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SCHOOL OF MANAGEMENT STUIDES

UNIT 1 – RESEARCH METHODS IN MANAGEMENT (SBAA5206)

SBAA5206- RESEARCH METHODS IN MANAGEMENT

UNIT 1

Introduction to Research: Business Research – Meaning, Purpose, Types, Significance, Ethics Steps in Research – Review of Literature – Research Gap – Formulation of Research Problem – Research Question – Research Design – Formulation of testable hypothesis

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INTRODUCTION

Research is a systematic process of collecting and analysing information in order to increase our understanding of the topic. Research is the search of knowledge. It is aninvestigation. Research is a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. Research refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analysing the facts and reaching certain conclusions either in the form of solutions towards the concerned problem or in certain generalisation for sometheoretical formulation.

Research methodology is a way to systematically solve the research problem. It is a science of studying how research is done scientifically. Research methods are all those methods / techniques that are used for conduction of research.

Definition:

Research is defined as, "careful or critical inquiry or examination in seeking facts or principles; diligent investigation in order to ascertain something."

-Webster's New International Dictionary

According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organising and evaluating data, making deductions and reaching conclusions; carefully testing the conclusions to determine whether they fit the formulating hypothesis.

OBJECTIVES OF RESEARCH:

Research is conscious approach to find out the truth which is hidden and which has not been discovered by applying scientific procedure. Therefore each research has its own focus. This is stated in terms of objectives of conducting research.

- To gain familiarity with a phenomenon or to achieve new insights into it studies.
- To portray accurately the characteristics of a particular individual, situation or studies.This helps to develop an approach to create opportunities in the society.
- To determine the frequency with which something occurs or with which it is associated with something else.
- To test a hypothesis of a causal relationship between variables. This type of research is undertaken mainly to determine the relationship between various factors so that necessary policy options could be framed.

Significance of research:

- Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organisation.
- Research provides the basis for nearly all government policies in our economicsystem.
- Research has its special significance in solving various operational and planning problems of business and industry.
- Research is equally important for social scientist in studying social relationships and in seeking answers to various social problems.

TYPES OF RESEARCH

Research can be classified into three broad categories

1. **On the basis of application**
2. **On the basis of Objectives**
3. **On the basis of extent of theory**
4. **On the basis of time dimension**

A. ON THE BASIS OF APPLICATION

Pure research (also called as fundamental or basis research): Pure research mainly concerned with generalizations and with the formulation of a theory. Gathering knowledge for knowledge's sake is termed as 'pure' or 'basic' research. Research concerning some natural phenomenon or relating to pure mathematics are examples of pure research. The pure research is directed towards finding information that has a broad base of applications and thus, adds to the already existing organized body of scientificknowledge.

Applied Research: Applied research aims at finding a solution for an immediate problem facing a

society or an industrial / business organisation. The research that aimed at certain conclusions (ex. solution) facing a concrete social or business problem is an example of applied research. The research to identify social, economic or political trends that may affect a particular institutions or the copy research (research to find out whether certain communications will be read and understood) or the marketing research or evaluation research are examples of applied research. Thus, the central aim of applied research is to discover a solution for some pressing practical problem.

B. ON THE BASIS OF OBJECTIVES

Exploratory research : It is a type of research conducted for a problem that has not been clearly defined. The exploratory research helps determine the best research design, data collection method and selection of subjects.The results of exploratory research are not usually useful for decision-making by themselves, but they can provide significant insight into a given situation. The exploratory research is not typically generalizable to the population at large.The exploratory research can be quite informal, relying on secondary research such as reviewing available literature and/or data like informal discussions with consumers, employees, management, case studies or pilot studies etc.

Conclusive research : Conclusive research is meant to provide information that is useful in reaching conclusions or decision-making. It tends to be quantitative in nature, that is to say in the form of numbers that can be quantified and summarized. It relies on both secondary data, particularly existing databases that are reanalysed to shed light on a different problem and primary data.

Descriptive research : Descriptive research includes surveys and fact-finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present.In social science and business research, it is quite often, the term *Ex post facto research* is used for descriptive research studies. The main characteristic of this method is that theresearcher has no control over the variables; she/he can only report what has happened or what is happening. The methods of research utilized in descriptive research and survey methods of all kinds, including comparative and correlation methods.

Causal / Experimental research: Experimental research is an objective, systematic, controlled investigation for the purpose of predicting and controlling phenomena and examining probability and causality among selected variables. Experimental research helps in best establishing the cause-and-effect relationships. The simplest experimental design includes two variables (Dependent and Independent variable) and two groups of participants (Control and Experimental group).The independent variable is the predictor variable whereas the dependent variable is the outcome variable.

Researchers manipulate and control the independent variable to study it's effect on the dependent variable. Before the beginning of experiment, the researcher (randomly) assigns her/his sample to two different groups; the control group and the experimental (treatment group or clinical group). The control group receives no manipulation of the independent variable (no treatment), whereas the experimental group receives the manipulation of the independent variable.

3 .ON THE BASIS OF EXTENT OF THEORY

Theoretical research: Theoretical research generally uses the findings from existing works to develop new ideas through analysing existing theory and explanations.These new ideas are not tested through collecting evidence in the form of primary data.

Empirical research

Empirical research relies on experience and observation alone, often without due regard for system and theory. It is a data-based research, coming up with conclusions which are capable of being verified by observation or experiment. In empirical research, the researcher must first provide himself with a working hypothesis or guessas to the probable results. He then works to get enough facts (data) to prove ordisprove his hypothesis.

4.ON THE BASIS OF TIME DIMENSION

Cross sectional research Cross-sectional research is used to examine one variable in different groups that are similar in all other characteristics. It means, the Cross-sectional research involves using different groupsof people who differ in the variable of interest but share other characteristics, such as socioeconomic status, educational background, and ethnicity. Cross-sectional research studies are based on observations that take place in different groups at one time. This means there is no experimental procedure, so no variables are manipulated by the researcher. Instead of performing an experiment, the researcher would simply record the information that she/he observe in the groups they are examining.

The following are the characteristics of cross-sectional research

- Takes place at a single point in time
- Variables are not manipulated by the researcher
- Provide information only; do not answer why

Longitudinal research

Longitudinal research is used to study individuals at different stages in their lives. A longitudinal study is **correlational** research which follows one group of individuals over a long period of time,

perhaps decades. Frequently, researchers meet with the subjects many times on a regular basis. The length of time is dependent on the topic of the research, the length of the study, and the age of the subjects.

Time series: A time series design collects data on the same variable at regular intervals in the form of aggregate measure of a population. Measurements are taken on each variable over two or more distinct time periods. This allows the researcher to measure change in variables overtime.

Time series Analysis is used for many applications such as:

- Economic forecasting
- Sales forecasting
- Budgetary Analysis
- Stock Market Analysis
- Yield projection
- Process and Quality control
- Inventory studies
- Workload projections
- Utilities studies
- Census analysis

Panel study A panel usually involves a somewhat random sample of subjects. Panel studies are a particular design of longitudinal study in which the unit of analysis is followed at specified intervals over a long period, often many years. The key feature of panel studies is that they collect repeated measures from the same sample at different points in time. Most panel studies are designed for quantitative analysis and use structured survey data.

Cohort study : Cohort study observes subjects in a similar group based on region, age, or common experiences. A cohort is a group of people who share a common characteristic or experienceperiod.Prospective cohort studies re-investigate groups of people who share some social characteristic. Cohort study takes its name from two intellectual traditions.Cohort studies are observational in design and are generally concerned with information regarding the prevalence distribution and inter-relationship of variables in a population. They are also used to identify risk factors and to collect information to describe the natural history or progression of disease. Cohort studies provide a wealth of valuable information about population health- which informs the planning and implementation of health policy. Cohort designs are thus ideal for many of the

health-related areas that interest nursing and midwifery researchers. An algorithm is a well-defined sequence of steps to solve a problem of interest in industry, business and government.

CRITERIA OF GOOD RESEARCH:

- Research is half complete, when the objectives or purposes of it are clearly spelt out. Objectives should be quantified so as to avoid any ambiguity.
- Unless the concepts associated with the research topic are explained clearly it is not possible to make the work understandable to others.
- It is necessary that every step followed in the process of research is explained fully.
- The research design adopted for the study should be clear and match with th+eobjectives.
- The researcher should be honest in reporting the facts and revealing the flaws in the work.
- Data is the basis for all research work. Hence, extreme care must be taken to compile the required volume of data so that the conclusions are relevant and scientifically derived.
- Every research work should be based on carefully selected analytical tools. Mere knowledge of the tools is not adequate for intelligent application of them in the research work.
- Conclusions of the research work should emerge from the data and analyses. Borrowing conclusions from other research work should be resisted and if it is inevitable, then it should be used only for validation of the conclusions.
- The research work is incomplete without acknowledging the sources of various facts or data.
- Referencing, foot note, bibliography, and several other minor points like punctuation, page numbering, etc., should also be conforming to the standard prescribed.
- Apart from being scientific and logical, the research work should be useful to the society.

ETHICS IN RESEARCH:

Ethics emerge as the plan for research is made. Ethics is the code of behaviour, while conducting research. It is a social norms that frames the behaviour type. Ethics is a principle and procedure to conduct the research.

1. Privacy as possible
2. Maintaining confidentially of the data

3. Meaningful objectivity of the research
4. When he data is collected, not to harass anyone, not to conduct during unreasonable time, not to prolong conversation.
5. Avoid questions that create stress or discomfort
6. Data collected must be fully reported
7. While reporting, misinterpretation must be avoided. Report must be honest and fair.
8. Process must be fair and lawful
9. Data must be up to date and accurate
10. Not to transfer the data outside the country
11. Keep security for the data.

Codes and Policies for Research Ethics

Given the importance of ethics for the conduct of research aseveral government agencies, and universities have adopted specific codes, rules, and policies relating to research ethics. Many government agencies, such as the National Institutes of Health (NIH), the National Science Foundation (NSF), the Food and Drug Administration (FDA), the Environmental Protection Agency (EPA), and the US Department of Agriculture (USDA) have ethics rules for funded researchers. Other influential research ethics policies include Singapore Statement on Research Integrity, the American Chemical Society, The Chemist Professional's Code of Conduct, Code of Ethics (American Society for Clinical Laboratory Science) American Psychological Association, Ethical Principles of Psychologists and Code of Conduct, Statement on Professional Ethics (American Association of University Professors), the Nuremberg Code and the World Medical Association's Declaration of Helsinki.

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:** Keep 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.

PROBLEMS ENCOUNTERED BY RESEARCHERS IN INDIA:

Researchers in India, particularly those engaged in empirical research, are facing several problems. Some of the important problems are as follows:

1. The lack of a scientific training in the methodology of research is a great impediment for

researchers in our country. Many researchers take a leap in the dark without knowing research methods

2. There is insufficient interaction between the university research departments on one side and business establishments, government departments and research institutions on the other side. A great deal of primary data of non-confidential nature remains untouched by the researchers for want of proper contacts.
3. Most of the business units in our country do not have the confidence that the materialsupplied by them to researchers will not be misused and as such they are often reluctant in supplying the needed information to researchers.
4. Research studies overlapping one another are undertaken quite often for want of adequate information.
5. There does not exist a code of conduct for researchers and inter- university and inter departmental rivalries are also quite common.
6. Many researchers in our country also face the difficulty of adequate and timely secretarial assistance, including computerial assistance.
7. Library management and functioning is not satisfactory at many places as much of the time and energy of researchers are spent in tracing out the books, journals,reports etc.
8. There is also the difficulty of timely availability of published data from various government and other agencies doing this job in our country.
9. Also the problem of conceptualization and also the problem relating to the process of data collection and related things is great problem faced by the researcher.

RESEARCH IN VARIOUS FUNCTIONAL AREAS OF MANAGEMENT RESEARCH.

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:

1. Decision making

2. Market research
3. Survey on demand
4. Product research
5. Customer research
6. Sales research
7. Promotional research
8. Risk management on collaboration
9. Research for market development
10. Research on marketing and reach of competitors
11. Research on formation of marketing strategy
12. Research to build up competitive advantage

Application of Research in Finance:

1. Break even analysis
2. Capital Budgeting
3. Ratio analysis
4. Portfolio management
5. Financial crisis management
6. Decision making
7. Risk perception
8. Investment analysis
9. Financial planning for salaried employees
10. Strategies for tax savings
11. Research to assess the perception of mutual fund investors
12. Research on investment pattern and preference of retail investors

Application of Research in HR:

1. Training and development
2. Recruitment
3. Manpower planning
4. Labor welfare study
5. Administrative roles
6. Performance appraisal system
7. Leadership style

8. Problem identification
9. Conflict management
10. Research on MBO
11. Research on statistical approach
12. Comparative approach

Application of Research in Production:

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

Application of Research in Entrepreneurship:

1. Proper planning
2. Market situation
3. Barriers in startup
4. Diversification and reverse strategy
5. Existing competitors or substitutes
6. Competitive advantage
7. Differentiation from others
8. Investment decisions
9. Govt. rules and regulations
10. Social culture and practices to utilize the opportunities

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:

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.

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.

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.

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.

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.

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.

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.

Lack of confidence: Lack of confidence is one of the most common problems among researchers. Researchers with low self-esteem feel less motivated thereby affecting the quality of the work.

Concern that your focus is either still too broad or too narrow: This concern is inevitable. Be prepared to adapt your research as you look through the literature. This might require you to either increase its focus or narrow down so that the research is manageable. A broad focus for research might be narrowed down by adding an appropriate context or by looking for another variable within the research question or by focusing upon a theoretical viewpoint.

Library management: Library management and functioning is not satisfactory in many Universities; A lot of time and energy is spent on tracing appropriate books, journals, reports etc. Also, many of the libraries are not able to get copies of new reports and other publications on time.

Research demands immediate action on the part pf the concerned authorities or personnel at national levels, so as to transform these challenges into major opportunities.

RESEARCH PROCESS

Research process consists of a number of closely related activities. But such activities overlap continuously and do not follow a strictly prescribed sequence. Various steps involved in a research process are not mutually exclusive; nor are they separate and distinct. They do not necessarily follow each other in any specific order. However the following order concerning various steps provides useful procedural guidelines regarding the research process.

Process

1. **Defining research problem**
2. **Extensive literature survey**
3. **Formulation of Hypothesis**
4. **Preparing the Research Design**
5. **Determining Sample Design**

6. **Collecting the Data**
7. **Execution of the project**
8. **Analysis of Data**
9. **Testing of hypothesis**
10. **Generalization and interpretations**
11. **Preparation of the report and presentation of the results**.

1.Defining Research Problem

The first step in research is defining a research problem. It is most important stage in applied research, as poorly defined problems will not yield useful results. It is rightly said that, "A problem well defined is half solved". Poorly defined problems cause confusions and do not allow the researcher o develop a good research design.

2.Extensive literature survey:

Once the problem is formulated, the next step is to write down a brief summary. For this the researcher should undertake extensive literature survey connected with the problem. This can be carried down by abstracting and indexing journals and published and unpublished bibliographies can be reviewed. Academic journals, conference proceedings, government reports, books must be aped depending on the nature of the problem.

3.Formulation of Hypothesis:

Now the researcher should state in clear terms the working hypothesi .Working hypothesis is the tentative assumptions made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypothesis are developed is particularly important since they provide the focal point for research. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested.

4. Preparing the Research Design:

Research design is the conceptual structure within which research should be conducted. A research design specifies the methods and procedures for conducting a particular study. The researcher should specify the approach he intends to use with respect to the proposed study.

Research design can be grouped into three categories:

- **Exploratory Research:** An exploratory research focuses on the discovery of ideas and is generally based on secondary data. It is preliminary investigation, which does not have a rigid design.

- **Descriptive Research:** A descriptive study is undertaken when the researcher wants to know the characteristics of certain groups as age, sex, educational level, occupation etc.

- Causal Research: A causal research is undertaken when the researcher isinterested in knowing the cause and effect relationship between two or more variable

5. Determining Sample design :

All the items under consideration in any field of inquiry constitute a universe or population. A complete enumeration of all the items in the population is known as census inquiry. In such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. A sample design id s definite plan determined before any data are actually collected for obtaining a sample from a given population. Samples can be either probability samples nor non probability samples.

6.Collecting the Data:

The next step is to determine the sources of data to be used. The researcher has to decide whether he has to collect primary data or depend exclusively on secondary data. Sometimes, the research study is based on both secondary and primary data. The primary data are those, which are collected afresh and for the first time, and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process.

7. Execution of the project:

The researcher should see that the project is executed in a systematic manner and intime. If the survey is to be conducted by means of structured questionnaire, data can be readily machine-processed. In such a situation, questions as well as the possible answers may becoded.

8.Analysis of Data:

After the data have been collected, the researcher turns to the task of analysing them. The analysis of data requires a number of closely related operations such as establishment ofcategories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences. Researcher should classify the raw data into some purposeful andusable categories.

1. **Coding :** This operation is usually done at this stage through which thecategories of data are transformed into symbols that may be tabulated and counted**.**

2. **Editing:** It is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation.

3. **Tabulation:** It is a part of Technical procedure where in the classified data areput in the form of tables.

9. Testing of hypothesis:

After analysing the data the researcher has to test the hypothesis, various test, such as Chi square test, T test, F-test, have been developed by statisticians for the purpose. The hypothesis may be tested through the use of one or more such tests, depending upon the nature and object of research inquiry.

10.Generalization and interpretations:

If a hypothesis is tested and upheld several times, it may be possible for the researcherto arrive at generalization .ie., to build a theory. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory.

11.Preparation of the report and presentation of the results.

Although report writing needs some skill, which can be developed with practice, the researcher should follow the main principles of writing a report. Some of the principles are as follows:

✓ There should be objectivity, coherence, clarity in the presentation of ideas.

✓ Report should be written in a concise and objectives style in simple language. Charts and illustrations in the main report should be used only if they present the information more clearly and forcibly.

✓ The layout of the report should be as follows:

1. The preliminary pages
2. Main text
3. The end matter.

RESEARCH PROBLEM(IN DETAIL) :

The initial step in the research process is the identification of the research problem. A research problem refers to some difficulty which a researcher experiences in the context of either a theoretical or conceptual situation and wants a solution for it. A research problem exists when the individual or the group having one or more desired outcomes are confronted with two or more courses of action that have some but not equal efficiency for the desired objectives and are in doubt about which course of action is best.

It is important to define the problem in a precise manner. A well defined problem gives he researcher a proper direction for carrying out investigation. It also helps in utilizing the resources provided for he research effectively. A researcher can focus his efforts on collecting relevant information, if the problem is defined properly.

Need for Defining a Problem:

The definition of a problem serves the following purposes:

- The definition of problem sets the direction of the study
- The definition reveals the methodology of the study
- The definition helps the researcher to control subjectivity of theresearcher
- The definition of the problem suggests and specifies the variables to be taken into the investigation.
- The definition makes the research work practicable.

Components of Research Problem:

- There must be an individual or a group , which has some difficulty or the problem.
- There must be some objectives to be attained at.
- There must be alternative means for obtaining the objectives one wishes to attain.
- There must remain some doubt in the mind of as researcher with regard to the selection of alternatives.
- There must be some environment to which the difficulty pertains.

Sources of research problem:

There is rarely any literature available regarding the procedure for identifying a researchproblem, while there is no dearth of literature on how to conduct research on a problemidentified. A research problem does not state how to do something, offer a vague or broad proposition, or present a value question.

The following are the sources of research problem:

- Deductions from theory
- Interdisciplinary Perspectives
- Interviewing practioners
- Personal experiences
- Relevant literature

PROCESS OF IDENTIFICATION OF RESEARCH PROBLEM:

It is evident that problem formulation is very important for planning and implementing research investigations. Though the nature of formulation process will mostly depend on the type of problem, objectives of the organizations, aptitude of the decision maker and researcher, but some common components are observed in general.

The following are the steps involved in the process of identification of research problem:

- **Decision maker Policies**:**Researcher should make every effort to learn about the goals and attitude ofthe individual responsible to take the final decision and for whom the information is tocollected.**

- **Objectives of the Decision maker: In spelling out the objectives of the investigation the researcher must explore the answer of the question "What is the purpose of the study"?**

- Determining Alternative Course of Action: Exploratory research is one way to learn more about a problem or opportunities as well as ing and identifying alternative course of actions.

Evaluation of the consequences of various alternatives:

Formalizing a decision process is vital for understanding a problem. It should benefit both the researcher and the decision maker. Conclusive research can beused in the evaluation of the various alternatives determined.

Preparation of the list of information needed

Anticipate the possible findings of the research project.

Steps in Defining a Problem:

Defining a problem involves he tasks of laying down boundaries within which a researcher shall study the problem with a predetermined objective in view.

Identification of the problem:

Identification of problems in a research is most important phenomenon. In general, a problem exists whenever one faces a question whose answer involves some doubt or uncertainty. The existence of the problem can be identified on the basis of following characteristics:

- Presence of some symptomatic situation
- There should be more than one solution to the problem with some uncertainty associated with it.

Statement of the problem in a General way:

Once the problem has been identified, the problem should be stated in a broad general way, keeping in view either some practical concern or some scientific or intellectual interest.For this purpose, the researcher must immerse himself thoroughly in the subject matter.

Understanding the nature of the problem :

The next step in defining the problem is to understand its origin and nature clearly. The best way of understanding the problem is to discuss it with those who first raised it in order to find out how the problem originally came about and with what objectives in view.

Locate Probable Alternatives:

Researcher should enlist all possible causes responsible for the occurrence of the problem and arrange them in order of their probable importance. Then there should be a discussion with the decision maker regarding each of the alternatives and its implications and asking him whether he follows that particular course of action.

Surveying the available literature:

All available literature concerning the problem at hand must necessarily be surveyed and examined before a definition of the research is given. This meansthat the researcher must be well conversant with relevant theories in the field, reports and records as also all other relevant

literature.

Developing the ideas through discussions:

Discussions concerning a problem often produce useful information. Various new ideas can be developed through such an exercise. Hence, a researcher must discuss his problem with his colleagues and others who have enough experience inthe same area or in working on similar problems. This is quite often known as an experience survey.

Rephrasing the research problem:

Finally, the researcher must be sit to rephrase problem into a working prepositions. Once the nature of the problem has been clearly understood, the environment has been defined, discussions over the problem have taken place and available literature has been surveyed and examined, rephrasing the problem into analytical or operational terms is not a difficult task.

REVIEW OF LITERATURE:

Once the problem is formulated, the next step is to write down a brief summary. For this the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceeding, government report, book etc., must be taped depending on the nature of the problem.

Purpose of the review:

The reason for reviewing a related literature are:

To gain a background knowledge of the research topic.

To identify the concepts related to its potential relationship between them and to formulate researchable hypothesis.

To identify appropriate methodology, research design, method of measuring concepts and techniques of analysis.

To identify data resources used by other researchers

Sources of Literature:

The sources of documentary information , which can aid the process of locating literatures relatingto selected research topics, are:

1. Subject Catalogues of libraries
2. Documentation Services
3. Bibliographies
4. List of books and publishers Bulletins
5. Journals
6. Government Report
7. Research abstracts
8. Information on Research done.

RESEARCH DESIGN:

A research project conducted scientifically has a specific framework of research from the problem identification to the presentation of the research report. This framework of conducting research is known as the research design. A research design is simply the framework or plan for a study that is used as a guide in collecting and analysing the data. It is the blue print that is followed in completing a study.

Definition-

According to Kerlinger," Research design is the plan, structure, and strategy of investigation conceived so as to obtain answers to research questions and to control variances."

According to Green and Tull , "A research design is the specification of methods andprocedure for acquiring the information needed. It is the overall operational pattern or framework of the project that stipulates what information is to be collected from which sourcesby what procedures."

Features of Research Design:

1. **Objectivity:** The objectivity of the procedure may be judged by the degree of agreement between the final scores assigned to different individuals by more that one independent observer. The more subjective the observation , recording and evaluation of the responses, the less the different observers agree.

2. **Reliability:** It is not easily tested by either by the multiple-form or split half technique. The test retest approach is the most effective measure of reliability as it refers to consistency throughout a series to measurements.

3. **Validity:** As in the case of reliability there are a good number of procedures for establishing the validity of test, such as validating the present data against a concurrent criterion or a future criterion or a theory etc.

4. **Generalization:** The next important aspects of a good research design is to ensure that the measuring instruments used in a research investigation yield objective, reliable and valid data and has to answer the generalization of the findings.

Purpose Of Research Design:

1. **Accurate Result:** All the research activities have the purpose of answering research questions. However, the manner of seeking answers to the research differs from situation to situation according to the nature of the problem.

2. **Control of Variance:** Second basic purpose of research design is the control of variance. Research designs help in manipulation of experimental variable and the effect, i.e., the dependent variable. To establish such a relationship it is essential that the effect of other variables, besides the experimental one, should be controlled. Such variables are known as extraneous variables.

3. **Replicate the Study:** To make study, in so far as possible, replicable, ie., worth repeating. This can be done by avoiding situations and procedures which are clearly unique.

4. **Provides Blueprint:** A researcher faces many problems like what sample is to be taken, what is to be asked, what method of data collection is to be used and so on. Research plan minimizes all these problems of the researchers because all decisions are taken beforehand.

5. **Facilitates Systematic Investigation:** This refers to determining whether only one cause out of many cause is to be examined, only one hypothesis is to be tested. Since the objectives are clear and structure is also provided, systematic investigation is possible

6. **Visualizes and forecasts Potential Problems:** The researcher studies available literature and learns about new approaches.

Components Of Research Design:

1. **Title of the Study:** Should be brief, precise and the project the scope in generalized terms.

2. **Statement of the problem:** should be unambiguous, precise, and the usage should be clear, simple and concise.

3. **Review of Previous studies:** Should be a brief survey of the relevant literature in the subject concerned and presented subject wise and critically and pinpoint the stage from where further research is called for.

4. **Definition of concept:** Should be defined in general terms and linked with the study.

5. **Coverage and scope of the study:** Should consider, geographical, temporal and functional dimensions.

6. **Objectives of the study:** Should explain the main purpose precisely and may bein the form of questions or an explanation to a particular issue.

7. **Formulation of the Hypothesis:** should be empirical, conceptually clear, specific, close to things observable and related to the body of theory.

8. **Methods of Investigation:** It depends upon the nature of study but researcher should define survey methodology, and statistical techniques adopted.

9. **Sampling Design:** Definition of the universe or population, size of the sample and representativeness of the sample should be defined.

10. **Constructing of Schedule/ Questionnaire:** Questions should be in an order on a form. Open ended questions are designed to permit a free response. The questions to be asked should have a direct bearing on the problem, avoiding the personal questions and multiple meanings.

11. **Data collection:** Depends up the subject matter, the unit of enquiry and the scope of the study.

12. **Analysis of Data:** To fulfil the objective or hypothesis the researcher should analyse the data subject to the appropriate statistical analysis besides tabulation.

13. **Interpretation of Results:** Researcher should draw inferences based on usual test for significance and relate with previous findings, to a wider field of generalization, to scientific objectivity, and to uncover any additional factors which would not be visualized by the investigator earlier.

14. **Reporting he findings:** Should be clear, specific, simple and directly relating to the objective of the study.

Requirements of Good Research Design:

1. **Well Defined Problems:** Nature and scope of the problem to be studied must be stated clearly, or say must be well defined and formulated.

2. **Clarity in Formulation:** If any hypothesis is to be tested it must be clearly formulated.

3. **Testable:** The research design must adequately answer the research questions. And test the hypothesis.

4. **Identifying Variables:** Relevant variables must be clearly identified and operationalized. Adequate methods of collecting the information and methods of logically deriving the conclusion must be developed. Only thencontrol of variance is possible.

5. **Serve the Validity Needs:** The research design must be structured in a manner that it fulfils the need of internal and external validity.

TYPES OF RESEARCH DESIGN:

The research designs are classified on the basis of the fundamental objective of the research. They may be exploratory or conclusive .

Exploratory Research:

1. Literature research
2. Survey of knowledgeable persons or experience survey
3. Case study
4. Focus Groups
5. Two – Stage Design
6. Projective Techniques

Conclusive Research:

1. Descriptive Research Design

2. Experimental / Causal Research Design.

EXPLORATORY RESEARCH DESIGN:

Exploratory research studies are also termed as formulative research studies. The main purpose of such studies is that of formulating a problem for more precise investigation or of developing the working hypothesis from an operational point of view. It provides insights into and comprehension of an issue or situation. It should draw definitive conclusions only with extreme caution. It is a type of research conducted because a problem has not been clearly defined. It often relies on secondary research such as reviewing available literature or qualitative approaches such as informal discussions with consumers , employees, management .

Objectives:

- Precise formulation of the problem.
- Provide more knowledge to the researcher about the problem environment.
- Establishes priorities for further research.
- To design appropriate information collection procedure for the given situation.
- To determine nature of relationship between various factors associated in the problem.
- Gathering information on the problems associated with doing conclusive research.

Techniques Of Exploratory Research:

- Literature Research/ Study of secondary data
- Depth Interview
- Case study
- Focus Group
- Projective technique
- Two stage Design

CONCLUSIVE RESEARCH DESIGN

Conclusive research provides information, which helps the executive to make a rational decision. The researcher has to arrive at a suitable decision from the various alternatives decision. The various alternatives conclusions and selecting the most suitable conclusions may be done by descriptive research design or experimental research design.

➢ **Descriptive Research design:** It is designed to describe something. For example,the characteristics of users of a given product, the degree to which product use varies with income,

age, sex or other characteristics. These studiesare simply fact gathering expeditions.

- **Causal or Experimental Research design:** Causal research design is highly structured, but is characterized also by the use of control procedures used during the experimental designs associated with the tests ofcausal relationship.

DESCRIPTIVE RESEARCH DESIGN:

This research design is used mostly in marketing studies. It determines the relationship between the variables.

Objectives:

- To describe the characteristics of relevant groups, such as consumers, salesperson, org. etc.
- To estimate the percentage of units in a specified population exhibiting a certain behaviour.
- To determine the perceptions of product characteristics.
- To determine the degree to which marketing variables are associated.
- To make specific predictions.

Types of Descriptive Studies:

Case Method: Case studies are more appropriate to exploratory research than descriptive research. They are not widely used in descriptive research, but they are worth some comment in the descriptive context and perhaps should be used more than they have been in the past.

Statistical Method: The statistical method is the most widely used method in research and is the method usually implied when a survey is referred to. The name comes from the statistical techniques that are used in analysing the data collected- techniques that vary from simple means and percentages to very sophisticatedtechniques that require computers to manipulate the data.

Uses of Descriptive Research:

- Consumer profiles
- Market potential studies
- Product usage studies
- Attitude surveys
- Sales analysis

- Media research

Research Hypotheses:

Hypothesis is an assumption that is made on the basis of some evidence. This is the initial point of any investigation that translates the research questions into a prediction. It includes components like variables, population and the relation between the variables. A research hypothesis is a hypothesis that is used to test the relationship between two or more variables.

Characteristics of Hypothesis:

- Hypothesis should be clear and precise.
- A good hypothesis is assumption or explanation of why or how something occurs.
- Hypothesis should be capable of being tested.
- Hypothesis should state relationship between variables
- Hypothesis should be limited in scope and must be specific
- Hypothesis should be stated in most simple terms so that the same is easily understandable by all concerns.
- Hypothesis should be amenable to testing within a reasonable time.
- Hypothesis must explain the facts what it claims to explain
- If the hypothesis is a relational hypothesis, then it should be stating the relationship between variables.
- The hypothesis must be specific and should have scope for conducting more tests.
- The way of explanation of the hypothesis must be very simple and it should also be understood that the simplicity of the hypothesis is not related to its significance.

Sources of Hypothesis

Following are the sources of hypothesis:

1. The resemblance between the phenomenon.
2. Observations from past studies, present-day experiences and from the competitors.
3. Scientific theories.
4. General patterns that influence the thinking process of people.

Types of Hypothesis

There are six forms of hypothesis and they are:

1. Simple hypothesis
2. Complex hypothesis
3. Directional hypothesis

4. Non-directional hypothesis
5. Null hypothesis
6. Associative and casual hypothesis

Simple Hypothesis

It shows a relationship between one dependent variable and a single independent variable. For example – If you eat more vegetables, you will lose weight faster. Here, eating more vegetables is an independent variable, while losing weight is the dependent variable.

Complex Hypothesis

It shows the relationship between two or more dependent variables and two or more independent variables. Eating more vegetables and fruits leads to weight loss, glowing skin, reduces the risk of many diseases such as heart disease, high blood pressure and some cancers.

Directional Hypothesis

It shows how a researcher is intellectual and committed to a particular outcome. The relationship between the variables can also predict its nature. For example- children aged four years eating proper food over a five-year period are having higher IQ levels than children not having a proper meal. This shows the effect and direction of effect.

Non-directional Hypothesis

It is used when there is no theory involved. It is a statement that a relationship exists between two variables, without predicting the exact nature (direction) of the relationship.

Null Hypothesis

It provides the statement which is contrary to the hypothesis. It's a negative statement, and there is no relationship between independent and dependent variables. The symbol is denoted by "HO".

1. Associative and Causal Hypothesis

Associative hypothesis occurs when there is a change in one variable resulting in a change in the other variable. Whereas, causal hypothesis proposes a cause and effect interaction between two or more variables.

Examples of Hypothesis

Following are the examples of hypothesis based on their types:

- Consumption of sugary drinks every day leads to obesity is an example of a simple hypothesis.
- All lilies have the same number of petals is an example of a null hypothesis.
- If a person gets 7 hours of sleep, then he will feel less fatigue than if he sleeps less.

Functions of Hypothesis

Following are the functions performed by the hypothesis:

- Hypothesis helps in making an observation and experiments possible.
- It becomes the start point for the investigation.
- Hypothesis helps in verifying the observations.
- It helps in directing the inquiries in the right directions.

Role of Hypothesis in scientific research

Researchers use hypothesis to put down their thoughts directing how the experiment would take place. Following are the steps that are involved in the scientific method:

- Formation of question
- Doing background research
- Creation of hypothesis
- Designing an experiment
- Collection of data
- Result analysis
- Summarizing the experiment
- Communicating the results

Types of errors in evaluating the hypothesis:

- **Type I error:** It occurs when one rejects the null hypothesis and accepts the alternative, when in fact the null hypothesis is true.

- **Type II error:** It occurs when one accepts the null hypothesis when in fact the null hypothesis is false.

Procedure of Testing of Hypothesis:

1. **Set up a Hypothesis:** In the research process setting of hypothesis is done at the third step of the process. Then we collect sample data produce sample statistics, and use this information to decide how likely it is that our hypothesized population parameter is correct.

2. **Set up a suitable significance level:** Having set up the hypothesis, the next step is to test the validity of Ho against that of H1 at a certain level of significance. The hypothesisare tested on a predetermined level of significance and as such the sameshould be specified. Generally either 5% level or 1% level is adopted for the purpose.

3. **Test Statistics:** The next step is to compute an appropriate test statistic which is based on an

appropriate probability distribution. It is used to test whether the null hypothesis set up should be accepted or rejected.

4. **Doing Computations:** Having taken the first three steps, we have completely designed a statistical test. We now proceed to the fourth step- performance of various computations- from a random sample of size n, necessary for the test. These calculations include the testing statistic and standard error of testing statistic.

5. **Making Decisions:** Lastly, a decision should be arrived as to whether the null hypothesis is to be accepted and rejected. In this regard the value of the test statistic computed to test the hypothesis plays a very important role.

Advantages of hypothesis to social research

Hypotheses are of different types and kinds and it is not easy to develop a good hypothesis. But a question arises as to what is its utility in social research. There is not one but many advantages of hypothesis in social research. These are:

1. It is with the help of hypothesis, that it becomes easy to decide as to what type of data is to be collected and what type of data is simply to be ignored.

2. Hypothesis makes it clear as what is to be accepted, proved or disproved and that what is the main focus of study.

3. It helps the investigator in knowing the direction in which he is to move. Without hypothesis it will be just duping in the dark and not moving in the right direction.

4. A clear idea about hypothesis means saving of time money and energy which otherwise will be wasted, thereby botheration of trial and error will be saved.

5. It helps in concentrating only on relevant factors and dropping irrelevant ones. Many irrelevant factors which otherwise get into the study can easily be ignored.

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- https://www.docsity.com
- http://citeseerx.ist.psu.edu/

UNIT 1 QUESTION BANK

PART - A

1. Define research. State the objectives.
2. Differentiate Basic Research and Applied Research.
3. State the criteria's of a good research.
4. "Problem definition stage the most important stage in research process" .Comment.
5. Discuss on the major problems encountered by researchers in India.
6. Discuss on the business research practices that are ethically questionable.
7. Identify the rights and obligations of researchers with subject to business research.
8. Analyze the significance of a Literature Review in the research process.
9. List out the sources of research problems.
10. Differentiate the various types of hypothesis: Null, Alternate, Causal, Descriptive and Predictive.

PART – B

1. Describe on the types of research based on application.
2. Describe on the types of research based on objectives.
3. Describe on the types of research based on the extent of theory.
4. Describe on the types of research based on time dimension.
5. Describe on the types of research based on application.
6. Comment on the ethics followed by researchers . and state is significance .
7. Discuss each stage of decision making process to investigate consumer attitudes towards an innovative home cleaning kit for use on clothes.
8. Differentiate between Exploratory, Descriptive and experimental research design.
9. Prepare a research design to conduct a study to understand the factors influencing employee satisfaction in a company electronic products.
10. Write detailed notes on the types of Hypothesis .

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SCHOOL OF MANAGEMENT STUDIES

UNIT 2 – RESEARCH METHODS IN MANAGEMENT (SBAA5206)

SBAA5206- RESEARCH METHODS IN MANAGEMENT

UNIT 2- MEASUREMENT IN RESEARCH

Measurement Scales – Scale construction techniques -semantic differential scale construction – construction of Likert's summated scales – tests of sound measurement – validity and reliability measures – sources of errors in measurement and measurement of control over errors.

Measurement

Measurement is the process of observing and recording the observations that are collected as part of a research effort. There are two major issues that will be considered here.

A measurement scale is used to qualify or quantify data variables in statistics. It determines the kind of techniques to be used for statistical analysis.

There are different kinds of measurement scales, and the type of data being collected determines the kind of measurement scale to be used for statistical measurement. These measurement scales are four in number, namely; nominal scale, ordinal scale, interval scale, and ratio scale.

The measurement scales are used to measure qualitative and quantitative data. With nominal and ordinal scale being used to measure qualitative data while interval and ratio scales are used to measure quantitative data.

Characteristics of a Measurement Scale

1. Identity: Identity refers to the assignment of numbers to the values of each variable in a data set. Consider a questionnaire that asks for a respondent's gender with the options Male and Female for instance. The values 1 and 2 can be assigned to Male and Female respectively.
2. Magnitude: The magnitude is the size of a measurement scale, where numbers (the identity) have an inherent order from least to highest. They are usually represented on the scale in ascending or descending order. The position in a race, for example, is arranged from the 1st, 2nd, 3rd to the least. This example is measured on an ordinal scale because it has both identity and magnitude.
3. Equal intervals: Equal Intervals means that the scale has a standardized order. I.e., the difference between each level on the scale is the same. This is not the case for the ordinal scale example highlighted above. Each position does not have an equal interval difference. In a race, the 1st position may complete the race in 20 secs, 2nd position in 20.8 seconds while the 3rd in 30 seconds. A variable that has an identity, magnitude, and the equal interval is measured on an interval scale.

4. Absolute zero : Absolue zero is a feature that is unique to a ratio scale. It means that there is an existence of zero on the scale, and is defined by the absence of the variable being measured (e.g. no qualification, no money, does not identify as any gender, etc.

The four characteristic mapping rules:

- Classification – The numbers are used only to group or sort responses. No order exists
- Order – The numbers are ordered. One number is greater than, less than, or equal to another
- Distance – Differences between the numbers are ordered. The difference between any pair of numbers is greater than, less than, or equal to the difference between any other pair of numbers
- Origin – The number series has a unique origin indicated by the number zero

LEVELS OF MEASUREMENT:

It is important for the researcher to understand the different levels of measurement, as these levels of measurement, together with how the research question is phrased, dictate what statistical analysis is appropriate. In fact, the Free download below conveniently ties a variable's levels to different statistical analyses.

Numbers assigned in measurement can take on different levels of meaning depending on one of our mapping characteristics possessed by the numbers:

- Classification
- Order
- Distance
- Origin

Scaling::

Scaling technique is a method of placing respondents in continuation of gradual change in the pre-assigned values, symbols or numbers based on the features of a particular object as per the defined rules. All the scaling techniques are based on four pillars, i.e., order, description, distance and origin

The four level scales of measurement:

1. **Nominal Scale**: a scale in which the numbers or letters assigned to an object serve only as labels for identification or classification, e.g. Gender (Male=1, Female=2) The first level of measurement is nominal level of measurement. In this level of measurement, the numbers in the variable are used only to classify the data. In this level of measurement, words, letters, and alpha-numeric symbols can be used. Suppose there are data about people belonging to three different gender categories. In this case, the person belonging to the female gender could be classified as F, the person belonging to the male gender could be classified as M, and

transgendered classified as T. This type of assigning classification is nominal level of measurement.

2. **Ordinal Scale**: a scale that arranges objects or alternatives according to their magnitude in an ordered relationship, e.g. Academic status (Sophomore=1, Freshman=2, Junior=3, etc. The second level of measurement is the ordinal level of measurement. This level of measurement depicts some ordered relationship among the variable's observations. Suppose a student scores the highest grade of 100 in the class. In this case, he would be assigned the first rank. Then, another classmate scores the second highest grade of an 92; she would be assigned the second rank. A third student scores a 81 and he would be assigned the third rank, and so on. The ordinal level of measurement indicates an ordering of the measurements.
3. **Interval Scale:** a scale that both arranges objects according to their magnitude, distinguishes this ordered arrangement in units of equal intervals, but does not have a natural zero representing absence of the given attribute, e.g. the temperature scale (40oC is not twice as hot as 20oC). The third level of measurement is the interval level of measurement. The interval level of measurement not only classifies and orders the measurements, but it also specifies that the distances between each interval on the scale are equivalent along the scale from low interval to high interval. For example, an interval level of measurement could be the measurement of anxiety in a student between the score of 10 and 11, this interval is the same as that of a student who scores between 40 and 41. A popular example of this level of measurement is temperature in centigrade, where, for example, the distance between 940C and 960C is the same as the distance between 1000C and 1020C.
4. **Ratio Scale:** a scale that has absolute rather than relative quantities and an absolute (natural) zero where there is an absence of a given attribute, e.g. income, age. The fourth level of measurement is the ratio level of measurement. In this level of measurement, the observations, in addition to having equal intervals, can have a value of zero as well. The zero in the scale makes this type of measurement unlike the other types of measurement, although the properties are similar to that of the interval level of measurement. In the ratio level of measurement, the divisions between the points on the scale have an equivalent distance between them.

Type of Scale	Data Characteristics	Numerical Operation	Descriptive Statistics	Examples
Nominal	Classification but no order, distance, or origin	Counting	Frequency in each category Percent in each category Mode	Gender (1=Male, 2=Female)
Ordinal	Classification and order but no distance or unique origin	Rank ordering	Median Range Percentile ranking	Academic status (1=Freshman, 2=Sophomore, 3=Junior, 4=Senior)
Interval	Classification, order, and distance but no unique origin	Arithmetic operations that preserve order and magnitude	Mean Standard deviation Variance	Temperature in degrees Satisfaction on semantic differential scale
Ratio	Classification, order, distance and unique origin	Arithmetic operations on actual quantities	Geometric mean Coefficient of variation	Age in years Income in dollars

Source: Zikmund; 2009..

SCALE CONSTRUCTION TECHNIQUES

Scale construction techniques in research methodology helps in social science studies, while measuring attitudes of the people we generally follow the technique of preparing the opinionnaire* (or attitude scale) in such a way that the score of the individual responses assigns him a place on a scale. Under this approach, the respondent expresses his agreement or disagreement with a number of statements relevant to the issue. While developing such statements, the researcher must note the following two points:

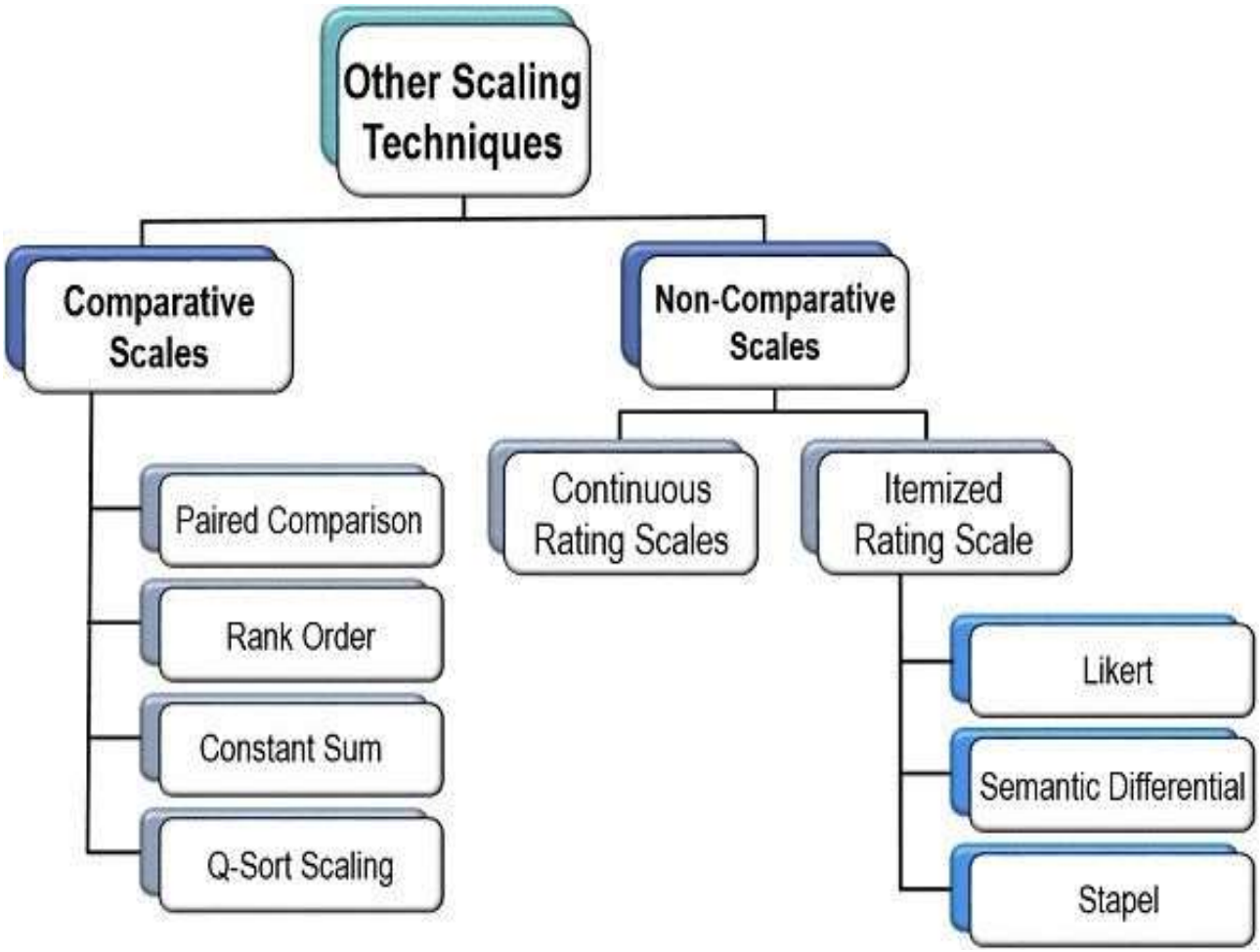
- **That the statements must elicit responses which are psychologically related to the attitude being measured;**
- **That the statements need be such that they discriminate not merely between extremes of attitude but also among individuals who differ slightly.**

Researchers must as well be aware that inferring attitude from what has been recorded in opinionnaires has several limitations.

- People may conceal their attitudes and express socially acceptable opinions. They may not really know how they feel about a social issue.

- People may be unaware of their attitude about an abstract situation; until confronted with a real situation, they may be unable to predict their reaction.
- Even behaviour itself is at times not a true indication of attitude. For instance, when politicians kiss babies, their behaviour may not be a true expression of affection toward infants.

Thus, there is no sure method of measuring attitude; we only try to measure the expressed opinion and then draw inferences from it about people's real feelings or attitudes There are two main types of mesurement scales, namely; comparative scales and non-comparative scales



Comparative Scales

In comparative scaling, respondents are asked to make a comparison between one object and the other. When used in market research, customers are asked to evaluate one product in direct comparison to the others. Comparative scales can be further divided into the pair comparison, rank order, constant sum and q-sort scales.

1.Paired Comparison Scale: Paired Comparison scale is a scaling technique that presents the respondents with two objects at a time and asks them to choose one according to a predefined criterion. Product researchers use it in comparative product research by asking customers to choose the most preferred to them in between two closely related products.

For example, there are 3 new features in the last release of a software product. But the company is planning to remove 1 of these features in the new release. Therefore, the product researchers are performing a comparative analysis of the most and least preferred feature.

1. Which feature is most preferred to you between the following pairs?

- Filter - Voice recorder
- Filter - Video recorder
- Voice recorder - Video recorder

2. Rank Order Scale: In rank order scaling technique, respondents are simultaneously provided with multiple options and asked to rank them in order of priority based on a predefined criterion. It is mostly used in marketing to measure preference for a brand, product, or feature. When used in competitive analysis, the respondent may be asked to rank a group of brands in terms of personal preference, product quality, customer service, etc. The results of this data collection are usually obtained in the conjoint analysis, as it forces customers to discriminate among options.The rank order scale is a type of ordinal scale because it orders the attributes from the most preferred to the least preferred but does not have a specific distance between the attributes.

For example:

Rank the following brands from the most preferred to the least preferred.

- Coca-Cola
- Pepsi Cola
- Dr pepper
- Mountain Dew

3.Constant Sum Scale: Constant Sum scale is a type of measurement scale where the respondents are asked to allocate a constant sum of units such as points, dollars, chips or chits among the stimulus objects according to some specified criterion. The constant sum scale assigns a fixed number of units to each attribute, reflecting the importance a respondent attaches to it.This type of measurement scale can be used to determine what influences a customer's decision when choosing which product to buy. For example, you may wish to determine how important price, size, fragrance, and packaging is to a customer when choosing which brand of perfume to buy. Some of the major setbacks of this technique

are that respondents may be confused and end up allocating more or fewer points than those specified. The researchers are left to deal with a group of data that is not uniform and may be difficult to analyze.

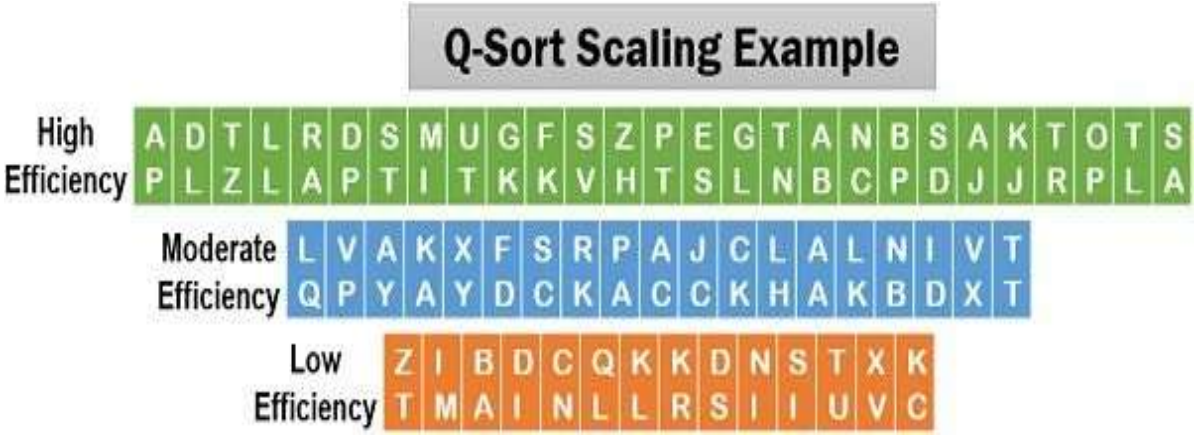
Example -Perfume features

Variables	Sum
Price.	20
Size	20
Fragrance	40
packing	20
total	100

. **4. Q-Sort Scale:** Q-Sort scale is a type of measurement scale that uses a rank order scaling technique to sort similar objects with respect to some criterion. The respondents sort the number of statements or attitudes into piles, usually of 11The Q-Sort Scaling helps in assigning ranks to different objects within the same group, and the differences among the groups (piles) are clearly visible. It is a fast way of facilitating discrimination among a relatively large set of attributes.

For example, Royal Enfield is introducing a new model and wants to collect some information of the expectation of the performance mileage and physical features a new restaurant and prepares a list about what potential customers like:

The document provided contains a list of 50 features of the bike launched . Please choose 10 features you like, 30 features you are neutral about (neither like nor dislike) and 10 features you dislike.



II- NON-COMPARATIVE SCALES

In non-comparative scaling, customers are asked to only evaluate a single object. This evaluation is totally independent of the other objects under investigation. Sometimes called monadic or metric scale, Non-Comparative scale can be further divided into continuous and the itemized rating scales

1. **Continuous Rating Scale :**In continuous rating scale, respondents are asked to rate the objects by placing a mark appropriately on a line running from one extreme of the criterion to the other variable criterion. Also called the graphic rating scale, it gives the respondent the freedom to place the mark anywhere based on personal preference. Once the ratings are obtained, the researcher splits up the line into several categories and then assign the scores depending on the category in which the ratings fall. This rating can be visualized in both horizontal and vertical form. Although easy to construct, the continuous rating scale has some major setbacks, giving it limited usage in market research.

2. **Itemized Rating Scale :**The itemized rating scale is a type of ordinal scale that assigns numbers each attribute. Respondents are usually asked to select an attribute that best describes their feelings regarding a predefined criterion.

Itemized rating scale is further divided into 2, namely;

a. Likert scale,
b. Stapel scale,
c. semantic scale.

a. **Likert Scale: A Likert scale is an ordinal scale with five response categories, which is used to order a list of attributes from the best to the least. This scale uses adverbs of degree like very strongly, highly, etc. to indicate the different levels.**

How will you rate the features of Royal Enfield?					
Variables	**Excellent**	**Very good**	**Good**	**Fair**	**Poor**
Mileage					
Performance					
Maintenance					
Physical Appearance					

b. **Stapel Scale: This a scale with 10 categories, usually ranging from -5 to 5 with no zero point. It is a vertical scale with 3 columns, where the attributes are placed in the middle and the least (-5) and highest (5) is in the 1st and 3rd columns respectively.**

+5	+5
+4 X	+4
+3	+3 X
+2	+2
+1	+1
High Food Quality	Poor Crew Service
-1	-1
-2	-2
-3	-3
-4	-4
-5	-5

c. **Semantic Differential Scale: This is a seven-point rating scale with endpoints associated with bipolar labels (e.g. good or bad, happy, etc.). It can be used for marketing, advertising and in different stages of product development.**

Organized	_ _ _ _ X _	Unorganized
Cold	_ X _ _ _ _ _	Warm
Modern	_ X _ _ _ _ _	Old-fashioned
Unreliable	_ _ _ _ _ X _	Reliable
Complex	_ _ _ _ _ X _	Simple

SAMPLING ERROR

A sampling error occurs when the sample used in the study is not representative of the whole population.

Sampling errors often occur, and thus, researchers always calculate a margin of error during final results as a statistical practice. The margin of error is the amount of error allowed for a miscalculation to represent the difference between the sample and the actual population.

Types of sampling error

1. **Population specification error: A population specification error occurs when researchers don't know precisely who to survey. For example, imagine a research study about kid's apparel. Who is the right person to survey? It can be both parents, only the mother, or the child. The parents make purchase decisions, but the kids may influence their choice.**
2. **Sample frame error: Sampling frame errors arise when researchers target the sub-population wrongly while selecting the sample. For example, picking a sampling frame**

from the telephone white pages book may have erroneous inclusions because people shift their cities. Erroneous exclusions occur when people prefer to un-list their numbers. Wealthy households may have more than one connection, thus leading to multiple inclusions.

3. **Selection error: A selection error occurs when respondents self-select themselves to participate in the study. Only the interested ones respond. You can control selection errors by going the extra step to request responses from the entire sample. Pre-survey planning, follow-ups, and a neat and clean survey design will boost respondents' participation rate. Also, try methods like CATI surveys and in-person interviews to maximize responses.**
4. **Sampling errors: Sampling errors occur due to a disparity in the representativeness of the respondents. It majorly happens when the researcher does not plan his sample carefully. These sampling errors can be controlled and eliminated by creating a careful sample design, having a large enough sample to reflect the entire population, or using an online sample or survey audiences to collect responses.**
5. **Controlling your sampling error**

   Statistical theories help researchers measure the probability of sampling errors in sample size and population. The size of the sample considered from the population primarily determines the size of the sampling error. Larger sample sizes tend to encounter a lower rate of errors. Researchers use a metric known as the margin of error to understand and evaluate the margin of error. Usually, a confidence level of 95% is considered to be the desired confidence level.

NON-SAMPLING ERROR

A non-sampling error is a statistical term that refers to an error that results during data collection, causing the data to differ from the true values. Systematic non-sampling errors are worse than random non-sampling errors Non-sampling error refers to any deviation between the results of a survey and the truth which are not caused by the random selecting of observations. That is, non-sampling error is the total of all forms of error other than sampling error. Common types of non-sampling error include non-response error, measurement error, interviewer error, adjustment error, and processing error.

1. **Non-response error**

   Non-response error refers to errors that are caused by differences between people that participate in surveys versus people who do not participate in surveys. For example,

surveys that ask people about how they spend their time likely have large amounts of non-response error, as people who spend their time doing surveys are likely quite different from those who do not.Non-response error can be narrowly defined as relating to whether people selected to participate actually do participate (e.g., the difference between people who opened their email invitation and completed a survey versus those who did not); or it can be more broadly defined to include all non-random aspects of sampling (e.g., selection of the list to be used in the research). Errors relating to whether the lists used in research are representative are also known as list selection error and coverage error.

2. **Measurement error**

   Measurement error refers to all the errors relating to the specific measurement of each sampling unit (as opposed to errors relating to how they were selected to be measured). For example, these could include confusing question wordings, low-quality data due to respondent fatigue, and low quality multi-item scales being used to measure abstract concepts.

3. **Interviewer error**

   Interviewer error occurs when an interviewer makes an error in how they administer the survey or record responses. For example, in qualitative research, an interviewer may "lead" a respondent to a certain answer, and in quantitative research a bored interviewer may choose to ask a question in words that they regard as superior to those in the questionnaire.

4. **Adjustment error**

   Adjustment error occurs where the analysis of the data inadvertently adjusts the data in such a way that it becomes less accurate. The main forms of adjustment error are errors with weighting, data cleaning, and imputation.

5. **Processing error**

   Processing error occurs when the processing of the data has caused an error of some kind, such as when it is incorrectly entered or corrupted.

RELIABILITY VS VALIDITY

Reliability: Reliability refers to how consistently a method measures something. If the same result can be consistently achieved by using the same methods under the same circumstances, the measurement is considered reliable.

Validity: Validity refers to how accurately a method measures what it is intended to measure. If research has high validity, that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world.

For example, if your scale is off by 5 lbs, it reads your weight every day with an excess of 5lbs. The scale is reliable because it consistently reports the same weight every day, but it is not valid because it adds 5lbs to your true weight. It is not a valid measure of your weight.

Types of Reliability

1. **Test-retest reliability** is a measure of reliability obtained by administering the same test twice over a period of time to a group of individuals. The scores from Time 1 and Time 2 can then be correlated in order to evaluate the test for stability over time.

   Example: A test designed to assess student learning in psychology could be given to a group of students twice, with the second administration perhaps coming a week after the first. The obtained correlation coefficient would indicate the stability of the scores.

2. **Parallel forms reliability** is a measure of reliability obtained by administering different versions of an assessment tool (both versions must contain items that probe the same construct, skill, knowledge base, etc.) to the same group of individuals. The scores from the two versions can then be correlated in order to evaluate the consistency of results across alternate versions.

   Example: If you wanted to evaluate the reliability of a critical thinking assessment, you might create a large set of items that all pertain to critical thinking and then randomly split the questions up into two sets, which would represent the parallel forms.

3. **Inter-rater reliability** is a measure of reliability used to assess the degree to which different judges or raters agree in their assessment decisions. Inter-rater reliability is useful because human observers will not necessarily interpret answers the same way; raters may disagree as to how well certain responses or material demonstrate knowledge of the construct or skill being assessed.

   Example: Inter-rater reliability might be employed when different judges are evaluating the degree to which art portfolios meet certain standards. Inter-rater reliability is especially useful when judgments can be considered relatively subjective. Thus, the use of this type of reliability would probably be more likely when evaluating artwork as opposed to math problems.

4. **Internal consistency reliability** is a measure of reliability used to evaluate the degree to which different test items that probe the same construct produce similar results.

    - **Average inter-item** correlation is a subtype of internal consistency reliability. It is obtained by taking all of the items on a test that probe the same construct (e.g., reading comprehension), determining the correlation coefficient for each pair of items, and finally taking the average of all of these correlation coefficients. This final step yields the average inter-item correlation.
    - **Split-half reliability** is another subtype of internal consistency reliability. The process of obtaining split-half reliability is begun by "splitting in half" all items of a test that are intended to probe the same area of knowledge (e.g., Advantages and Disadvantages of World War II) in order to form two "sets" of items. The entire test is administered to a group of individuals, the total score for each "set" is computed, and finally the split-half reliability is obtained by determining the correlation between the two total "set" scores.

VALIDITY

Validity refers to how well a test measures what it is purported to measure. Though reliability is necessary, it alone is not sufficient. For a test to be reliable, it also needs to be valid.

For example, if your scale is off by 5 lbs, it reads your weight every day with an excess of 5lbs. The scale is reliable because it consistently reports the same weight every day, but it is not valid because it adds 5lbs to your true weight. It is not a valid measure of your weight.

Types of validity

1. **Face Validity** ascertains that the measure appears to be assessing the intended construct under study. The stakeholders can easily assess face validity. Although this is not a very "scientific" type of validity, it may be an essential component in enlisting motivation of stakeholders. If the stakeholders do not believe the measure is an accurate assessment of the ability, they may become disengaged with the task.

   Example: If a measure of art appreciation is created all of the items should be related to the different components and types of art. If the questions are regarding historical time periods, with no reference to any artistic movement, stakeholders may not be motivated to give their best effort or invest in this measure because they do not believe it is a true assessment of art appreciation.
2. **Construct Validity** is used to ensure that the measure is actually measure what it is intended to measure (i.e. the construct), and not other variables. Using a panel of "experts" familiar with

the construct is a way in which this type of validity can be assessed. The experts can examine the items and decide what that specific item is intended to measure. Students can be involved in this process to obtain their feedback.

Example: A women's studies program may aim to understand the difference between the psychological nature of working women vs home makers than so as to serve the purpose If a questionnaire is written (with complicated wording and phrasing) than the this can cause the test in advertently becoming a test of reading comprehension, rather than a test of women's studies. It is important that the measure is actually assessing the intended construct, rather than an extraneous factor.

3. **Criterion-Related Validity** is used to predict future or current performance - it correlates test results with another criterion of interest.

   Example: If a program is designed to measure or to assess cumulative student learning throughout the year in a MBA entrance program. The measure could be correlated with a standardized measure of ability in this discipline, CAT , SAT ,GMAT preparation test scores by the institution.The higher the correlation between the established measure and new measure, the more faith stakeholders can have in the new assessment tool.

4. **Formative Validity** when applied to outcomes assessment it is used to assess how well a measure is able to provide information to help improve the program under study.

   Example: When designing program to assess student's knowledge across the discipline in History. If the measure can provide information that students are lacking knowledge in a certain area, for instance the Civil Rights Movement, then that assessment tool is providing meaningful information that can be used to improve the course or program requirements.

5. **Sampling Validity** (similar to content validity) ensures that the measure covers the broad range of areas within the concept under study. Not everything can be covered, so items need to be sampled from all of the domains. This may need to be completed using a panel of "experts" to ensure that the content area is adequately sampled. Additionally, a panel can help limit "expert" bias (i.e. a test reflecting what an individual personally feels are the most important or relevant areas).

   Example: When designing an assessment of learning in the theatre department, it would not be sufficient to only cover issues related to acting. Other areas of theatre such as lighting, sound, functions of stage managers should all be included. The assessment should reflect the content area in its entirety.

Reliability and validity are concepts used to evaluate the quality of research. They indicate how well a method, technique or test measures something.

- **Reliability is about the consistency of a measure**
- **Validity is about the accuracy of a measure.**

It's important to consider reliability and validity when you are creating your research design, planning your methods, and writing up your results, especially in quantitative research.

Reliability Vs validity		
	Reliability	**Validity**
What does it tell you?	**The extent to which the results can be reproduced when the research is repeated under the same conditions.**	**The extent to which the results really measure what they are supposed to measure.**
How is it assessed?	**By checking the consistency of results across time, across different observers, and across parts of the test itself.**	**By checking how well the results correspond to established theories and other measures of the same concept.**
How do they relate?	**A reliable measurement is not always valid: the results might be reproducible, but they're not necessarily correct.**	**A valid measurement is generally reliable: if a test produces accurate results, they should be reproducible.**

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UNIT 2- QUESTION BANK

PART – A

1. Explain the characteristics of Measurement scale.
2. Differentiate between nominal, ordinal and interval and ratio scales ?
3. Discuss the difference between validity and reliability.
4. Describe the types of validity used in Research.
5. Differentiate between probability and non-probability scaling.
6. Explain constant sum scaling with an example.
7. Discuss the advantages that numerical scales have over semantic scales.
8. Differentiate between the 'Ordinal scale' and all the other three scales of measurement.
9. List out the various errors in measurement.

PART - B

1. Describe the types of comparative scales used in research
2. Describe the types of non-comparative scales used in research.
3. Identify the issues a researcher should consider when making a decision about the choice of measurement scale.
4. Comment on the types of sampling errors faced by researchers.
5. Discuss on the types of non- sampling error in research.
6. Evaluate on the types of reliability . State its importance in research.
7. Critically examine the problems involved in attempting to utilize attitude measures to predict specific behaviour.
8. Elaborate the use of a semantic differential scale with example.
9. Examine the types of validity.
10. Differentiate between reliability and validity.

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SCHOOL OF MANAGEMENT STUDIES

UNIT 3 – RESEARCH METHODS IN MANAGEMENT (SBAA5206)

SBAA5206- RESEARCH METHODS IN MANAGEMENT

UNIT 3

SAMPLING : Sampling Theory – types – steps in sampling – determination of sample size – sampling and non-sampling errors – measures and control – collection and analysis of data – questionnaire construction and administration – suitability of each mode – pretest – pilot study – secondary data: nature, source, desirability, precaution and web.

SAMPLING:

Sampling as a method also used in research Sampling is the process of obtaining informationabout the entire population by examining only a part of it. In the most of the research work and surveys, the usual approach happens to be to make generalization or to draw inferences based on samples about the parameters of population from which the sample is taken.

SAMPLE:

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

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 determine.
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. That is suppose a researcher selects 500 people from

Chennai city as a sample to study consumer behavior of the people, them the sample elements should be all be people living in Chennai city.

MERITS OF SAMPLING:

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

LIMITATIONS OF SAMPLING:

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

METHODS OF SAMPLING:

Sampling may be classified as:

1. Random or probability sampling and
2. Non-random or non-probability sampling.

- In Random or probability sampling every element of the population enjoys equal chance of being selected.
- While Non-random or non-probability sampling elements constituting the sample are selected on some basis.

RANDOM (OR)PROBABILITY SAMPLING

Simple (or) unrestricted sampling

1. **Lottery Method:** In this method all the terms in the population are given numbers and

these are written on chits of uniform size. Then these chits are placed in a local or a bag and therequired number of chits are selected.

2. **Table of Random number:** In this method, first the size of the sample is determined. Thenusing random number table, the required number of items is selected to form the sample.

3. **Restricted Random Sampling;**

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

4. **Systematic Random Sampling:** In this method the sample is formed by selecting the first unit at random and them selecting the remaining items at evenly spaced intervals. For example suppose from 2000 college students we have to select a sample of 50 students. First we determine the sampling interval (k). this is obtained by dividing the size of population by sample size (i.e.40; 2000/50) = 40.Them from serial number 0001 to 0040 we selected at random a serial number. Suppose we have selected with the serial number 15 with that we add 50 for another sample, So the sample will be as 15, 65,115 ,… and so on.

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

NON- RANDOM SAMPLING OR NON PROBABILITY SAMPLING

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

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

1. **Judgment Sampling:** In this method the sample selecting is purely based on the judgment of the researcher. This is because the researcher may lack information regarding the population from which he has to collect the sample. Population characteristics not known in such cases the researcher can use this method. Once the sample size is determined the

investigator is free toselect any item on the field.

2. **Convenience Sampling:** This method of sampling involves selecting the sample elementsusing some convenient method without going through the rig our of sampling method.' Forexample, suppose 100 car owners are to be selected. Then we may collect from the RTO's office the list of car owners and then make a selection of 100 from that the form the sample.
3. **Quota Sampling:** In this method the sample size is determined first and then quota is fixed for various categories of population, which is followed while selecting the sample, Suppose we want to select 100 students, and it might say that selection oof sample be according to the quota given below. Boys 50% and girls 50% then among the boys 60% college students and 40% from plus two students. A different or the same quota may be fixed for girls.

SAMPLING ERROR

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

Biased Errors:

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

The following are the reasons for biased errors.

Faulty process of selection: This refers to a situation when the investigator does not apply the randomness in his choice or selection of the sample elements from the population.

Faulty collection of information; Adoption of faulty method of collecting information may cause errors. This will happen if the scope is not clear.

Faulty method of analysis: This will happen when the researcher is not having knowledge about the usage of tools.

Un Biased Errors:

Non-sampling errors are those errors, which are not due to any sampling process. It is due to several other causes. Such errors are most due to the following reasons:

- Investigators may collect data without using complete schedules or proper measurement. As a result data collected may not be relevant at all.
- aulty method of interview or observations may also contribute to non sampling errors.
- Using un trained and un skilled investigators.

SAMPLE SIZE AND ITS DETERMINATION

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

- Nature of the Universe
- Number of groups
- Nature of study
- Sample Technique
- Accuracy and confidence level
- Resources available

DATA COLLECTION

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

Primary Data:

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

1. **Questionnaire (or) Schedule**: In this method a pre-printed list of questions arranged in sequence is used to elicit response from the respondent
2. **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.

3. **Observation:** In this method the observer applies his sense organs to note down whatever that he could observe in the field and relate these data to explain some phenomena.
4. **Feed Back Form:** In the case of the consumer goods the supplier or the manufacturer send the product along with a pre-paid reply cover in which questions on the product and its usage are raised and the customer is requested to fill it up and send. Based on this firsthand information about the product from the consuming public is obtained.
5. **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.
6. **Projective techniques:** This technique is adopted to study the consumers though methods like recalling advertisements them story completion tests etc. Through this technique it is possible to compile information to be used as the basis for projecting the demand for the product at different points of time.
7. **Collection through Mechanical Devices:** There are several shopping establishments where hidden video cameras are positioned at vantage points this are used for observing the public inside the ship.

PRIMARY (DATA) SOURCESI.OBSERVATION

Observation as a method of data collection is used very frequently whenever collection of data through other methods is difficult for example it is not always possible to conduct interviews with every person to collect required information. Observation may be defined as, "sensibleapplication of sense organs in understanding less explained or unexplained phenomena" Whenever a researcher is unable to compile information through any other method then he has to effectively apply his sense organs to observe and explain. So it may be said that observation involves recording of information applying visual understanding backed by alert sense organs.

Types of Observation:

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

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

Participant Observation: In this method the observer is very much present in the mindset of what is observed for example, suppose a researcher is studying the life style of a hill tribe, then he might understand the life style of the tribe better only when the stays with them. He is a participant in the sense he is physically present on the spot to observe andnot influencing the activities.

Non-participant Observation: This is a method in which the observer remain detached from whatever is happening around and does not involve himself in any activities tapes place. He is present only to observe and not to take part in the activities.

Controlled Observation: In this method the observer performs his work in on environment or situation, which is very much planned (or) set.

Merits of Observation Method of Data Collection:

- If observation is done correctly, the scope for bias is very much minimized.
- Through observation, the current scenario in which anything is happening noticed and explained there is no interpretation of how things would be happened in the past or will
- happen in future etc.
- As there is no need to get any reply or details from the respondents, observation does not require any co-operation of the respondents.
- This is fairly reliable method, provided the observer is well experienced trained and sincere.
- Whenever respondents are illiterate and incapable of answering any question (due to language barrier (or) cultural background etc.,) observation is the only method of data collection available.

Limitations of Observation:

- This is a relatively costly method of datacollection
- It could be noticed that what is observed may bring out only part of the facts. While
- data collected through questionnaireor interview ensure letter coverage.
- There is a lot of scope for the observer to get distracted or influenced by unexpected factors which would affect the accuracy of information collected

INTERVIEW

One of the very old methods of collecting data is the interview method. Interview methodinvolves direct or indirect meeting of the respondents by the researcher. The researcher determines the

questions to be raised at the time of interview and elicit the response for them. The reply given is either written down in a note book or recorded in audio or video cassette. This method has to be necessarily adopted whenever details regarding any confidential matter are tobe collected or the research requires data collection directly from the respondents.

Interview may be broadly classified as 1.Direct interview and 2.Indirect interview

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

Structured Interview:

In this type of interview the person collecting information decides in advance the naturescope questions to be asked, the person to be contacted etc in advance. At the time of interview no deviation is made from the questions to be asked. For example, it is usual for journalist to interview the Finance Minister after the presentation of Budget. In such occasions, the journalist should be were prepared and decide in advance the questioned to be asked etc., Sometimes even the questions to be asked and other details are to be submitted to the authorities concerned, before conducting the interview. The most important advantages ofsuch interview are below:

- The interview is well prepared and so the interview is conducted in the focused manner'
- Time of both the interviewer and respondents could besaved.
- There is no scope for irrelevant matter to find a place in the course of interview
- If the respondent is informed in advance he could prepare necessary details so that the outcome is reliable

Un Structured Interview:

In this type of interview, interview is conducted on the spot without any preparations(or) advance information to the respondent. For example, suppose an organization producing anew health drink wants to know the opinion of the people directly. Then it might send trainedfield investigators who meet people directly. Then it might send trained field investigators who meet people at random and offer them a cp of that new drink. After they drink, their opinion is asked and the responses are noted down or recorded. Such interviews are also conducted when opinion poll is conducted.

Focused Interview:

In this type of interview the object of the interviewer is to focus the attention of therespondent ion a specific issue (or) point /for example suppose a detective is questioning a person regarding a crime committed in an area. The detective has to be very much experienced to make the person interviewed to answer only about the crime and nothing else. In this type ,the interviewer encourages the respondents to say whatever he likes and feels on a subject matter. There may not me much questing taking place. The respondent is free to express his views or opinions without any direction from the interviewer.

Telephone Interview:

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

- When the informant and interviewer are geographicallyseparated.
- When the study requires responses to five (or) six sample questions e.g. Radio, TV program me survey.
- When the survey must be conducted in very short period of time, provided the units are listed in telephone directory.

QUESTIONNAIRE METHOD:

A questionnaire is a sheet(s) of paper containing questions relating to certain specific aspect. Regarding which the researcher collects the data. The questionnaire is given to the respondent or respondent to be filled up. Sometimes questionnaire is also in the form of files generated trough computer. This usually called soft copy of questionnaire. Generally to test the reliability of the questionnaire, it should be tested on a limited scale and this is technically known as Pilot Survey. The objective of a pilot survey is to filter unnecessary questions, and the questions which are difficult to answer.

Mechanics of Questionnaire Construction / Designing a Questionnaire:

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 shouldall 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
6. Questions on sentiments / belief/ faith should be avoided
7. Repetition of question should be eliminated
8. Sufficient space should be given for answeringquestions
9. If any diagram me or map is used then it shouldbe printed clearly
10. 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

TYPES OF QUESTIONS:

- Open – end questions
- Closed questions
- Pictorial Questions
- Dichotomous questions
- Multiple choice questions:

TYPE OF QUESTIONS TO BE AVOIDED:

- Leading questions:
- Loaded Questions:
- (c)Ambiguous questions**:**

II. 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 in which the questions are listed and record the replies on the space given. Enumerators should be trained

Example: Population census.

PILOT STUDY

A pilot study can be defined as a 'small study to test research protocols, data collection instruments,

sample recruitment strategies, and other research techniques in preparation for a larger study. The purpose of the Pilot Test is to evaluate the feasibility, time, cost, risk, and performance of a research project.

IMPORTANCE OF PRE-TEST AND PILOT TESTING:

1. Help define the research question
2. Test the proposed study design and process. This could alert you to issues which may negatively affect your project.
3. Educate yourself on different techniques related to your study.
4. Test the safety of the medical treatment in preclinical trials on a small number of participants. This is an essential step in clinical trials.
5. Determine the feasibility of your study, so you don't waste resources and time.
6. Provide preliminary data that you can use to improve your chances for funding and convince stakeholders that you have the necessary skills and expertise to successfully carry out the research.

REASONS FOR CONDUCTING PILOT STUDIES

1. Developing and testing adequacy of research instruments
2. Assessing the feasibility of a (full-scale) study/survey
3. Designing a research protocol
4. Assessing whether the research protocol is realistic and workable
5. Establishing whether the sampling frame and technique are effective
6. Assessing the likely success of proposed recruitment approaches
7. Identifying logistical problems which might occur using proposed methods
8. Estimating variability in outcomes to help determining sample size
9. Collecting preliminary data
10. Determining what resources (finance, staff) are needed for a planned study
11. Assessing the proposed data analysis techniques to uncover potential problems
12. Developing a research question and research plan
13. Training a researcher in as many elements of the research process as possible
14. Convincing funding bodies that the research team is competent and knowledgeable
15. Convincing funding bodies that the main study is feasible and worth funding
16. Convincing other stakeholders that the main study is worth supporting

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.

Secondary Research: Definition

Secondary research or desk research is a research method that involves using already existing data. Existing data is summarized and collated to increase the overall effectiveness of research.

- Secondary research includes research material published in research reports and similar documents. These documents can be made available by public libraries, websites, data obtained from already filled in surveys etc. Some government and non-government agencies also store data, that can be used for research purposes and can be retrieved from them.
- Secondary research is much more cost-effective than primary research, as it makes use of already existing data, unlike primary research where data is collected first hand by organizations or businesses or they can employ a third party to collect data on their behalf.

Secondary Research Methods with Examples

Secondary research is cost effective and that's one of the reasons that makes it a popular choice among a lot of businesses and organizations. Not every organization is able to pay huge sum of money to conduct research and gather data. So, rightly secondary research is also termed as "desk research", as data can be retrieved from sitting behind a desk.

SOURCES OF SECONDARY DATA:

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

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

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

- Exactly what products are included in the statistical classification

- Who originally collected the data for what purpose
- From whom the data were collected
- how reliable the methodology might have been
- How consistent the data are with other local or international statistics.

Following are popularly used secondary research methods and examples:

1. Data available on the internet: One of the most popular ways of collecting secondary data is using the internet. Data is readily available on the internet and can be downloaded at the click of a button. This data is practically free of cost or one may have to pay a negligible amount to download the already existing data. Websites have a lot of information that businesses or organizations can use to suit their research needs. However, organizations need to consider only authentic and trusted website to collect information.

2. Government and nongovernment agencies: Data for secondary research can also be collected from some government and non-government agencies. For example, US Government Printing Office, US Census Bureau, and Small Business Development Centers have valuable and relevant data that businesses or organizations can use.

There is a certain cost applicable to download or use data available with these agencies. Data obtained from these agencies are authentic and trustworthy.

3. Public libraries: Public libraries are another good source to search for data for secondary research. Public libraries have copies of important research that were conducted earlier. They are a storehouse of important information and documents from which information can be extracted.The services provided in these public libraries vary from one library to another. More often, libraries have a huge collection of government publications with market statistics, large collection of business directories and newsletters.

4. Educational Institutions: Importance of collecting data from educational institutions for secondary research is often overlooked. However, more research is conducted in colleges and universities than any other business sector.The data that is collected by universities is mainly for primary research. However, businesses or organizations can approach educational institutions and request for data from them.

5. Commercial information sources: Local newspapers, journals, magazines, radio and TV stations are a great source to obtain data for secondary research. These commercial information sources have

first-hand information on economic developments, political agenda, market research, demographic segmentation and similar subjects.Businesses or organizations can request to obtain data that is most relevant to their study. Businesses not only have the opportunity to identify their prospective clients but can also know about the avenues to promote their products or services through these sources as they have a wider reach.

Key Differences between Primary Research and Secondary Research

Primary Research	Secondary Research
Research is conducted first hand to obtain data. Researcher "owns" the data collected.	Research is based on data collected from previous researches.
Primary research is based on raw data.	Secondary research is based on tried and tested data which is previously analyzed and filtered.
The data collected fits the needs of a researcher, it is customized. Data is collected based on the absolute needs of organizations or businesses.	Data may or may not be according to the requirement of a researcher.
Researcher is deeply involved in research to collect data in primary research.	As opposed to primary research, secondary research is fast and easy. It aims at gaining a broader understanding of subject matter.
Primary research is an expensive process and consumes a lot of time to collect and analyze data.	Secondary research is a quick process as data is already available. Researcher should know where to explore to get most appropriate data.

Steps involved in conducting secondary research:

1. Identify the topic of research: Before beginning secondary research, identify the topic that needs research. Once that's done, list down the research attributes and its purpose.

2. Identify research sources: Next, narrow down on the information sources that will provide most relevant data and information applicable to your research.

3. Collect existing data: Once the data collection sources are narrowed down, check for any previous data that is available which is closely related to the topic. Data related to research can be obtained from various sources like newspapers, public libraries, government and non-government agencies etc.

4. Combine and compare: Once data is collected, combine and compare the data for any duplication and assemble data into a usable format. Make sure to collect data from authentic sources. Incorrect data can hamper research severely.

5. Analyze data: Analyze data that is collected and identify if all questions are answered. If not, repeat the process if there is a need to dwell further into actionable insights.

Advantages of Secondary Research

1. Most information is secondary research is readily available. There are many sources from which relevant data can be collected and used, unlike primary research, where data needs to collect from scratch.

2. This is a less expensive and less time-consuming process as data required is easily available and doesn't cost much if extracted from authentic sources. A minimum expenditure is associated to obtain data.

3. The data that is collected through secondary research, gives organizations or businesses an idea about the effectiveness of primary research. Hence, organizations or businesses can form a hypothesis and evaluate cost of conducting primary research.

4. Secondary research is quicker to conduct because of availability of data. Secondary research can be completed within a few weeks depending on the objective of businesses or scale of data needed.

Disadvantages of Secondary Research

1. Although data is readily available, credibility evaluation must be performed to understand the authenticity of the information available.

2. Not all secondary data resources offer the latest reports and statistics. Even when the data is accurate, it may not be updated enough to accommodate recent timelines.

3. Secondary research derives its conclusion from collective primary research data. The success of your research will depend, to a greater extent, on the quality of research already conducted by primary research.

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UNIT 3- QUESTION BANK

PART – A

1. Define Sampling .state the features of sampling.
2. Discuss the merits and demerits in sampling.
3. Describe lottery method with an example.
4. Differentiate between judgment sampling and convenience sampling.
5. Discuss 'Ambiguity in a Questionnaire'
6. List down the various types of Closed ended questions.
7. In what type of situation is conducting a census more appropriate than sampling
8. Differentiate between Quota Sampling and Stratified Random Sampling.
9. Differentiate between Stratified Random Sampling and Cluster Sampling.
10. Describe the differences between probability sampling and non-probability sampling techniques
11. Analyze the differences between Population and Sampling Frame.
12. List out the sampling and non-sampling errors.
13. What are the sources of secondary data.

PART – B

1. Critically examine the various steps in designing a questionnaire.
2. Draft a questionnaire for studying the impact of online education in Indian school.
3. Examine the process of Sampling Design.
4. Comment on the Random Sampling Techniques.
5. Critically analyze the importance of sample size determination.
6. Comment on the methods used in different observation methods.
7. What are the sources of primary data collection?
8. Analyze the various methods of primary data collection and explain.
9. Enumerate the methods of secondary data collection.
10. Differentiate between primary and secondary data collection methods,
11. Analyze the various methods of primary data collection and explain.
12. Differentiate between the types of interview techniques used in research.
13. Evaluate the key differences between questionnaire and schedule.

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SCHOOL OF MANAGEMENT STUDIES

UNIT 4 – RESEARCH METHODS IN MANAGEMENT (SBAA5206)

SBAA5206- RESEARCH METHODS IN MANAGEMENT

UNIT 1V

Data analysis: Checking – Corroboration – Editing – Coding – Transcription – Tabulation and Types there of – Pictorial Data Presentation; Analysis of Data – Purpose and Methods – Qualitative and Quantitative Research – Univariate, Bivariate And Multivariate Data Analysis – Interdependence and Dependence Analysis and their basic assumptions – Time Series Analysis, Statistical Software for Data Analysis.

DATA ANALYSIS

Analysis of data is the process by which data is converted into useful information. Analyzing the data is an important part in the research method. The data obtained after analysis is then interpreted into useful information.

Definition of research in data analysis:

According to LeCompte and Schensul, research data analysis is a process used by researchers for reducing data to a story and interpreting it to derive insights. The data analysis process helps in reducing a large chunk of data into smaller fragments, which makes sense.

Marshall and Rossman, on the other hand, describe data analysis as a messy, ambiguous, and time-consuming, but a creative and fascinating process through which a mass of collected data is being brought to order, structure and meaning.

There are several steps that are included in data analysis. These steps are as follows :

1. **Error checking and verification**– This stage involves different steps like editing, coding, and keyboarding
2. **Data Analysis** can be done through different methods like descriptive analysis, univariate analysis, bivariate analysis, multivariate analysis

Types of Data Analysis

1. Data processing – General
2. Statistical analysis – Specialized (Univariate, Bivariate, and Multivariate)
3. Data Processing – this application is for coding and entering data for all respondents, for all questions on a questionnaire.
4. Data Input Format – The input follows a matrix format, where the variable appears on the column heading, and data for one person is entered in one row.
5. Editing :It is the process in which the data is ready for the purpose of coding and is

transferred to the data storage, this is known as editing. Its purpose is to ensure the completeness, consistency and reliability of data.

Terms in data analysis

- Code – A rule used for interpreting, classifying, and recording data in the coding processes; the numerical or other symbol assigned to raw data.
- Field – A collection of characters that represents a single type of data.
- Record – A collection of related fields.File – A collection of related records.
- Data Matrix – A rectangular arrangement of data into rows and columns.

Types of Analysis:

1. Univariate, involving a single variable at a time,
2. Bivariate, involving two variables at a time, and
3. Multivariate, involving three or more variables simultaneously.

Editing

Once the data collection is complete, 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 onthat it could be two types. Field editing and centralized editing

- **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 fielditself.
- **Centralized Editing:** In this type of editing, editing is done by a person or a team after allthe 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.

Process editing:

1. Field Editing – preliminary editing by a field supervisor on the same day as the interview; its purpose is to catch technical omissions, check legibility of handwriting,

and clarify responses that are logically or conceptually inconsistent.

2. In-house Editing – A rigorous editing job performed by centralized office staff.
3. Coding -The process of identifying and classifying each answer with a numerical score or other character symbol is called coding.

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

TABULATION

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

- ✓ It conserves space
- ✓ It avoid need for explanation
- ✓ Computation of data is made easier
- ✓ Comparison of data becomes very simple
- ✓ Adequacy or inadequacy of the data is clearly visible
- ✓ A table contains columns and row, these columns and rows create small boxes. Which are called cells and this structure nelps to put the data is readable form.

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 andthe footnotes must be positioned below the table
- ✓ Data to be compared must be placed in adjacent columns

Significance of tables

- ✓ It reduces the complexity of data and provides simplicity of presentations
- ✓ It facilitates comparison
- ✓ It gives identity to the data
- ✓ It provides patterns

Part of a table

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

TYPES OF TABLES:

Tables can be broadly classified to two categories:

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

Simple and complex frequency table

1. **Simple or one way table:** here only characteristics is shown, this is the simple type of table.
2. **Two – way table:** it shows two characteristics and is formed when either the sub or the caption is divided into two coordinate parts.
3. **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

Simple and cross tabulation

1. Dependent and Independent Variables – two variables are called independent variables if a

change in one does not influence or cause a change in the other. But if a change in one variable causes a change in the other, the first one is called an independent variable, and the second one is called a dependent variable.

2. Demographic Variables – variables such as age, location, income, occupation, sex, education are generally independent variables for the purposes of marketing studies, because other variables depend on them.

TYPES OF DIAGRAMS USED IN IRESEARCH REPORT

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

1. They provide bird's eye view of the entire data
2. 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

- ✓ Nature of data
- ✓ The target audience for whom the diagram is drawn
- ✓ The volume of communication to be given
- ✓ The facilities available to draw the diagram
- ✓ Purpose of the representation
- ✓ 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 Diagram:

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

One Dimensional Diagrams or Bar Diagrams

- ✓ **A** bar diagram is thick line whose width is shown merely for attention, the merits 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 eused effectively

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.

- ✓ Rectangles
- ✓ Square Diagrams

Three Dimensional Diagrams;Pictographs and Cartograms:

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.

RESEARCH APPROACH

Research approach can be divided into three types:

- Deductive research approach
- Inductive research approach
- Abductive research approach

The relevance of hypotheses to the study is the main distinctive point between deductive and inductive approaches.

- Deductive approach tests the validity of assumptions (or theories/hypotheses) .
- Inductive approach contributes to the emergence of new theories and generalizations.
- Abductive research starts with ‘surprising facts’ or ‘puzzles’ and the research process is devoted their explanation

The following table illustrates the major differences between deductive, inductive and abductive research approaches in terms of logic, generalizability, use of data and theory.[2]

	Deduction	Induction	Abduction
Logic	In a deductive inference, when the premises are true, the conclusion must also be true	In an inductive inference, known premises are used to generate untested conclusions	In an abductive inference, known premises are used to generate testable conclusions
Generalizability	Generalising from the general to the specific	Generalising from the specific to the general	Generalising from the interactions between the specific and the general
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth
Theory	Theory falsification or verification	Theory generation and building	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Types of data in research

a) **Qualitative data: When** the data presented has words and descriptions, then we call it qualitative data. Although you can observe this data, it is subjective and harder to analyze data in research, especially for comparison. Example: Quality data represents everything describing taste, experience, texture, or an opinion that is considered quality data. This type of data is usually collected through focus groups, personal interviews, or using open-ended questions in surveys.

b) **Quantitative data:** Any data expressed in numbers of numerical figures are called quantitative data. This type of data can be distinguished into categories, grouped, measured, calculated, or ranked. Example: questions such as age, rank, cost, length, weight, scores, etc. everything comes under this type of data. You can present such data in graphical

format, charts, or apply statistical analysis methods to this data. The (Outcomes Measurement Systems) OMS questionnaires in surveys are a significant source of collecting numeric data.

c) **Categorical data:** It is data presented in groups. However, an item included in the categorical data cannot belong to more than one group. Example: A person responding to a survey by telling his living style, marital status, smoking habit, or drinking habit comes under the categorical data. A chi-square test is a standard method used to analyze this data.

METHODS USED FOR DATA ANALYSIS IN QUALITATIVE RESEARCH

There are several techniques to analyze the data in qualitative research, but here are some commonly used methods,

a) **Content Analysis:** It is widely accepted and the most frequently employed technique for data analysis in research methodology. It can be used to analyze the documented information from text, images, and sometimes from the physical items. It depends on the research questions to predict when and where to use this method.

b) **Narrative Analysis:** This method is used to analyze content gathered from various sources such as personal interviews, field observation, and surveys. The majority of times, stories, or opinions shared by people are focused on finding answers to the research questions.

c) **Discourse Analysis:** Similar to narrative analysis, discourse analysis is used to analyze the interactions with people. Nevertheless, this particular method considers the social context under which or within which the communication between the researcher and respondent takes place. In addition to that, discourse analysis also focuses on the lifestyle and day-to-day environment while deriving any conclusion.

d) **Grounded Theory:** When you want to explain why a particular phenomenon happened, then using grounded theory for analyzing quality data is the best resort. Grounded theory is applied to study data about the host of similar cases occurring in different settings. When researchers are using this method, they might alter explanations or produce new ones until they arrive at some conclusion.

DATA ANALYSIS IN QUANTITATIVE RESEARCH

The first stage in research and data analysis is to make it for the analysis so that the nominal data can be converted into something meaningful. Data preparation consists of the below phases.

Phase I: Data Validation

Data validation is done to understand if the collected data sample is per the pre-set standards, or it is a biased data sample again divided into four different stages

Fraud: To ensure an actual human being records each response to the survey or the questionnaire

Screening: To make sure each participant or respondent is selected or chosen in compliance with the research criteria

Procedure: To ensure ethical standards were maintained while collecting the data sample

Completeness: To ensure that the respondent has answered all the questions in an online survey. Else, the interviewer had asked all the questions devised in the questionnaire.

Phase II: Data Editing

More often, an extensive research data sample comes loaded with errors. Respondents sometimes fill in some fields incorrectly or sometimes skip them accidentally. Data editing is a process wherein the researchers have to confirm that the provided data is free of such errors. They need to conduct necessary checks and outlier checks to edit the raw edit and make it ready for analysis.

Phase III: Data Coding

Out of all three, this is the most critical phase of data preparation associated with grouping and assigning values to the survey responses. If a survey is completed with a 1000 sample size, the researcher will create an age bracket to distinguish the respondents based on their age. Thus, it becomes easier to analyze small data buckets rather than deal with the massive data pile.

METHODS USED FOR DATA ANALYSIS IN QUANTITATIVE RESEARCH

After the data is prepared for analysis, researchers are open to using different research and data analysis methods to derive meaningful insights. For sure, statistical techniques are the most favored to analyze numerical data. The method is again classified into two groups.

1. First, 'Descriptive Statistics' used to describe data.
2. Second, 'Inferential statistics' that helps in comparing the data.

Descriptive statistics describes data (for example, a chart or graph) and inferential statistics allows you to make predictions ("inferences") from that data. With inferential statistics, you take data from samples and make generalizations about a population.

1. **Descriptive statistics**

   Descriptive analysis is also called a 'univariate analysis' since it is commonly used to analyze a single variable. This method is used to describe the basic features of versatile types of data in research. It presents the data in such a meaningful way that pattern in the data starts making sense. Nevertheless, the descriptive analysis does not go beyond making conclusions. The conclusions are again based on the hypothesis researchers have formulated so far.

Types of descriptive analysis methods.

- Measures of Frequency
- Count, Percent, Frequency
- It is used to denote home often a particular event occurs.
- Researchers use it when they want to showcase how often a response is given.
- Measures of Central Tendency

2. **Inferential statistics :** Inferential statistics are used to make predictions about a larger population after research and data analysis of the representing population's collected sample. For example, you can ask some odd 100 audiences at a movie theater if they like the movie they are watching. Researchers then use inferential statistics on the collected sample to reason that about 80-90% of people like the movie.

UNIVARIATE DATA ANALYSIS:

This type of data consists of **only one variable**. The analysis of univariate data is thus the simplest form of analysis since the information deals with only one quantity that changes. It does not deal with causes or relationships and the main purpose of the analysis is to describe the data and find patterns that exist within it.Eg: Suppose that the heights of seven students of a class is recorded(figure 1),there is only one variable that is height and it is not dealing with any cause or relationship. The description of patterns found in this type of data can be made by drawing conclusions using central tendency measures (mean, median and mode), dispersion or spread of data (range, minimum, maximum, quartiles, variance and standard deviation) and by using frequency distribution tables, histograms, pie charts, frequency polygon and bar charts.

BIVARIATE DATA ANALYSIS:

This type of data involves **two different variables**. The analysis of this type of data deals with causes and relationships and the analysis is done to find out the relationship among the two variables.Example of bivariate data can be temperature and ice cream sales in summer season.

Suppose the temperature and ice cream sales are the two variables of a bivariate data(figure 2). Here, the relationship is visible from the table that temperature and sales are directly.proportional to each other and thus related because as the temperature increases, the sales also increase. Thus bivariate data analysis involves comparisons, relationships, causes and explanations. These variables are often plotted on X and Y axis on the graph for betterunderstanding of data and one of these variables is independent while the other is dependent.

MULTI-VARIATE DATA ANALYSIS:

The data involves **three or more variables**, it is categorized under multivariate. Example of this type of data is suppose an advertiser wants to compare the popularity of four advertisements on a website, then their click rates could be measured for both men and women and relationships between variables can then be examined.It is similar to bivariate but contains more than one dependent variable. The ways to perform analysis on this data depends on the goals to be achieved.Some of the techniques are regression analysis,path analysis, factor analysis and multivariate analysis of variance (MANOVA).

INTERDEPENDENCE AND DEPENDENCE ANALYSIS:

- A **dependence** is a connection between your data. For example, how much you earn *depends*
- upon how many hours you work.
- **Independence** means there isn't a connection. For example, how much you earn isn't connected to what you ate for breakfast. The assumption of independence means that your data isn't connected in any way (at least, in ways that you haven't accounted for in your model).
- The assumption of independence is used for T Tests, in ANOVA tests, and in several other statistical tests. It's essential to getting results from your sample that reflect what you would find in a population. Even the smallest dependence in your data can turn into heavily biased results (which may be undetectable) if you violate this assumption.

ASSUMPTIONS OF INTERDEPENDENCE AND DEPENDENCE ANALYSIS:

The **observations between groups** should be independent, which basically means the groups are made up of different people. You don't want one person appearing twice in two different groups as it could skew your results.

The observations **within each group** must be independent. If two or more data points in one group areconnected in some way, this could also skew your data. For example, let's say you were taking a snapshot of how many donuts people ate, and you took snapshots every morning at 9,10, and 11 a.m.. You might conclude that office workers eat 25% of their daily calories from donuts. However, you made the mistake of timing the snapshots too closely together in the morning when people were more likely to bring bags of donuts in to share (making them *dependent*). If you had taken your

measurements at 7, noon and 4 p.m., this would probably have made your measurements independent

TIME SERIES ANALYSIS:

A **time series** is a series of data points indexed (or listed or graphed) in time order. Most commonly, atime series is a sequence taken at successive equally spaced points in time. Thus it is a sequence of discrete-time data. Examples of time series are heights of ocean tides, counts of sunspots, and thedaily closing value of the Dow Jones Industrial Average

Time series are very frequently plotted via line charts. Time series are used in statistics, signal processing, pattern recognition, econometrics, mathematical finance, weather forecasting, earthquake prediction, electroencephalography, astronomy and largely in any domain of applied science and engineering which involves temporal measurements

Time series *analysis* comprises methods for analyzing time series data in order to extractmeaningful statistics and other characteristics of the data.

Time series *forecasting* is the use of a model to predict future values based on previously observed values.

While regression analysis is often employed in such a way as to test theories that the current values of one or more independent time series affect the current value of another time series, this type of analysis of time series is not called "time series analysis", which focuses on comparing values of a single time series or multiple dependent time series at different points in time. Interrupted time series analysis is the analysis of interventions on a single time series.

There are various computer applications used in scientific research. Some of the most important applications used in scientific research are data storage, data analysis, scientific simulations, instrumentation control and knowledge sharing.

STATISTICAL ANALYSIS TOOL:

SPSS is the most popular tool for statisticians. SPSS stands for Statistical Package for Social Sciences. The latest version of SPSS is IBM SPSS STATISTICS 20 (purchased by IBM after version It provides all analysis facilities like following and many more.

- Provides Data view & variable view
- Measures of central tendency & dispersion
- Statistical inference Correlation & Regression analysis
- Analysis of variance Non parametric test
- Hypothesis tests: T-test, chi-square, z-test, ANOVA,
- Bipartite variable

- Multivariate data analysis
- Frequency distribution
- Data exposition by using various graphs like line, scatter, bar, histogram,pie chart

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- https://pdfcoffee.com
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- https://icsehelp.com/rs-aggarwal
- https://byjus.com

UNIT 4- QUESTION BANK

PART A

1. Briefly state the importance of Data Analysis in research.
2. Examine the types of Editing used in research.
3. Comment on the usage of data coding in research with an example.
4. Differentiate between field editing and centralized editing.
5. What are basis of classification of a data?
6. Examine the need for tabulation in research
7. Classify the types of diagrams used in research.
8. What is meant by coding of data in research?
9. Differentiate between qualitative data and quantitative data.
10. Give two advantages of usage of statistical tools in data analysis .
11. Comment on time series analysis in research
12. Define the purpose of statistical analysis in research.

PART B

1. Describe the type of data analysis used in research.
2. Classify the approaches to research.
3. Methods used for data analysis in qualitative research.
4. Differentiate between null hypothesis and alternate hypothesis.
5. List the types of tables used in data presentation in a research report.
6. List the types of diagrams and graphs used in data presentation in a research report.
7. What are the phases in quantitative research?
8. Comment on the methods used in quantities research
9. Differentiate between Univariate, Bi-Variate and multivariate analysis.
10. Enumerate interdependence and dependence analysis.

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SCHOOL OF MANAGEMENT STUDIES

UNIT 5 – RESEARCH METHODS IN MANAGEMENT (SBAA5206)

SBAA5206- RESEARCH METHODS IN MANAGEMENT

UNIT V

COMMUNICATING RESEARCH RESULTS: Structuring the research report – Chapter format – pagination – using quotations – presenting footnotes/ end – abbreviations – presentation of tables and figures – referencing of different types of sources – documentation– use and format of appendices – indexing – process of report writing – first draft preparation.

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 REPORTS

Research reports vary greatly in length and type, in each individual case boththe length and the form are largely dictated by the problems at hand. For instance, business firms prefer reports in the letter form, just one or two page in length. Banks insuranceorganization and financial institution are generally fond of the short balance-sheet type of tabulation for their annual reports to their customers and shareholders. Mathematicians prefer to write the results of their investigations in the form of algebraic notations, chemists report their results in symbols and formulae, students of literature usually write long reports presenting the critical analysis of some writer or period or the like with a liberal use of quotations from the works of the author under discussion. In the field of education and psychology, the favorite form is the report on the results of experimentation accompanied by the detailed statistical tabulations. Clinical psychologists and social pathologists frequently find it necessary to make use of the case-history form.

News items in the daily papers are also forms of report writing. They representfirsthand on-the-scene accounts of the events described or compilations of interviews with persons who were on the scene. In such reports the first paragraph usually contains the important information in detail and the succeeding paragraphs contain material which isprogressively less and less important.

Book –reviews which analyze the content of the book and report on the author's intentions, his success or failure in achieving his aims , his language, his style,scholarship, bias or his point of view. Such reviews also happen to be a kind of short report. The reports prepared by governmental

bureaus, special commissions and similar other organizations are generally very comprehensive reports on the issues involved. Such reports are usually considered as important research products. Similarly PhD theses and dissertations are also a form of report-writing usually completed by students in academic institutions. The above narrations throws light on the fact that the results of a research investigation can be presented in a number of ways viz., a technical report, a popular report, an article a monograph or at times even in the form of oral presentation. A technical report is used whenever a full written report of the study is required whether for record – keeping or for public dissemination. A popular report is used if the research results have policy implication.

(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.

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 required etc.,
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 ofa survey 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

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

(B) PopularReport

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 alongwith 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 ofmost 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 alongwith 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 of the 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 is entirely meant for general public.There can be several variations of the form in which a popular report can be

prepared. The only important thing about such a report is that it gives emphasis on simplicityand policy implications from the operational point of view, avoiding the technical details ofall sorts to the extent possible.

STEPS IN WRITING A REPORT

- **Introduction of the subject matter in a logical manner:** In this stage, the researcher would develop his subject matter in a logical manner. He would study the sequence of his subject matter and prepare the draft logically.
- **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.
- **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
- **Redrafting the report:** In this stage, the rough draft is edited, polished and brought to actual size, by eliminating all that is unwanted 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 researchwhich has been done.
- **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 remembers 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.

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 integralpart of the research

process. But the general opinion is in favor of treating the presentation of research results or the writing of report as part and parcel of the research project. Writing of report is the last 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.

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 begiven 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.

LAYOUT OF THE RESERCH REPORT

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

(A) PreliminaryPages

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.

(D)Main Text

The main text provides the complete outline of the research report along with all details. Title of 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 reportshould 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.

(i) 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 thepresent study can be seen in that context. The hypotheses of study if any and the definitionsof the major concepts employed in the study should explicitly state in the introduction of the report.The methodology adopted in conducting the study must be fully explained. Thescientific 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 theyselected? 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 findingsand 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 isthe 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.

(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 statedbelow:

- 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 thestudy 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.

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 ofindex lies in the fact that it works as a guide to the reader for the contents in the report.

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, \otherwisemisleading 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 hypothesesare 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 thebasis of some theory. This may at times result in new questions leading to further researches. All this analytical information and consequential inference may well be communicated, preferably through research report to the consumers of research results who may be eitheran individual or a group of individuals or some public / private organizations.

5.5 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.

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 leasthalf 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.

Procedure: Various steps in writing the report should be strictly adhered (All such steps have already

been explained earlier in this chapter)

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).

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 indentedat least half an inch to the right of the normal text margin.

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 or a means of the display of scholarship. The modern tendencyis to make the minimum use of footnotes for scholarship does not need to be displayed.
- 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, exceptin case of statistical tables and other numerical material, where symbols such as the asterisk(*) or the like one may be used to prevent confusion.
- Footnotes are always typed in single space though they are divided fromone another by double space

Documentation style: Regarding documentation the first footnote reference to any given work should be complete in its documentation, giving all the essential facts about the edition used. Such documentary footnotes follow a general sequence. The common order may be described as under:

Regarding the single-volume reference

Author's name in normal order (and not beginning with the last name as in bibliography) followed by a comma;

Title of work, underlined to indicate italics Place and date of publications 4.Pagination references (The page number)

Regarding multi volumed reference

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

Regarding works arranged alphabetically

For works arranged alphabetically such as encyclopedias and dictionaries, nopagination reference is usually needed. In such cases the order is illustrated as under:

(ii) Regarding periodicals reference

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

(iii)Regarding anthologies and collections reference

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

(iv) Regarding second-hand quotations reference

In such cases the documentation should be handled as follows;

Original author and title; 2."quoted or cited in,";

3 Second author and work.

(v) 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".

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"etc.) 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.

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."

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

- **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.

ACADEMIC DISHONESTY:

1. **Academic dishonesty** or **academic misconduct** is any type of cheating that occurs in relationto a formal academic exercise. It can include
2. **Plagiarism**: The adoption or reproduction of original creations of another author (person, collective, organization, community or other type of author, including anonymous authors) without due acknowledgment.
3. **Fabrication**: The falsification of data, information, or citations in any formal academicexercise.
4. **Deception**: Providing false information to an instructor concerning a formal academic exercise—*e.g.*, giving a false excuse for missing a deadline or falsely claiming to havesubmitted work.
5. **Cheating**: Any attempt to obtain assistance in a formal academic exercise (like an examination) without due acknowledgment.
6. **Bribery** or paid services: Giving assignment answers or test answers for money.
7. **Sabotage**: Acting to prevent others from completing their work. This includes cuttingpages out of library books or willfully disrupting the experiments of others.
8. **Professorial misconduct**: Professorial acts that are academically fraudulent equate to academic fraud and/or grade fraud.**Impersonation**: assuming a student's identity with intent to provide an advantage for thestudent.
9. Academic dishonesty has been documented in every type of educational setting from elementary school to graduate school. Throughout history this type of dishonesty has been met with varying degrees of approbation.

PLAGIARISM

Plagiarism

- "To steal and pass off (the ideas or words of another) as one's own: to use (another's production) without crediting the source"

- Merriam-Webster Dictionary
- Plagiarism is considered academic dishonesty and a breach of journalistic ethics.
- It is subject to sanctions like penalties, suspension, and even expulsion.
- Plagiarism is not in itself a crime, but can constitute copyright infringement.
- In academia and industry, it is a serious ethical offense.
- Plagiarism and copyright infringement overlap to a considerable extent, but they are not equivalent concepts, and many types of plagiarism do not constitute copyright infringement, which is defined by copyright law and may be adjudicated by courts. Plagiarism is not defined or punished by law, but rather by institutions (including professional associations, educational institutions, and commercial entities, such as publishing companies).

Types of plagiarism

Plagiarism takes various forms. It ranges from reusing an entire document to rewriting a single paragraph. In the end, all types of plagiarism come down to passing off someone else's ideas or words as your own.

Common types of plagiarism	
Copy-and-paste plagiarism	Copy-and-paste plagiarism, also known as direct plagiarism, means using a paragraph from another source without a citation. If you really want to include a passage from another source word for word, you should learn how to quote it.
Mosaic plagiarism	Copying and pasting different pieces of text together to create a kind of "mosaic" or "patchwork" of other researchers' ideas is plagiarism. Although the result is a completely new piece of text, the words and ideas aren't new.
Self-plagiarism	When you use parts of your previous work (e.g. a paper, a literature review or a dataset) without properly citing it, you commit what's called self-plagiarism. Although it sounds a bit crazy to be penalized for plagiarizing your own work, you should know that it is done because it goes against the expectations of the readers of your paper. They expect the work to be original.
Global plagiarism	When you use someone else's paper, you are committing plagiarism because you are pretending that the words and ideas are yours. Using someone else's work includes, for example, having a friend or family write the text for you or buying an essay from a so-called essay mill.

Consequences of plagiarism

The consequences of committing plagiarism vary according to the university or journal. Below, you can find statements from American University and the American Marketing Association (AMA). Always check the editorial policies and academic integrity code of your institution.The consequences of plagiarism depend on the type of plagiarism and whether you're a first-year student, an experienced academic or a working professional.

These are some possible consequences of plagiarism:

- Failing the course
- Expulsion or suspension from your university
- Copyright infringement
- Ruined reputation and potentially the end of your career
- Statements about plagiarism from universities and journals

American University"Sanctions for code violations [plagiarism] include

- Loss of credit for the assignment,
- A failing grade for the course,
- A permanent notation on the transcript and dismissal from the university
- Ban on submitting to any journal published by the ama for a period of time.
- The committee reserves the right to inform an author's institution, depending on the seriousness of the offense.**"**

How to avoid plagiarism

To avoid plagiarism, simply follow these two steps:

- Quote, paraphrase or summarize the words or ideas from someone else.
- Give credit to the original source by including a citation in the text and the reference list.
- Get the knowledge on what information needs to be cited?
  (Not all the information you use needs to be cited. Some information is considered common knowledge. Common knowledge is information that most people know.)

How to cite sources

- To cite your sources, you can use several citation styles, such as **APA Style, MLA format or Chicago Style citations.** Universities and journals often tell you which citation style to use. You should cite sources both **in the running text** with an in-text citation, footnote or endnote and **in the reference list**.
- The in-text citation often only names the author(s) and the year of publication. The reference list contains all the information about a source, including the title of the work and the website URL.

- Every source type, such as a website, book or journal article, has different citation guidelines. For instance, you only include a URL when you cite a website. Be sure to check the guidelines of the citation style you use.
- The easiest way to cite your sources is by using the Scribbr Citation Generator, as you only have to enter the website URL, book ISBN or journal DOI. All the relevant information is automatically retrieved and translated into a citation.
- Name of the Author(year)" title of the paper published", Title of the journal, Volume No., Isue No., page no., issn no , doi no.

Citation example (APA Style) commonly used in journal and thesis for referencing

(Watson, 2009).Reference list entryWatson, V. (2009). 'The planned city sweeps the poor away…': Urban planning and 21st century urbanisation. Progress in Planning, 72(3), 151–193. https://doi.org/10.1016/j.progress.2009.06.002

How to detect plagiarism

Detecting plagiarism isn't too difficult. Either the reader of your text notices a change in tone and writing style when reading a passage or uses plagiarism detection tools.

These days, all documents submitted to a university or journal are automatically checked for plagiarism using software like Turnitin. Turnitin is one of the leading company in plagiarism detection software.

10 Best Free Plagiarism Checker 2020 (Updated)

- Duplichecker.
- PaperRater.
- Copyleaks.
- PlagScan.
- Plagiarisma.
- Plagiarism Checker.
- Quetext.
- Small SEO Tools – Plagiarism Checker.
- Free plagiarism checkers online

Top 10 Free Plagiarism Detection Tools

Plagiarisma. It works on Windows, Android, BlackBerry, Moodle and Web. ...

- Viper
- Quetext.
- Edubirdie.

- Small seo tools.
- Paperrater.
- Grammarly
- Duplichecker

How do plagiarism checkers work?

Plagiarism checkers compare your document to a database of existing texts. The plagiarism software searches for similarities and highlights passages that contain potential plagiarism.

Not all plagiarism checkers are reliable. Where one plagiarism checker detects 2% plagiarism, another might detect 45% plagiarism.

The accuracy of plagiarism depends on two things:

Database size

Some plagiarism checkers only compare the uploaded document with web pages, while others also check books, publications and papers from other students.

BENEFITS OF PLAGIARISM DETECTION SOFTWARE

1. You can check your work against a wide range of databases

The plagiarism checkers that academics use today compare a document against a wide variety of databases. Instead of having to use different software for each database that you want to search, one will be enough to search all of those available. The majority of teachers use a standard type that anybody has access to; just choose which one seems most reliable and start uploading your documents.

2. You will be deterred from plagiarizing yourself

One (often unnoticed!) advantage of using plagiarism detection software is that you will be aware of how much information is scanned and recognized if it is duplicated. Students sometimes try to get away with copying just small parts of sentences when they start university, but they are then usually found out and penalized. In order to avoid this happening, it is a good idea to make use of this type of software in your first writing assignments to make you see how sensitive it is.

3. You can be confident that all of your work is free from plagiarism

The submission of assignments is stressful enough as it is, so why make it worse by worrying that your teacher might find duplicate content? If you run your assignments through a plagiarism checker before handing them in, you can relax knowing that there won't be any issues with the information you have included from external sources. You can usually see how similar certain phrases and sentences are when you use a checker, so you will know exactly where you might need to tweak the

wording a bit.

4. You may find more sources by using plagiarism software

When you run your work through a checker, it will show you which sources contain similar wording to that which you have included. If you haven't used this book or article in your research of the topic and it is merely a coincidence, you could go on to do further research for that source and add in other relevant information that you come across. Just make sure you check your work for plagiarism again afterwards, just in case you have accidentally written something that is too close to the source text.

5. You can improve your paraphrasing abilities

As previously mentioned, when the checker finds similarities between your work and an external source, it will give you a percentage to show you how similar the wording actually is. This will be a useful tool for improving your paraphrasing abilities and further preventing future plagiarism issues, as you will inevitably practice lowering the similarity percentages you receive with each document you submit.

Reference Books:

- CR. KOTHARI @Gaurav Garg,Reseaserch Methodlogy ;Mthods & Techniques, New age International Publisher 4th Edition 2012
- Donald R.Copper, Business Research Methods, Tata Mcgraw Hill, 12th Edition 2016
- John W. Creswell ,Qualitative Inquiry and Research Design: Choosing Among Five Approaches. Sage Publications ,2012.
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- Panner selvan ,Research Methodology insocial /science , Sultan chand&Sons ,7th Revised Edition 2014.
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- Sameer Phanse, Research Methodology, Logic Methods and Cases , Orford Higher Education,!st Edition.2016.
- 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://theintactone.com
- https://www.wisdomjobs.com
- https://www.docsity.com
- https://www.coursehero.com
- http://users.stat.umn.edu/
- http://users.stat.umn.edu/
- https://www.scribd.com
- https://pdfcoffee.com

UNIT 5- QUESTION BANK

PART - A

1. Define a research report and explain its purpose.
2. What are all the characteristics of research report?
3. What may be format requirement for a research article in professional journal?
4. What is all the purpose of footnote?
5. Narrate the instructions to be followed typing footnotes.
6. Describe the points to be kept in mind in writing first draft
7. Describe the points to be kept in mind in revision report.
8. What is briefing? Under what situations it will be made.
9. How the research reports will be classified?
10. What are the basic issues in writing a report?
11. What is meant by plagiarism in research?

PART - B

1. Describe the principles of thesis writing
2. Explain the format for dissertations.
3. Draw and explain the format of Research Report
4. Describe the steps in planning of report writing.
5. Differentiate between the types of reports
6. Prepare an outline report for the research problem on job absenteeism.
7. Prepare an outline report for the research problem on new product development
8. Prepare an outline report for the research problem on customer perception on insurance products by companies.
9. What are the ethical concerns that arise when you prepare a research report ?
10. Discuss on the role of plagiarism check in research report.