. 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 belarge otherwise it should be small.
13. **Miscellaneous factors:**
14. In addition to the above considerations the following points to be considered by a researcher. Nature of units size 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.

Some times 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.

DATA COLLECTION METHODS

There are two types of data: 1. Primary Data and 2. Secondary Data

Primary Data :

Primary data means original data that has been collected specially for the purpose in mind.It means someone collected the data from the original source first hand.Primary data has not been published yet and is more reliable, authentic and objective. When a data is collected from beginning to end for the first time by an institution or researcher, such data is called primary data, it is the original data, i.e. the data which is first It is completely renewed, it is called primary data. It is collected from scratch a lot of money is spent on collecting primary data. At the same time, man power is also required, that is, people are also needed.

Secondary Data

Secondary data is data that has already been collected by an institution or researcher and the new researcher generates new information about the use of this already collected data. For example, if you already have the population data of India, then you can easily find out what percentage of people in your city are literate and what percentage of people are illiterate, but you have already collected that data from the population data of India Therefore, this data will be called Secondary Data.

Difference between Primary and Secondary Data :

S.NO	PRIMARY DATA	SECONDARY DATA
1.	Primary data is the first data collected by a researcher for the first time.	Whereas secondary data is a data that is already collected by someone earlier.
2.	Primary data is called real-time data.	While this is not real-time data, it is related to the past.
3.	The process is very much involved in collecting primary data.	While collecting secondary data it does not involve much process but rather quickly and easily.
4.	Primary data is cost effective.	While it is economical.
5.	The primary data takes long time for collection.	While secondary data takes shorter time than primary data for collection.
6.	Primary data is available in crud form.	While it is available in processed or refined form.
7.	Primary data is more accurate than secondary data.	While it is less accurate than primary data.
8.	Primary data is more reliable than secondary data.	While secondary data is less reliable than primary data.
9.	There is also difficulty in collecting data.	While there is no difficulty in collecting data as it is already published.

DATA 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.

Sources of 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.

i. **Questionnaire (or) Schedule**:

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

ii. 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.

iii. Observation:

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

iv. 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 first hand information about the product from theconsuming public is obtained.

v. 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.

vi. 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 differentpoints of time.

vii. **Collection through Mechanical Devices:**

There are several shopping establishments where hidden video cameras are positioned at vantagepoints 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 ofproducts.

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.

Source of Secondary Data Collection:

Secondary data is data collected by someone other than the actual user. It means that the information is already available, and someone analyses it. The secondary data includes magazines, newspapers, books, journals, etc. It may be either published data or unpublished 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.,

Pre-requisites of a secondary data

When the researcher uses the secondary data he/ she should consider the following points:

i. Have knowledge on exactly what products are included in the statistical classification
ii. Knowledge on who originally collected the data for what purpose, and whether three might any motive for misrepresentation'
iii. From whom the data were collected and how reliable the methodology is of the secondary data.

iv. How consistent the data are with other local or international statistics.

Published data are available in various resources including

1) Government publications
2) Public records
3) Historical and statistical documents
4) Business documents
5) Technical and trade journals
6) Unpublished data includes
7) Diaries
8) Letters
9) Unpublished biographies, etc

➢

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 are 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 of different 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.
4. It provides a framework for organizing the conclusions of the findings:
5. It offers explanations for the relationships between those variables that can be empirically tested.
6. It furnishes proof that the researcher has sufficient background knowledge to enable him/her to make suggestions in order to extend existing knowledge.
7. It gives direction to an investigation.
8. 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.
1. **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.

2. **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.
3. **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.
4. **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:

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"

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

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.

Findings of studies: Hypotheses may be developed out of the findings of other studies in orderto replicate and test.

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 the alternative 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 the purpose.

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.

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UNIT 2- QUESTION BANK

PART- A

1. Define the term research design?
2. List the stages in research process?
3. State qualities of a good research design.
4. What is meant by research problem?
5. .What are the sources of review of literature?
6. What is meant by hypothesis testing?
7. Differentiate between Type I and Type II Error.
8. What are requirement of requirements of a hypothesis statement?
9. Give the major sources of collection of data?
10. List out the types of research design?

PART B

1. Discuss in detail on the process of research.
2. Write the steps in the determination of sample size
3. Explain the factors that influence the research design?
4. Differentiate between primary data and secondary data
5. Describe the process of hypothesis teseting in a research .

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UNIT 3 – RESEARCH METHODS - SBAA1601

UNIT 3

SAMPLING METHODS

Samping 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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POPULATION VS SAMPLE

- The **population** is the entire group that you want to draw conclusions about.
- The **sample** is the specific group of individuals that you will collect data from.
- The population can be defined in terms of geographical location, age, income, and many other characteristics.

SAMPLING FRAME

The sampling frame is the actual list of individuals that the sample will be drawn from. Ideally, it should include the entire target population (and nobody who is not part of that population).

Example

You are doing research on working conditions at Company X. Your population is all 1000 employees of the company. Your sampling frame is the company's HR database which lists the names and contact details of every employee.

SAMPLE SIZE

The number of individuals you should include in your sample depends on various factors, including the size and variability of the population and your research design. There are different sample size calculators and formulas depending on what you want to achieve with statistical analysis.

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.

DEFINITION

Sampling may be defined as the procedure in which a sample is selected from an individual or a

group of people of certain kind for research purpose. In sampling, the population is divided into a number of parts called sampling units.

Essentials (features)of sampling:

1. **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.
2. **Adequacy:** The size of the sample should be large enough so as to provide accurate results. Though it is difficult to state what is the ideal size of sample, statistically it can be determined.
3. **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.
4. **Homogeneity:** Any number of samples could be drawn from a population. But all these samples should have similarity in every respect.

   Eg:- If a researcher selects has to select 500 respondents from Chennai city as a sample to study consumer behavior of the people, than 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.

TYPES OF SAMPLING

Sampling can be broadly classified as probability sampling and non probability sampling

1.Probability sampling methods

Probability sampling means that every member of the population has a chance of being selected. It is mainly used in quantitative research. If you want to produce results that are representative of the whole population, probability sampling techniques are the most valid choice.

There are four main types of probability sampling methods used by the researcher .

1. **Simple randon sampling**
2. **Systematic sampling**
3. **Stratified sampling**
4. **Cluster sampling**

1.Simple random sampling

In a simple random sample, every member of the population has an equal chance of being selected. Your sampling frame should include the whole population. To conduct this type of sampling, you can use tools like random number generators or other techniques that are based entirely on chance.

Example

You want to select a simple random sample of 100 employees of Company X. You assign a number to every employee in the company database from 1 to 1000, and use a random number generator to select 100 numbers.

2. Systematic sampling

Systematic sampling is similar to simple random sampling, but it is usually slightly easier to conduct. Every member of the population is listed with a number, but instead of randomly generating numbers, individuals are chosen at regular intervals.

Example

All employees of the company are listed in alphabetical order. From the first 10 numbers, you randomly select a starting point: number 6. From number 6 onwards, every 10th person on the list is selected (6, 16, 26, 36, and so on), and you end up with a sample of 100 people.

If you use this technique, it is important to make sure that there is no hidden pattern in the list that might skew the sample. For example, if the HR database groups employees by team, and team members are listed in order of seniority, there is a risk that your interval might skip over people in junior roles, resulting in a sample that is skewed towards senior employees.

3.Stratified sampling

Stratified sampling involves dividing the population into subpopulations that may differ in important ways. It allows you draw more precise conclusions by ensuring that every subgroup is properly represented in the sample.

To use this sampling method, you divide the population into subgroups (called strata) based on the relevant characteristic (e.g. gender, age range, income bracket, job role).

Based on the overall proportions of the population, you calculate how many people should be sampled from each subgroup. Then you use random or systematic sampling to select a sample from each subgroup.

Example

The company has 800 female employees and 200 male employees. You want to ensure that the sample reflects the gender balance of the company, so you sort the population into two strata based on

gender. Then you use random sampling on each group, selecting 80 women and 20 men, which gives you a representative sample of 100 people.

4.Cluster sampling

Cluster sampling also involves dividing the population into subgroups, but each subgroup should have similar characteristics to the whole sample. Instead of sampling individuals from each subgroup, you randomly select entire subgroups.

If it is practically possible, you might include every individual from each sampled cluster. If the clusters themselves are large, you can also sample individuals from within each cluster using one of the techniques above.

This method is good for dealing with large and dispersed populations, but there is more risk of error in the sample, as there could be substantial differences between clusters. It's difficult to guarantee that the sampled clusters are really representative of the whole population.

Example : The company has offices in 10 cities across the country (all with roughly the same number of employees in similar roles). You don't have the capacity to travel to every office to collect your data, so you use random sampling to select 3 offices – these are your clusters.

Non-probability sampling methods

In a non-probability sample, individuals are selected based on non-random criteria, and not every individual has a chance of being included.

- This type of sample is easier and cheaper to access, but it has a higher risk of sampling bias. That means the inferences you can make about the population are weaker than with probability samples, and your conclusions may be more limited. If you use a non-probability sample, you should still aim to make it as representative of the population as possible.
- Non-probability sampling techniques are often used in exploratory and qualitative research. In these types of research, the aim is not to test a hypothesis about a broad population, but to develop an initial understanding of a small or under-researched population.

There are four main types of probability sampling methods used by the researcher .

1. **Convenience sampling**
2. **Judgment sampling**
3. **Quota sampling**
4. **Smowball sampling**

1.Convenience sampling

A convenience sample simply includes the individuals who happen to be most accessible to the researcher.This is an easy and inexpensive way to gather initial data, but there is no way to tell if the sample is representative of the population, so it can't produce generalizable results.

Example

You are researching opinions about student support services in your university, so after each of your classes, you ask your fellow students to complete a survey on the topic. This is a convenient way to gather data, but as you only surveyed students taking the same classes as you at the same level, the sample is not representative of all the students at your university.

2.Judgemental/ Purposive sampling

This type of sampling, also known as judgement sampling, involves the researcher using their expertise to select a sample that is most useful to the purposes of the research.

It is often used in qualitative research, where the researcher wants to gain detailed knowledge about a specific phenomenon rather than make statistical inferences, or where the population is very small and specific. An effective purposive sample must have clear criteria and rationale for inclusion.

Example

You want to know more about the opinions and experiences of disabled students at your university, so you purposefully select a number of students with different support needs in order to gather a varied range of data on their experiences with student services.

3.Quota sampling

In Quota sampling researchers create a sample involving individuals that represent a population. Researchers choose these individuals according to specific traits or qualities. They decide and create quotas so that the market research samples can be useful in collecting data. These samples can be generalized to the entire population. The final subset will be decided only according to the interviewer's or researcher's knowledge of the population. This method of sampling is often used by market researchers.

For example, a researcher adopts quota sampling method to find out the effect of tv ads on products. He selects 20 adult men, 20 adult women, 10 teenage girls and 10 teenage boys so that they could interview them about their television viewing for the purpose of the study . Ideally the quotas chosen would proportionally represent the characteristics of the underlying population.Whilst this has the advantage of being relatively straightforward and potentially representative, the chosen sample may

not be representative of other characteristics that weren't considered (a consequence of the non-random nature of sampling).

4.Snowball sampling

If the population is hard to access, snowball sampling can be used to recruit participants via other participants. The number of people you have access to "snowballs" as you get in contact with more people.

Example

You are researching challenges faced by differently abled person working in your city. Since there is no list such people with you probability sampling isn't possible. You meet one person who agrees to participate in the research, and she puts you in contact with other differently abled people that he/ she knows in the city.

MERITS /ADVANTAGES OF SAMPLING

Sampling ensures convenience, collection of intensive and exhaustive data, suitability in limited resources and better rapport. In addition to this, sampling has the following advantages also.

1. Low cost of sampling

If data were to be collected for the entire population, the cost will be quite high. A sample is a small proportion of a population. So, the cost will be lower if data is collected for a sample of population which is a big advantage.

2. Less time consuming in sampling

Use of sampling takes less time also. It consumes less time than census technique. Tabulation, analysis etc., take much less time in the case of a sample than in the case of a population.

3. Scope of sampling is high

The investigator is concerned with the generalization of data. To study a whole population in order to arrive at generalizations would be impractical. Some populations are so large that their characteristics could not be measured. Before the measurement has been completed, the population would have changed. But the process of sampling makes it possible to arrive at generalizations by studying the variables within a relatively small proportion of the population.

4. Accuracy of data is high

Having drawn a sample and computed the desired descriptive statistics, it is possible to determine the stability of the obtained sample value. A sample represents the population from which its is drawn. It permits a high degree of accuracy due to a limited area of operations. Moreover, careful execution of field work is possible. Ultimately, the results of sampling studies turn out to be sufficiently accurate.

5. Organization of convenience

Organizational problems involved in sampling are very few. Since sample is of a small size, vast facilities are not required. Sampling is therefore economical in respect of resources. Study of samples involves less space and equ**ipment.**

6. Intensive and exhaustive data

In sample studies, measurements or observations are made of a limited number. So, intensive and exhaustive data are collected.

7. Suitable in limited resources

The resources available within an organization may be limited. Studying the entire universe is not viable. The population can be satisfactorily covered through sampling. Where limited resources exist, use of sampling is an appropriate strategy while conducting marketing research.

8. Better rapport

An effective research study requires a good rapport between the researcher and the respondents. When the population of the study is large, the problem of rapport arises. But manageable samples permit the researcher to establish adequate rapport with the respondents.

DEMERITS /DISADVANTAGES OF SAMPLING

The reliability of the sample depends upon the appropriateness of the sampling method used. The purpose of sampling theory is to make sampling more efficient. But the real difficulties lie in selection, estimation and administration of samples.

1. Chances of bias

The serious limitation of the sampling method is that it involves biased selection and thereby leads us to draw erroneous conclusions. Bias arises when the method of selection of sample employed is

faulty. Relative small samples properly selected may be much more reliable than large samples poorly selected.

2. **Difficulties in selecting a truly representative sample**

Difficulties in selecting a truly representative sample produces reliable and accurate results only when they are representative of the whole group. Selection of a truly representative sample is difficult when the phenomena under study are of a complex nature. Selecting good samples is difficult.

3. In adequate knowledge in the subject

Use of sampling method requires adequate subject specific knowledge in **sampling technique**. Sampling involves statistical analysis and calculation of probable error. When the researcher lacks specialized knowledge in sampling, he may commit serious mistakes. Consequently, the results of the study will be misleading.

4. Changeability of units

When the units of the population are not in homogeneous, the sampling technique will be unscientific. In sampling, though the number of cases is small, it is not always easy to stick to the, selected cases. The units of sample may be widely dispersed. Some of the cases of sample may not cooperate with the researcher and some others may be inaccessible. Because of these problems, all the cases may not be taken up. The selected cases may have to be replaced by other cases. Changeability of units stands in the way of results of the study.

5. Impossibility of sampling

Deriving a representative sample is difficult, when the universe is too small or too heterogeneous. In this case, census study is the only alternative. Moreover, in studies requiring a very high standard of accuracy, the sampling method may be unsuitable. There will be chances of errors

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 resourcesAvailability of time
- Degree of accuracy desired
- Status of the researcher (individual, govt., corprn,, etc)

Differences between the primary and secondary data

Comparison Chart

BASIS FOR COMPARISON	PRIMARY DATA	SECONDARY DATA
Meaning	Primary data refers to the first hand data gathered by the researcher himself.	Secondary data means data collected by someone else earlier.
Data	Real time data	Past data
Process	Very involved	Quick and easy
Source	Surveys, observations, experiments, questionnaire, personal interview, etc.	Government publications, websites, books, journal articles, internal records etc.
Cost effectiveness	Expensive	Economical
Collection time	Long	Short
Specific	Always specific to the researcher's needs.	May or may not be specific to the researcher's need.
Available in	Crude form	Refined form
Accuracy and Reliability	More	Relatively less

QUESTIONNAIRE

A questionnaire is a form prepared and distributed to **secure responses to certain questions**. It is a tool for obtaining response to questions by using a form which the respondent fills by himself.

- It is a **systematic compilation of questions** that are submitted to a group of population called samples from whom the required information is acquired.
- It is that **form of inquiry** which contains a systematically compiled and organized series

of questions that are to be sent to the population samples.

Steps involved in designing a questionnaire

1. The investigator cannot get a ready made questionnaire appropriate for his study. He has to prepare it for himself. He should keep in mind the following steps and suggestions.
2. While planning and constructing his questionnaire, the investigator should secure all the help he can. He should **study other questionnaires** and submit his items for critical evaluation. He should consult those who have experience in questionnaire construction.
3. He **should obtain a thorough grasp of the field** in which he is constructing questionnaire. He must have a **clear understanding of the objectives of the study** and of the nature of the data needed.
4. Constructing a questionnaire calls for numerous revision. Variations of the same questions should be submitted to **experimental trial**. The same question posed in different ways brings out different response.
5. The content of question should elicit valid and reliable answers. Each question must be justified on the basis of its contribution to the overall purpose of the study
6. Each question must be absolutely clear not only to the maker but also to the listener.
7. If the desired information is delicate or confidential in nature, he should provide for anonymous response.
8. The questionnaire may not be desirable for all. It should be sent only to those who possess the required information.
9. The questions should be so worded as to allay any fears, suspicion, hesitation, embarrassment or hostility of the respondent.
10. Some specific questions may be asked in order to check the truthfulness of answers to general questions.
11. The items should be placed psychologically or logically – in a sound sequence – simple, interesting neutral questions preceding the more difficult ones.
12. He should include a courteous, carefully constructed covering letter to explain the purpose and importance of the study.
13. The respondents often cause delay while returning completed questionnaires. To avoid this, a vigorous follow up is necessary.

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

1) Questionnaire should be printed / Cyclostyled / Xeroxed
2) The first part of the questionnaire should specify the object or should be constructed using simple language and technical terms, concepts should all be avoided.
3) Each question should be specific and clear.
4) Personal Questions on wealth, habits etc., could be avoided
5) Questions needing computation / calculation / consultation should be avoided Questions on sentiments / belief/ faith should be avoided
6) Repetition of question should be eliminated
7) Sufficient space should be given for answering questions
8) If any diagram me or map is used then it should be printed clearly
9) 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

1. Open – end questions:

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

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

2. 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

3. Pictorial Questions:

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

4. Dichotomous questions:

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

- "Do you own a watch"?
- Yes..... No .....

5.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:

1) **Leading questions:**

   A leading questions is one which makes it easier for the respondent to react in a certain way andis 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?"

2) **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 pressuringthem?"

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

3) **Ambiguous questions:**

An ambiguous question is one that does not have a clear meaning. It may mean different thingsto 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

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.

TYPES OF SCHEDULES (examples)

Following are the different types of schedules used by social scientists and anthropologists.

i. **Village or community schedule**: It is used by census researchers who collect general information on populations, occupations, etc.

ii. **Family or Household schedule:** It gives full demographic details of households, the status of individuals, data on education, age, family relations etc.

iii. **Opinion or attitude schedule**: To schedule the views of population regarding an issue.

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	Answers in the Schedule method of data

emails, posts and the answers will be given as per instructions given in the cover letter.	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.

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UNIT 3- QUESTION BANK

PART A

1. Define sampling.
2. List the essentials features of sampling .
3. Differentiate between probability and non -probability sampling
4. List the methods of probability sampling.
5. What is simple random sampling?
6. What are various methods of probability sampling?
7. What is snow ball sampling ?
8. State the meaning of stratified sampling.
9. What is cluster sampling ?
10. Differentiate between a questionnaire and schedule.

PART B

1. Describe the methods of probability sampling with suitable examples
2. Enumerate the methods uses in non – probability sampling with examples
3. Bring out the merits and demerits of sampling .
4. Differentiate between primary data and secondary data.
5. Describe the procedure for designing a questionnaire .
6. Enumerate the types of questions used in a questionnaire with suitable examples.
7. Differentiate between a questionnaire and a schedule.

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SCHOOL OF MANAGEMENT STUDIES

UNIT 4 – RESEARCH METHODS -SBAA1601

UNIT 4

DATA ANALYSIS

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

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DATA EDITING

Once the data collection is completed, it is examined carefully to eliminate any errors or mistakes. 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 also avoid 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, andweight 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 likeare available the description becomes exact.
3. Third, statistical analysis facilitates identification of the casual factorsunderlying the complex phenomena. What are the factors which determine a variablelike 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 observationaldata.
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

HYPOTHESIS TESTING

Hypothesis is an assumption or some supposition to be proved or disproved. Aresearch Hypothesis is a predictive statement icapable of being tested by scientificmethods, that relates an independent variable with some variable. Hypothesis is usuallyconsidered as the principal instrument for research. Its main function is to suggest new experiments and observations.

Definition

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 are as follows:

- It should be clear and preciseIt should be capable of tested
- It should state the relationship betweenvariables It should be limited in scopeand must be specific It should be statedin simple terms

1. **Null Hypothesis:** The random selection of the samples from the given population makes the tests of significance valid for us. For applying any test of significance wefirst set up hypothesis Such a statistical hypothesis, which is under test. Is usually ahypothesis of no difference and hence is called Null Hypothesis. It is usually denotedby H_o
2. **Alternate Hypothesis:** Any hypothesis which is complementary to null hypothesis iscalled and alternate hypothesis. It is usually denoted by H_a For example if the null hypothesis is that there is no relationship between the eye colour of husbands and wives is rejected then automatically the alternate hypothesis is that there is relationship between the eye color of husbands and wives is accepted.

TYPE I ERROR AND TYPE II ERROR:

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

1. Type I error: We commit this error when we reject a null hypothesis which is true.
2. Type II error: This error is committed when we accept the null hypothesis which is false. Thiscould be stated below:

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

For example, suppose we want to test the relationship between rainfall and production. Suppose we set a null hypothesis that rainfall does not affect food production. From experience and research findings in the past it is well known that rain fall certainly affect food production. Hence the null hypothesis should be rejected, but instead, if we accept it we commit type II error.

PROCEDURE FOR HYPOTHESIS TESTING

1. **The researcher has to state H_o as well as H_a**
   - The researcher has to specify the level of significance (or the α value)The researcher has to decide the correct sampling distribution
   - The researcher has state sample a random sample(s) and workout an appropriate value from sample date
   - He has to calculate the probability that sample result could diver age as widely as it has from expectation H_o wee true. If this probability equal to or smaller then a value in case of one – tailed test and a/2 in case 2- tailed test then decide yes or no.
2. **Making a formal statement:** It consists of making a formal statement of the null hypothesis Ho and also of the alternative hypothesis H1
3. **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 the purpose.
4. **Deciding the distribution to use:**After deciding the level of significance the researcher has to determine the appropriatesampling distribution.
5. **Selecting a random sample and computing an appropriate value**: The researcher has to select a random sample(s) and compute an appropriate valuefrom the sample data.
6. **Calculation of the probability**: The researcher has to calculate the probability that the sample result would diverge aswidely as it has from expectations.
7. **Comparing the probability**: Afterwards, the researcher has to compare the probability thus calculated with ithespecified value for α significance level.

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

Rules for tabulation

A table contains columns and row, these columns and rows create small boxes. Which are called 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 the table 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 bythe 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 identifiedand can be used as a source reference in the interpretation of a problem.
4. **It provides patterns**
5. Tabulation reveals patterns with the figures which can not be seen in the narrative form. It also facilitates the summation of the figures if the reader desires to check the totals.

Parts of a table

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

Types of tables:

Tables can be broadly classified to two categories:

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

1.Simple And Complex Frequency TablesSimple or One Way Table:

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

Number of Employees in a BankAccording 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 isdivided 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 andRanks

Age in years	Rank									Total		
	Supervisors			Assistance			Clerks					
	M	F	T	M	F	T	M	F	T	M	F	T
BELOW 25	-	-	-	-	-	-	-	-	-	-	-	-
25-35	-	-	-	-	-	-	-	-	-	-	-	-
35-45	-	-	-	-	-	-	-	-	-	-	-	-
45-55	-	-	-	-	-	-	-	-	-	-	-	-
55&ABOV E	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL									-			

GRAPHICAL PRESENTATION OF DATA

A good graph or chart can show as much as several paragraphs of words

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. Historigram

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 amathematical 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 have 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.

Footnote: Foot notes may be given at the bottom of a diagram if necessary. It clarifies certain points in the diagram.

GRAPHICAL REPRESENTATION

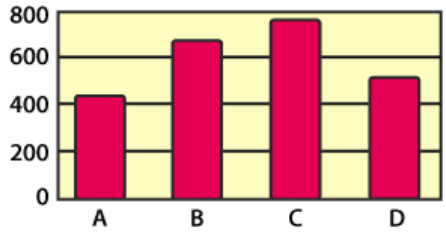
Graphical Representation is a way of analysing numerical data. It exhibits the relation between data, ideas, information and concepts in a diagram. It is easy to understand and it is one of the most important learning strategies. It always depends on the type of information in a particular domain. There 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 organised 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 organised 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 summarises the data by dividing into four parts. Box and whisker show the range (spread) and the middle (median) of the data.

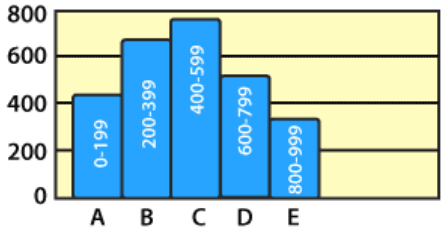
TYPES OF GRAPHICAL REPRESENTATION

BYJU'S The Learning App

Bar Graphs



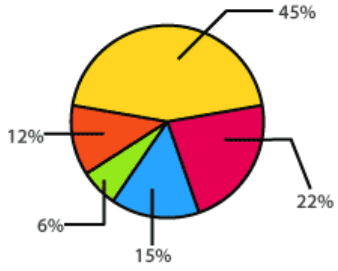
Histograms



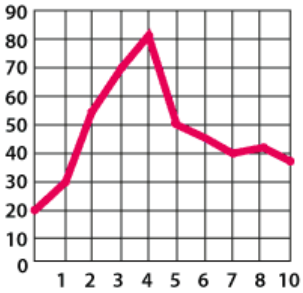
Frequency Table

Rulers of France		
Reign (Years)	Tally	Frequency
1-15	𝍸 𝍸 𝍸 III	18
16-30	𝍸 𝍸 I	11
31-45	𝍸 I	6
46-60	IIII	4
61-75	I	1

Circle Graph



Line Graphs

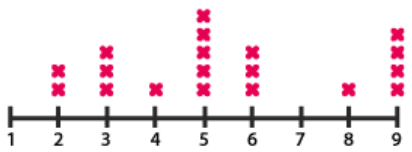


Stem and Leaf Plot

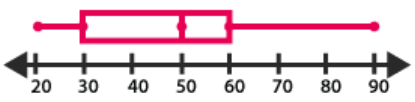
Stem	Leaf
0	1, 1, 2, 2, 3, 4, 4, 4, 4, 5, 8
1	0, 0, 0, 1, 1, 3, 7, 9
2	5, 5, 7, 7, 8, 8, 9, 9
3	0, 1, 1, 1, 2, 2, 2, 4, 5
4	0, 4, 8, 9
5	2, 6, 7, 7, 8
6	3, 6

Key : 6 | 3 = 63 Year

Line Plot



Box and Whisker Plot



Source : byju's .com

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, graphps and maps significance of Diagrams and Graphs:

1.They provide bird's eye view of the entire data2.They are attractive

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

TYPES OF DIAGRAMS

- 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 diagramme, 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	9	1	30	46
2	18	23	5	2	35	45
3	22	29	1	8	32	43
4	20	25	3	9	36	46
5	19	24	7	1	34	42
6	14	18	8	5	37	47

Deviation bars:

Deviation bars are specially 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 from of bar diagrams and give more detailed information than is furnished by bar diagrams.

Square Diagrams:

Among the two dimensional diagrams, squares are specially 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**

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 of data 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.

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

Reference Books:

- John W. Creswell ,Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Sage Publications ,2012.
- Kothari KC, Research Methodology, 4th Edition , New Age Publications , 2019.
- Manion, Keith Morrison, Research Methods in Education 7th Edition, by Louis Cohen Lawrence ,Routledge ,2011.
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- Tripathi P.C,Research Methodology,2nd Edition,Prentice Hall, Inc., 2014.
- Uwe Flick, Introducing Research Methodology: A Beginner's Guide to Doing a Research Project 2nd ed. Edition, Sage Publications ,2015.
- William M. K. Trochim , James P. Donnelly, The Research Methods Knowledge Base,Wadsworth publishing ,2015

- Zina O'Leary. The Essential Guide to Doing Your Research Project 2nd Edition. Publisher : SAGE South Asia; Second Edition , 2011.

Reference links

- https://www.scribd.com
- https://pdfcoffee.com
- https://www.docsity.com/
- http://arts.brainkart.com
- https://www.dynamictutorialsandservices.org
- https://icsehelp.com/rs-aggarwal
- https://byjus.com

UNIT 4- QUESTION BANK

PART A

1. Define data editing.
2. Define Data coding in research.
3. Differentiate between field editing and centralized editing.
4. What are basis of classification of a data?
5. What is meant by coding of data in research?
6. Give two advantages of usage of statistical tools in data analysis .
7. Differentiate between null and alternate hypothesis.
8. What is TYPE –I and TYPE –II error.
9. Differentiate between null hypothesis and alternate hypothesis.
10. List the types of tables used in data presentation in a research report.
11. List the types of graphs used in data presentation in a research report.
12. State any four advantages of using graphs and tables in report.

PART B

1. Define Hypothesis. Explain the steps followed in Hypothesis testing .
2. Explain the parts of a table with its significance in research using an example.
3. Evaluate the types of tables used in a research report.
4. Comment on the types of graphical presentation used in a research report.
5. Describe in detail on the types of diagrams used in research reports.
6. State the importance of graphs and diagrams in research with illustrations .

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SCHOOL OF MANAGEMENT STUDIES

UNIT 5 – RESEARCH METHODS -SBAA1601

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 and supporting data. The general outline of a technical report listed below 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.

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

1. **Summary of results:** A brief review of the main findings just in two or three pages.
2. **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 data

requiredetc.,

3. **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.
4. **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 asurvey the manner in which data were collected should be fully described.
5. **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.
6. **Conclusions:** A detailed summary of the findings and the policy implications drawn from the results be explained.
7. **Bibliography:** bibliography of various sources consulted be prepared and attached.
8. **Technical appendices:** Appendices be given for all technical matters relating to questionnaire mathematical derivations, elaboration on particular technique of analysis and the like ones
9. **Index:** Index must be prepared and be given invariably in the report at the end

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.

1. **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.
2. **Recommendations for action**: Recommendations for action on the basis of the n of the study is made in this section of the report.
3. **Objective of the study**: A general review of how the problem arise is presented along with

the specific objectives of the project under study

4. **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 ofthe report.
5. **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
6. **Technical appendices:** More detailed information on methods used, forms etc, is presented in the form of appendices. But the appendices are often not detailed if the report isentirely 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.

C.ORAL PRESENTATION

An oral is presentation of one's research work in seminar, conference, workshop etc.. Oral presentation of the results of the study is considered effective, particularly in cases where policy recommendations are indicated by project results

Importance of oral report

1. Save time and energy.
2. To assess/evaluate experienced, knowledge, skill etc. of a learner.
3. Learner can request opinions, suggestions from the audience.
4. For effective feedback from facilitators.
5. For a better relationship between learner and facilitator.
6. Improvement for future oral report.

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1. 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.
2. 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.

3. In order to overcome this difficulty a written report may be circulated before the oral presentation and referred to frequently during the discussions.
4. 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 attentive who have a ready outline on which to focus their thinking.
5. Oral report presentation is often used by academic institutions where the researcher discusses his research finding and policy implications with others either in a seminar or in a group discussion.

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 of at least one and one-half inches should be allowed at the left hand and of at least half an inch at 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, except in case of statistical tables and other numerical material, where symbols such as the asterisk(*) or the like one may be used to prevent confusion.

   (d) Footnotes are always typed in single space though they are divided from one another by double space

DOCUMENTATION STYLE USED FOR FOOTNOTES

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

1.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;

- .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.

2.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)

3.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:

Examples 1 :-"Salamanca," Encyclopedia Britannica, 14th edition

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.

3.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.

5.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.

6.Regarding second-hand quotations reference

In such cases the documentation should be handled as follows; 1.Original author and title"quoted or cited in,"; Second author and work.Example: J.F.Jones, Life in Polynesia, p. 16, quoted in History of the Pacific Ocean area, by R.B. Abel,op. 191.

7.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 Loc.cit. (loco citato, in the place cited) are two of the very convenient abbreviations used in the footnotes. Op. cit or Loc. Cit. after te 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 .

8.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 Lond, 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.

9.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.

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 is meant'? 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 achieving the goal of adequate communication."

10.Bibliography: Bibliography should be prepared and appended to the research report as discussed earlier.

11.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, ithe 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 answered etc.
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.**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.
5. **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 itare 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 wouldappear in the list of

- Reference / Bibiliography.
- Books with Authors
- An essay / paper presented / articles publishedJournals

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 opinion is in favour 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 last A.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 thestudy 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 thereis 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. Titleof the research 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 genealizability 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 :

1. 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.
2. 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.
3. Integrity: Keed gfp your promises and agreements; act with sincerity; strive for consistency of thought and action.
4. 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.
5. Openness : Share data, results, ideas, tools, resources. Be open to criticism and new ideas.
6. 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.

7. Confidentiality: Protect confidential communications, such as papers or grants submitted for publication, personnel records, trade or military secrets, and patient records.
8. Responsible Publication: Publish in order to advance research and scholarship, not to advance just your own career. Avoid wasteful and duplicative publication.
9. Responsible Mentoring: Help to educate, mentor, and advise students. Promote their welfare and allow them to make their own decisions.
10. Respect for colleagues: Respect your colleagues and treat them fairly.
11. Social Responsibility: Strive to promote social good and prevent or mitigate social harms through research, public education, and advocacy.
12. 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
13. 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.
14. Legality: Know and obey relevant laws and institutional and governmental policies.
15. Animal Care: Show proper respect and care for animals when using them in research. Do not conduct unnecessary or poorly designed animal experiments.
16. 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.

Reference Books:

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- Tripathi P.C,Research Methodology,2nd Edition,Prentice Hall, Inc., 2014.
- Uwe Flick, Introducing Research Methodology: A Beginner's Guide to Doing a Research Project 2nd ed. Edition, Sage Publications ,2015.
- William M. K. Trochim , James P. Donnelly, The Research Methods Knowledge Base,Wadsworth publishing ,2015
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UNIT 5- QUESTION BANK

PART A

1. What is research report.
2. List the types of research report
3. Define technical report.
4. What is meant by popular report
5. What is footnote ?
6. State the advantages of a popular report.
7. Comment on the use of oral report.
8. What is the importance of interpretation in report writing?
9. List the layout of a research report
10. State the significance of ethics in research?

PART A

1. What is the mechanism followed by researcher to write a report?
2. What is technical report .Describe the general outline of a technical report?
3. Evaluate the documenting style used in footnotes in a report.
4. Describe the steps in report writing.
5. Explain the precautions to be followed while writing a research report.
6. State the significance of report writing.
7. What are the contents of a research report?
8. Describe the ethical practices to be followed by researchers.