

Research Methodology (MBA 2nd Semester) as per SMKV Syllabus

Syllabus:

- Concepts of Research, Scientific Approach to Research, Types of Social Science Researches. Research Process and Planning for Research, Formulation of Research Problem.
 - Research Designs – Exploratory, Descriptive and Experimental Research Designs, Sampling Design, Sources and Methods of Data Collection, Observation Design, Interviewing for Research, Formulation of Questionnaire.
 - Scaling Techniques, Techniques of Data Analysis (including Statistical Techniques) like ANOVA, Awareness of Software Packages relevant to Management Researches
 - Interpretation of Data and Drawing Inferences, Research Report Writing, Research Publications.
 - Applications in Marketing Research with special reference to Product Research, Service Research, Advertising Research and Sales Research.
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Concepts of Research

Research in common parlance refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation.

Research is commonly known as search for knowledge. It can be defined as search for systematic knowledge. Research is scientific and systematic investigation in relation to specific aspect. It is a movement from known to unknown. Research is considered as careful investigation or inquiry to find out new facts in any branch of knowledge. It is an original contribution to the existing stock of knowledge making for its advancement. Therefore, research is systemized effort to acquire new knowledge.

Definition

Grinnel further adds: 'Research is a structured inquiry that utilizes acceptable scientific methodologies to solve problems and creates new knowledge that is generally acceptable'.

Burns defines: Research as a systematic investigation to find answer to a problem.

Kerlinger: 'scientific research is a systematic, controlled empirical and critical investigation of propositions about the presumed relationships about various phenomena.

Bulmer states: 'Nevertheless sociological research is primarily committed to establishing systematic, reliable and valid knowledge about the social world'.

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

D. Slesinger and M. Stephenson: The manipulation of things, concepts or symbols for the purpose of generalising to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art.

On the basis of the definitions given above we can summarize that the research is an organized inquiry designed and carried out to provide information for solving problem.

Characteristics of Research:

a) **Controlled:** There are many factors that effect on outcome. In a study of cause-and-effect relationships it is important to be able to link the effect (s) with the cause (s) and vice versa. The concept of control implies that, in exploring set up your study in a way that minimizes the effects of other factors affecting the relationship. This is possible in physical sciences, where as in 4 social sciences such controls as impossible, therefore attempts are made to quantity their impact.

b) **Rigorous:** You must be scrupulous in ensuring that the procedures followed to find answer to questions are relevant; appropriate and justified. Again, the degree of rigour varies between the physical and the social sciences.

c) **Systematic:** This implies that the procedures adopted to undertake an investigation follow a certain logic sequence. The different steps cannot be taken in a haphazard way. Some procedures must follow others.

d) **Valid and Verifiable:** This concept implies that whatever you conclude on the basis of your findings is correct and can be verified by you and others.

e) **Empirical:** This means that any conclusions drawn are based upon hard evidence gathered from information collected from real life experiences or observations.

f) **Critical:** Critical scrutiny of the procedures used and the methods employed is crucial to a research inquiry. The process of investigation must be fool proof and free from drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny.

Objectives of Research

objectives of research can be broadly classified as academic and utility one.

A) **Academic Objectives** – It relates to development of new concept and addition to old concept. It means that urge for knowledge is main factor in this type of objectives of research.

B) **Utility objectives-** It relates to utility of research work, as research work, as research is accepted for more use to the society. It has to provide the base for policy formation in the society.

This 5 type of research must be in a position to provide for achievements in attending organizational objectives.

1. **Decision making objectives.** : Decision making objectives: Decision making is now influenced by research. The project identification and implementation is based on the research conducted. There cannot be any business policy which is not affected by research findings. Controlling, which is the main function in the management, can effectively be organized through research study.

2. **Environmental objectives** : Environmental objectives: All the decisions in the business are taken in relation to the environment in which business operates. All the factors affecting business like state, investor, worker, customer and the competition requires systematic investigation before any decision is to be taken.

3. **Market objectives** : : The market objectives of research are defined as market research. This includes the market share of products, profit margin of the organization and total sales volume of the company.

On the basis of the careful investigation of the available market information, relevant market strategies can be drawn regarding new product development, product selling approach and product modification.

4. Customer objectives : The need of the customer is assessed, well in advance even before product is planned. The utility of product is decided on the basis of the quality of the product, in relation to the requirements of the customers. It is in this respect that the inquiry is conducted to find out the level of satisfaction of customers

5. Profit and promotional objectives: Profit and promotional objectives: In most of the companies profit maximization is the main objective to be attended by them. This requires investigations and consultations to be conducted. Surveys are also conducted to work out the variables in support of the promotional activities.

Features of Research

1. Systematic in nature.
 2. logical.
 3. Empirical and replicable in nature.
 4. According to plans.
 5. According to the rules and the assumptions should not be based on the false bases or judgments.
 6. Relevant to what is required.
 7. Procedure should be reproducible in nature.
 8. Controlled movement of the research procedure
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RESEARCH PROCESS:

The research process will consist of particular objective which should be clearly stated and there should be a hypothesis which has to be proceed right or wrong.

The research process consists of series of various actions, which are necessary to effective research work. It includes all such stages required to carry out research work. This must specify desired steps involved in conducting research work. It is necessary to understand that there is no specific sequence or established order in which research work is carried out. Therefore, in research process there are certain guidelines regarding steps involved in research work.

Stages of Research Process

1. Formulation of research problem
2. Review of the existing literature
3. Formation and development of working hypothesis
4. Preparation of research design
5. Determining sample design
6. Data collection
7. Project execution
8. Data analysis
9. Testing of hypothesis
10. Data interpretation

11. Report of the research work.

1. **Formulation of research problem:** The research problem relates to statement of problem and relationship between two variables under study. Research has to identify the problem first and later on its required to single out the problem. This will give scope to researcher to decide general area of interest or subject matter of that researcher who has no knowledge about subject matter will not be in a position to collect and analyze data. Therefore researcher is suppose to have proper knowledge of later stages before be perform the earlier stages. Research process is system of interdependent related stages. Before giving brief description of the various stages involved in research process it is necessary to understand the difference between research method and research process.

2. **Review of the existing literature:** Research can not be conducted without reviewing of existing literature may be conceptual or empirical in nature. Conceptual literature is concerned with concept on theories empirical literature is concerned with earlier studies of similar nature already conducted. This review of existing studies provides base to understand how to plan for the study.

3. **Formation and development of working hypothesis:** After the formation of the research problem and reviewing of the available existing literature now hypothesis is required to be explained by the researcher. The normal assumptions which are the base of the study which may be tentative in nature are considered as hypothesis

4. **Preparation of research design:** The research design is prepared by the research after the formulation of research problem, reviewing of literature and developing of hypothesis. If is an outline on a conceptual structure within its limit research work is suppose to be carried on. The research design is prepared with an object of collecting relevant data with the minimum efforts and with minimum of expenditure, just to control wasteful expenditure.

5. **Determining sample design:** The success of the research study is largely based on proper identification of the sample to be selected for the study. the method for selecting is normally known as sample design. It is a sample plan already decided before later is collected from given population brief description of these techniques of various sampling is given below.

I. **Deliberate sample:** This technique involve deliberate selection of sample which represent the whole universe.

II. **Simple random sampling:** As this sample is controlled by probability, there is every equal chance for all the items of the universe to get selected.

III. **Systematic sampling:** This is most simple and practical way of sampling. It is covered under the techniques of probability sampling.

IV **Stratified sampling:** This is also a technique of probability sampling, which is used for the population not having homogeneous group.

V. **Quota sampling:** This is an important from non-probability technique of sampling quota sampling is considered as judgement sampling.

VI. **Custer sampling:** This is a probability sampling technique cluster refers to a group and in this sampling technique first the population is grouped, then specific group is selected for the study.

VII. **Area sampling:** The area sampling is just like a cluster sampling when geographical area under the investigation is very large than the total area is divided into non-overlapping small area.

6. **Data collection:** The data is collected as per the requirement of the study. this may be primary or secondary in nature. If the secondary is sufficient enough to assess the research problem then there is no necessity for primary data to be collected. As per the requirement of the research study appropriate

data is a basic need of research. This primary data can be collected by observation, interview, questionnaire and schedule.

7. **Project execution:** The project execution is very important stage in the research process. It should be executed in a systematic manner. Therefore periodical and occasional check is essential for verification of the data collected.

8. **Data analysis:** In research process after the data is collected it is required to analyse the meaning of objective. The collected data is processes through various operations. So in order to make raw data meaningful these operations will help us to draw proper conclusions.

9. **Testing of hypothesis:** It is only after the analysing data, researcher can go further in testing of his hypothesis in which he can ascertain the fact to support or disagree with the hypothesis.

10. **Data Interpretation:** After hypothesis is tested than researcher can go further for drawing of general inferences so that he can arrive at making of statement. The ability of any research is largely based on its capacity of making general statement.

11. **Report writing:** Report writing is final job to be done by the researcher. Research work which is conducted by him is finally presented in form of research report. Report must be written in systematic manner, which normally should have following parts.

- I. Preliminary part
- II. Main text of the report
- III. Conclusion part
- IV. Reference material

Types of Research

Basic research is driven by a scientist's curiosity or interest in a scientific question. The main motivation is to expand man's knowledge, not to create or invent something. There is no obvious commercial value to the discoveries that result from basic research.

For example, basic science investigations probe for answers to questions such as:

- How did the universe begin?
- What are protons, neutrons, and electrons composed of?
- How do slime molds reproduce?
- What is the specific genetic code of the fruit fly?

Applied research refers to scientific study and research that seeks to solve practical problems. Applied research is used to find solutions to everyday problems, cure illness, and develop innovative technologies, rather than to acquire knowledge for knowledge's sake.

For example, applied researchers may investigate ways to:

- Improve agricultural crop production
- Treat or cure a specific disease
- Improve the energy efficiency of homes, offices, or modes of transportation

Exploratory research:

It is a type of research conducted for a problem that has not been clearly defined. 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.
- Exploratory research is not typically generalizable to the population at large.
- Exploratory research can be quite informal, relying on secondary research such as reviewing available literature and/or data, or qualitative approaches such as informal discussions with consumers, employees, management or competitors, and more formal approaches through in-depth interviews, focus groups, projective methods, case studies or pilot studies.

Descriptive research

It refers to research that provides an accurate portrayal of characteristics of a particular individual, situation, or group. Descriptive research, also known as statistical research. These studies are a means of discovering new meaning, describing what exists, determining the frequency with which something occurs, and categorizing information. In short descriptive research deals with everything that can be counted and studied, which has an impact on the lives of the people it deals with.

For example, Finding the most frequent disease that affects the children of a town. The reader of the research will know what to do to prevent that disease thus, more people will live a healthy life.

Phases of Business Research

1. Selection of Research Problem.
2. Extensive Literature Survey
3. Making Hypothesis
4. Preparing the Research Design
5. Sampling
6. Data collection
7. Data Analysis
8. Hypothesis Testing
9. Generalization and Interpretation
10. Preparation of Report

PROCESS AND FORMULATION OF RESEARCH PROBLEM

Identify the Broad Study Area

This is a great idea to thinking about the subject area of your interest. You should identify the field in which you would like to work a long time after your academic study or graduation. It will help you tremendously to get an interesting research topic. For example- if you do graduation in sociology, you must decide your research study area in sociology. You might choose social problems like unemployment, road accident, community health, HIV/AIDS, etc.

Dissect the Broad Study Area into Subareas

In this stage, you need to dissect and specify your research broad study area into some subareas. You would consult with your supervisor in this regard. Write down subareas. For example- if you select unemployment as your broad study area, then dissect it into unemployment & social

stability, unemployment & crime, unemployment & individual frustration, etc. In this case, your research title maybe how unemployment produces criminal activities. Or how it creates frustration in mind among unemployed people.

Mark-up your Interest

It is almost impossible to study all subareas. That's why you must identify your area of interest. You should select issues in which you are passionate about. Your interest must be the most important determinant of your research study. Once you selected your research study of interest, you should delete other subareas in which you do not feel interested. Keep in mind that if you lose your interest in your research study it won't bring any results eventually.

Study Research Questions

In this step in formulating a research problem, you would point out your research questions under the area of interest as you decided in the previous stage. If you select unemployment as your study area, your questions might be "how unemployment impacts on individual social status?" "How it affects social stability?" "How it creates frustration on individuals?" Define what research problem or question you are going to study? The more you study the research problem it will be just as relevant and fruitful to solve the problem indeed.

Set Out Objectives

Set out conspicuously your research root objectives and sub-objectives. Research objectives essentially come from research questions. If you do study "Impact of unemployment on individual social status" as your research problem or research question. Then, set out what would you like to explore to address. For Example- your main objective might be to examine the unemployment status in a particular society or state. And sub-objectives would be its effects on individuals' social life. Setting out specific main and sub-objectives are so crucial.

Assess your Objectives

Now, you should evaluate your objectives to make sure the possibility of attaining them through your research study. Assess your objectives in terms of time, budget, resources and technical expertise at your hand. You should also assess your research questions in light of reality. Determine what outcome will bring your study. If you can assess accurately the purpose of the research study it will bring significant results in the long run. In fact, research objectives determine the value of the study you are going to work out.

Check Back

Before you go on research work you should review all steps in formulating a research problem and all the things that you have done till now for the purpose of your research study. Then, ask yourself about your enthusiasm. Do you have enough resources to step up? If you are quite satisfied, then you forward to undertake your research work. You can change any of your plans in the light of reality if it requires.

SOURCES OF RESEARCH

Primary sources

It contain first-hand information, meaning that you are reading the author's own account on a specific topic or event that s/he participated in. Examples of primary resources include scholarly research articles, books, and diaries. Primary sources such as research articles often do not explain terminology and theoretical principles in detail. Thus, readers of primary scholarly research should have foundational knowledge of the subject area. Use primary

resources to obtain a first-hand account to an actual event and identify original research done in a field. For many of your papers, use of primary resources will be a requirement.

Examples of a primary source are:

- Original documents such as diaries, speeches, manuscripts, letters, interviews, records, eyewitness accounts, autobiographies
- Empirical scholarly works such as research articles, clinical reports, case studies, Dissertations
- Creative works such as poetry, music, video, photography.

Secondary sources

It describe, summarize, or discuss information or details originally presented in another source; meaning the author, in most cases, did not participate in the event. This type of source is written for a broad audience and will include definitions of discipline specific terms, history relating to the topic, significant theories and principles, and summaries of major studies/events as related to the topic. Use secondary sources to obtain an overview of a topic and/or identify primary resources. Refrain from including such resources in an annotated bibliography for doctoral level work unless there is a good reason.

Examples of a secondary source are:

- Publications such as textbooks, magazine articles, book reviews, commentaries, encyclopaedias, almanacs

Scientific Approach to Research

Science is the knowledge ascertained by observation and experiment critically tested, systematized, and brought under general principles. When we apply principle of science to reduce uncertainty in marketing problems, the technique is called scientific method. Scientific method is a set of prescribed procedures for establishing the connecting general laws about events and for predicting events yet unknown. This method is an impartial, consistent, and systematic process that may be employed in solving business problems. While applying the scientific method to the research problems, we ask well structured and likely truthful questions from the respondent

Steps in Scientific Research:

: (i) observation, (ii) formulation of hypothesis, (iii) prediction of future, and (iv) testing of hypothesis.

Relation between scientific method and marketing research :

Sr. No.	Scientific Method Stages	Used during the following marketing research steps
1	Observation	Problem definition situation analysis informal investigation
2	Formulation of hypothesis	Situation analysis informal investigation formal research planning
3	Prediction of the future (action implications)	Situation analysis information investigation formal research (planning)
4	Testing of hypothesis	Formal research (unless management is satisfied with an earlier but more intuitive solution)

Distinction between Scientific and Non-scientific Method :

Sr. No.	Scientific Method	Non-Scientific Method
1	Objectivity of the investigator: The scientific method is more objective because it attempts to eliminate the preconception or desires of the investigator from the results, making them unbiased	The non-scientific method is more subjective because it based its judgement on pre-conceived notions authoritative statement or intuition, making the results more biased
2	Systematic procedure: the scientific method proceeds in a systematic manner with pre-designed steps for this purpose	This non-scientific method is carried out in a haphazard manner
3	Accuracy procedure: The results in a scientific method can be measured more accurately with the help of electronic measuring devices which are available for most of the research conducted scientifically. Most of the data is quantitative and hence measurable	The results in a non-scientific method cannot be measured accurately because accurate measuring devices do not lend themselves owing to unsystematically conducted research and scattered or sporadic presence of data. Also most of the data are qualitative in nature.
4	Continuing and exhaustive nature is of investigation scientific method considers all the fact that are pertinent to the problem at hand. Evidences are found to support the existing conclusion repeatedly. The scientist is never sure that he has found the ultimate truth.	Non-scientific method does not consider all the facts will regard to problems at hand. It is not continues like scientific method because the results are not scientific and same cannot be taken up further researches.
5	Method of analysis and interpretation: a number of statistical techniques are applied to analyse the data	The sophisticated statistical tool may not be applicable because of the sporadic nature of data and its qualitative nature.

Difficulties In Applying Scientific Method: Business Research

It is easy to explain conceptual frame work of scientific method but may not be that simple to apply it in practical situations. The researchers may encounter some difficulties while attempting to apply the scientific method. There are six main difficulties facing the researchers? Viz.

- (i) complexity of subject;
- (ii) difficulty of obtaining accurate measurements;
- (iii) process of measurement may influence results;
- (iv) difficulty of using experiments to text hypothesis;
- (v) difficulty of making accurate predictions; and
- (vi) problematic objectivity of investigator

Social Science Researches.

Sciences are broadly divided into natural (or physical) sciences and social sciences. Social sciences include various disciplines dealing with human life, human behaviour, social groups and social institutions. They consist of Anthropology, Behaviour Science, Commerce, Demography, Economics, Education, Geography, History, Law, Linguistics management, Political Science, Psychology, Public Administration. Sociology and Social Work. Though these sciences are treated as separate branches of knowledge for the purpose of study, they are interdependent studies of the different aspects of the same object, viz. man. By applying scientific method of study, the social sciences have grown and advanced man's knowledge of himself.

Meaning Of Social Science Research:

“Social science research is a systematic method of exploring, analysing and conceptualizing human life in order to extend, correct or verify knowledge of human behaviour and social life.” In other words, social science research seeks to find explanations to unexplained social phenomena, to clarify the doubtful and correct the misconceived facts of social life.

Objectives Of Social Science Research:

The aim of social science research, like research in physical sciences, is to discover new facts. It tries to understand the human behaviour and its interaction with the environment and the social institutions. It tries to find out the casual connection between human activities and natural laws governing them. Another purpose of social science research is to develop new scientific tools, concepts and theories which would facilitate reliable and valid study of human behaviour and social life.

Functions Or Uses of Social Science Research:

1 Discovery of facts and their Interpretation:- Research provides answer to questions of what, where, when, how and why of man, social life and institutions. They are half truths pseudotruths and superstitions. Discovery of facts and their interpretation help us discard such distortions and thus enlighten us and contribute to our understanding of social reality research strengthens our desire for truth and opens up before our eyes, hidden social mysteries.

2 Diagnosis of problems and their analysis:- The developing countries have innumerable problems such as poverty, unemployment, economic imbalance, economic inequality, social tension, low productivity, technological backwardness, etc. The nature and dimensions of such problems have to be diagnosed and analysed; social science research plays a significant role in this respect. An analysis of problems leads to an identification of appropriate remedial actions.

3 Systematization of knowledge:- The facts discovered through research are systematized and the body of knowledge is developed. Thus research contributes to the growth of various social sciences and theory building.

4 Control over social phenomena:- Research in social science areas equips us with first-hand knowledge about the organizing and working of the society and its institutions. This knowledge gives us a greater power of control over the social phenomena.

5 Prediction:- Research aims at finding an order among social facts and their casual relation. This affords a sound basis for prediction in several cases. Although the predictions cannot be perfect because of the inherent limitations of social sciences, they will be fairly useful for better social planning and control.

6 Development planning:- Planning for socio-economic development calls for baseline data on the various aspects of our society and economy, resource endowment, peoples needs and aspirations, etc. systematic research can give us the required data base for planning and designing developmental schemes and programmes. Analytical studies can illuminate critical areas of policy and testing the validity of planning assumptions. Evaluation studies point the impact of plan, policies and programmes and throw out suggestions for their proper reformulation.

7 Social Welfare:- Social research can unfold and identify the causes of social evils problems. It can thus help in taking appropriate remedial actions. It can also give us sound guidelines for appropriate positive measures of reform and social welfare.

Formulation of Research Problem

The Research Problem

Broadly speaking, any question that you want answered and any assumption or assertion that you want to challenge or investigate can become a research problem or a research topic for your study.

The Importance of Formulating A Research Problem:

The formulation for research problem is the first and most important step of the research process. It is like the identification of destination before undertaking a journey. As in the absence of a destination, it is impossible to identify the shortest or indeed any route, in the absence of a clear research problem, a clear and economical plan is impossible. A research problem is like the foundation of a building. The type and design of the building is dependent upon the foundation. If the foundation is well designed and strong you can expect the building to be also. The research problem serves as the foundation of a research study: It is well formulated; you can expect a good study to follow. According to Kerlinger, if one wants to solve a problem one must generally know what the problem is. It can be said that a large part of the problem lies in knowing what one is trying to do.

Sources of Research Problem:

Most research in the humanities revolves around four Ps: • People • Problems • Programs • Phenomena

Aspects of a research problem:

Aspects of Study	About	Study of	
Study Population	People	Individuals, organizations, groups, communities	Information that you need to collect to find answer to your research questions
Subject Area	People	Issues, situations, associations, needs population compositions, profits, etc	
	Program	Contents, structure, outcomes, attributes, satisfaction, consumers, service providers, etc.	
	Phenomenon	Cause-and-effect relationships, the study of a phenomenon itself, etc	

Criteria/Considerations in Selecting Research Problem

When selecting a research problem/topic there are a number of considerations to keep in mind.

These considerations are interest, magnitude, measurement of concepts, level of expertise, relevance, availability of data and ethical issues.

a) **Interest:** Interest should be most important consideration in selecting a research problem. A research endeavour is usually time consuming, and involves hard work and possibly unforeseen problems. If you select a topic which does not greatly interest you, it could become extremely difficult to sustain the required motivation, and hence its completion as well as the amount of time taken could be affected.

b) **Magnitude:** You should have sufficient knowledge about the research process to be able to visualise the work involved in completing the proposed study. Narrow the topic down to something manageable, specific and clear. It is extremely important to select a topic that you can manage within the time and

resources at your disposal. Even if you are undertaking a descriptive study, you need to carefully consider its magnitude.

c) **Measurement of Concept:** If you are using a concept in your study, make sure you are clear about its indicators and their measurement for example, if you plan to measure the effectiveness of a health promotion program, you must be clear as to what determines effectiveness and how it will be measured. Do not use concepts in your research problem that you are not sure how to measure. This does not mean you cannot develop a measurement procedure as the study progresses. While most of the developmental work will be done during your study, it is imperative that you are reasonably clear about the measurement of these concepts at this stage.

d) **Level of Expertise:** Make sure you have an adequate level of expertise for the task you are proposing. Allow for the fact that you will learn during the study and may receive help from your research supervisors and others, but remember you need to do most of the work yourself.

e) **Relevance:** Select a topic that is of relevance to you as a professional. Ensure that your study adds to the existing body of knowledge, bridges current gaps or is useful in policy formulation. This will help you to sustain interest in the study.

f) **Availability of Data:** If your topic entails collection of information from secondary sources (office records, client records, census or other already-published reports, etc) before finalising your topic, make sure that these data are available and in the format you want.

g) **Ethical Issues:** Another important consideration in formulating a research problem is the ethical issue involved. In the course of conducting a research study, the study population may be adversely affected by some of the question (directly or indirectly); deprived of an intervention, expected to share sensitive and private information; or expected to be simply experimental 'guinea pigs'. How ethical issues can affect the study population and how ethical problems can be overcome should be thoroughly examined at the problem formulation stage.

Step in the Formulation of a Research Problem

The process of formulating a research problem consists of a number of steps. Working through these steps presupposes a reasonable level of knowledge in the broad subject area within which the study is to be undertaken.

Step 1: **Identify a Broad Subject :** Identify a broad field or subject area of interest to you.

Step 2: **Discussing sub Area of subject :** Dissect the broad area into sub areas. At the onset, you will realise that all the broad areas mentioned above youth welfare, refugees, domestic violence, consumer behaviour and HIV/AIDS have many aspects.

Step 3: **Selecting most interested Area of study :** Select what is of most interest to you. It is neither advisable nor feasible to study all sub areas. Out of this list, select issues or sub areas about which you are passionate.

Step 4: **Development of Research Problem :** Raise research questions at this step you ask yourself, 'what is it that I want to find out about in this sub area'?

Step 5: **Formulate Objectives :** Formulate objectives formulate your main objectives and your sub objectives.

Step 6: **Examine Objectives :** Assess your objectives. Now examine your objectives to ascertain the feasibility of achieving them through your research endeavour.

Step 7: **Double check.** Go back and give final consideration to whether or not you are sufficiently interested in the study,

The Formulation of Objectives

Objectives are the goals you set out to attain in your study. Since, these objectives inform a reader of what you want to achieve through the study, it is extremely important to word them clearly and specifically.

Objectives should be listed under two headings:

a) **Main Objectives** : The main objectives are an overall statement of the thrust of your study. It is also a statement of the main associations and relationships that you seek to discover or establish. The sub-objectives are the specific aspects of the topic that you want to investigate within the main framework of your study.

b) **Sub-Objectives** : Sub-objectives should be numerically listed. They should be worded clearly and unambiguously. Make sure that each sub-objective contains only one aspect of the study. Use action oriented words or verbs when writing your objectives. The objectives should start with words such as ‘to determine’, ‘to find out’, ‘to ascertain’, ‘to measure’ and ‘to explore’.

Characteristics of Objectives:



A Research Design

A research design is a logical and systematic plan prepared for directing a research study. It specifies the objectives of the study, the methodology and techniques to be adopted for achieving the objectives. It constitutes the blue print for the collection, measurement and analysis of data. It is the plan, structure and strategy of investigation conceived so as to obtain answer to research question. The plan is the overall scheme or program of research. A research design is the program that guides the investigator in the process of collecting, analyzing and interpreting observation.

According to Seltiz “A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose which economy in procedure”.

According to Kerlinger, “research design is the plan, structure and strategy and strategy of investigation conceived so as to obtain answers to research questions and to control variance” Research design is in fact the conceptual framework within which the research is conducted.

According to Bernard Philips “Research Design is a blue print for the collection, measurement and analysis of data”.

According to S.L. Gupta and Hitesh, “a research design provides a flow of activities from problem formulation to hypothesis development to data collection to data analysis to final results to implications”.

A research design provide :

- Design of research-that is explanatory, conclusive, descriptive, casual or experimental
- Type of data required for information gathering
- Measurement and scaling requirements
- Form of data collection such as questionnaire
- Sampling process and sampling size required
- Data analysis to be done

Types of Research Design :

On the basis of objectives of the research, the research can be classified into

(a) Exploratory Research Design and

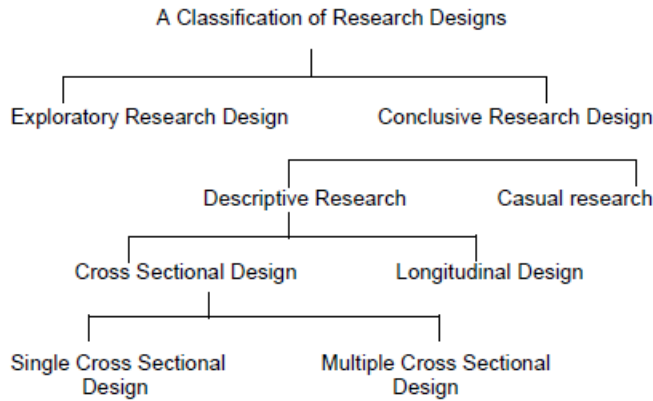
(b) conclusive Research Design. The conclusive Research Design can be sub divided into

(i) Descriptive Research and

(ii) casual or experimental research design.

(c) Descriptive Research further divided into cross sectional design and longitudinal design. The cross sectional design classified into single cross sectional design and multiple cross sectional design.

A Classification of Research Designs



Exploratory Research:

The research design for exploratory research is best characterised by its lack of structure and flexibility. This research design is diagnostic in nature. It is generally used for the development of hypothesis regarding potential problems and opportunities. This type of research provides insight and understanding of the problems. Exploratory research method includes secondary data sources, expert's opinion, surveys, in depth discussions, case studies and observation. In most of the time exploratory research is followed by conclusive research for more precise analysis and conclusion.

Nature of Exploratory Research Design:

- i) Exploratory Research using secondary sources of information many companies who regularly conduct market research studies have maintained a record of research finding over the years., the access to which is both quick and economical for a market researcher.
- ii) Exploratory Research using expert opinions and ideas : Experts can give valuable insights into a marketing problem because of their expensive with the problem hand, ability to act as an observer and an ability to express ideas unlike any other individual. Despite the desire to find individuals with ideas, it is important not to concentrate the investigation only among the better educated or more articulate person.
- iii) Depth Interviews : There are one-to-one interviews because most people do not have clear ideas why they make particular purchase decisions. Individuals normally do not report decisions. They normally do not report socially unacceptable motives. So market researcher indepth interviews attempt to influence respondents to talk freely about their subject of interest.
- iv) Group Interviews : When the management wants to get a first person feel of consumer reactions an its marketing mix variables, a marketer researcher can convert a focus group with him acting as a moderator.
- v) Projective Techniques : in projective techniques interviewing the respondents we asked to project themselves into a particular situation.

Conclusive Research This type of research is generally more formal and structured as compared to exploratory research. Conclusive research is used to provide information for the evaluation of alternative courses of action. This type of research can be classified into **descriptive research and casual or experimental research**. Conclusive research method include descriptive research with cross sectional or time series or longitudinal or case studies method and casual / experimental research with the design of experiments. Descriptive research is *used to describe marketing to predict future marketing phenomena*. In cross sectional design, which is typically used in descriptive research project, a sample of population elements is taken at one point of time conclusive research studies can be classified either as descriptive or experimental.

- i) Descriptive Research : The research objectives in this types of research is generally

describing the characteristics of consumer segment viz, demographic and benefits sought. Descriptive studies can also portray buyer perceptions of brands, audience profiles for media types viz. TV, radio, newspaper, availability of distributors, product consumption patterns, price sensitivity of consumers, market share, etc. These are just a few representative studies out of numerous studies that come under descriptive research in marketing. The purpose and nature of descriptive research is quite different from that of exploratory research. Many descriptive studies are made with only hazy objectives and with inadequate planning. Much of the data collected in such studies turns out to be useless. Descriptive studies of this type are actually more of exploratory type.

Other types of Research Design listed below is the whole range of research design that you can use for dissertation.

1. Historical Research Design
2. Case and field Research Design
3. Descriptive or Survey Research Design
4. Correlational or prospective Research Design
5. Development or Time Series Research Design
6. Quasi Experimental Research Design.

ii) **Experimental or Causal Research** : Although, it is the nature of marketing decision-making that all the conditions allowing the most accurate causal statements are not usually present out in these circumstances, causal inference will still be made by marketing manager.

Types and Methods of Research

Although any typology of research is inevitable arbitrary, research may be classified crudely according to its major intent or the methods.

According to the intent, research may be classified as

- Pure Research
- Applied Research
- Exploratory Research
- Descriptive Study
- Diagnostic Study
- Evaluation Study
- Action Research

According to the methods of study, research may be classified as:

- Expectational Research
- Analytical Research
- Historical Research
- Survey

Pure Research:-

Pure research is undertaken for the sake of knowledge without any intention to apply it in practice, e.g., Einstein's theory of relativity, Newton's contribution, Galileo's contribution etc. Pure research is also known as basic or fundamental research. It is undertaken out of intellectual curiosity or inquisitiveness. It is not necessarily problem-oriented. It aims at extension of knowledge. It may lead

to either discovery of a new theory or refinement of an existing theory. The development of various sciences owes much to pure research. The findings of pure research enrich the storehouse of knowledge that can be drawn upon in the future to formulate significant practical researchers. In the words of Dixy, “ natural knowledge pursued for its own sake without any direct view to future utility will often lead to results of most unexpected kind and of very highest practical importance.”

Contribution of Pure Research:-

- By developing principle, pure research offers solutions to many practical problems. For example, Maslow’s theory of motivation serves as a guideline for formulating incentive schemes and approaches to motivating employees in organizations. Generalizations have many practical applications. In fact, nothing is so practical for the goals of diagnosis or treatment as good theoretical research.
- Pure research helps to find the critical factors in a practical problem. For example, a common sense approach to problems like communal disharmony or ethnic conflict fail to abstract the key factors. On the other hand, by deeper study such social maladies can be better understood and it may be possible to find a solution to such problems.
- Pure research develops many alternative solutions and thus enables us to choose the best solution. By applying scientific knowledge developed by pure researches. Various appliances like radio, television, refrigerator, computer etc. have been invented. Continuous basic research in these fields has contributed to the manufacture of more effective and useful models at the least cost.

Applied Research:-

Applied research is carried on to find solution to a real life problem requiring an action or policy decision. It is thus problem oriented and action action-directed. It seeks an immediate and practical result, e.g., marketing research carried on for developing a new market or for studying the post-purchase experience of customers. There is vast scope for applied research in the fields of technology, management, commerce, economics and other social sciences. Innumerable problems are faced in those areas. They need empirical study for finding solutions. Though the immediate purpose of an applied research is to find solutions to a practical problem, it may incidentally contribute to the development of theoretical knowledge by leading to the discovery of new facts or testing of a theory or to conceptual clarity.

Contribution of Applied Research:-

- Applied research can contribute new facts. A practical study designed to improve productivity in agricultural farms may stimulate theoretical analysis of extension technology, land tenure system, price parity between agricultural inputs and output, etc. Applied research uncovers new facts, which enrich the concerned body of knowledge.
- Applied research can put theory to the test. Applied research is also a scientific endeavour. The researcher has to design it scientifically. From his knowledge of theory, he has to develop a conceptual framework for his study and formulate hypothesis. Thus, his study offers an opportunity to test the validity of existing theory.
- Applied research may aid in conceptual clarification. Many concepts like small farmer, agricultural labourer, social responsibility, social structure, etc. are not precise. Different people define them differently leading to confusion and clarity. The vagueness of a concept surfaces most sharply when we attempt to operationalise it for dealing with it in research. Thus, research aids conceptual clarity.
- Applied research may integrate previously existing theories. A practical problem has many facts. It cannot be solved by the application of abstract principles from a single science. Township development, for example may draw upon such disciplines as town planning, geology, demography, sociology, economics, etc. Thus, the solution of a practical problem may require some integration of the theories and principles of various disciplines.

Exploratory or Formulative Research:

Meaning:- Exploratory research is preliminary study of an unfamiliar problem about which the researcher has little or no knowledge. It is similar to a doctor's initial investigation of a patient suffering from an unfamiliar malady for getting some clues for identifying it. "it is ill-structured and much less focused on pre-determined objectives." It usually takes form of a pilot study.

Though it is a separate type of research, it is appropriate to consider it as the first stage of a three-stage process of exploration, description and experimentation.

Purposes:- The purpose of an exploratory study may be:

- To generate new ideas or.
- To increase the researcher's familiarity with the problem or
- To make a precise formulation of the problem or
- To gather information for clarifying concepts or
- To determine whether it is feasible to attempt the study.

Sometimes, a scientist may find, after spending a tremendous amount of energy and time on a research project, that it is not possible to secure the required data. A preliminary exploration could help avoiding such dismay. For example, a research student of the author wanted to study the pattern of marketing strategies of large manufacturing enterprises. A critical pre-requisite to this study was to know whether marketing executives would divulge adequate information about their marketing strategies. An exploration determined that they would not. An exploratory study does not aim at testing hypothesis. According to Daniel Katz, it just attempts "to see what is there rather than to predict the relationships that will be founded." But it should be so designed as to provide definite information as possible for a set of research objectives.

The need for Exploratory Studies:- Social sciences are relatively young. Research in them are scarce. Many of them inevitably have to be exploratory ones. Few well-trodden paths exist to follow for the investigators of social life. Most existing theories in social sciences are either too general or too specific to provide clear guidance for empirical research. Hence, exploratory research is necessary to get initial insight in to the problems for the purpose of formulating them for more precise investigation. Hence, it is also known as formulative research.

The steps in Exploration:- Selitz and others have suggested the following three steps/methods for the exploratory study: (a) A review of pertinent literature (b) A experience survey (c) An analysis of 'insight stimulating' cases.

Descriptive Research:

Meaning:- Descriptive study is a fact-finding investigation with adequate interpretation. It is the simplest type of research. It is more specific than an exploratory study, as it has focus on particular aspects or dimensions of the problem studied. It is designed to gather descriptive information and provide information for formulating more sophisticated studies. Data re collected by using one or more appropriate methods: observation, interviewing and mail questionnaire. All problems do not lend themselves to descriptive study. This method is applicable to problems which satisfy certain criteria. 42 First, the problem must be describable and not arguable. For instance, philosophical and controversial issues are not suitable for descriptive study. Second, the data should be amenable to an accurate, objective, and, if possible, quantitative assemblage for reliability and significance. Third, it should be

possible to develop valid standards of comparison. Last, it should lend itself to verifiable procedure of collection and analysis of data.

Objective:- A descriptive study aims at identifying the various characteristics of a community or institution or problem under study but it does not deal with the testing of proposition or hypothesis. However, it “can reveal potential relationships between variables thus setting the stage for more elaborate investigation later.”¹¹ A descriptive study also aims at a classification of the range of elements comprising the subject matter of study the classification must satisfy two criteria, viz., (1) exhaustiveness and (2) mutual exclusiveness occurs when each item can be unambiguously placed in only one category in the system. Descriptive information should also be useful for explanation, prediction and awareness.

Diagnostic Research:

Meaning:- This is similar to descriptive study but with a different focus. It is directed towards discovering what is happening. Why is it happening and what can be done about. It aims at identifying the cases of a problem and the possible solutions for it. **Purpose:-** A diagnostic study may also be concerned with discovering and testing whether certain variable are associated, e.g. are persons hailing from rural areas more suitable for manning the rural branches of banks? Do more villagers that city – voters for a particular party?

Diagnostic Study v/s Descriptive Study:-

Though these two types of studies have in common emphasis on the specific characteristics of given phenomenon, they differ from each other in some respects. First, a diagnostic study is more directly concerned with casual relationships and with implications for action that is a descriptive study. Second, while a descriptive study is oriented towards finding out what is occurring, a diagnostic study is directed towards discovering not only what is occurring but why it is occurring and what can be done about it. Third, a diagnostic study is more actively guided by hypothesis than is a descriptive study. Last, a diagnostic study is not possible in areas where knowledge is not advanced enough to make possible adequate diagnosis. In such cases, the social scientist limits his effort to descriptive studies.

Evaluation Studies:

Meaning:- Evaluation study is one type of applied research. It is made for assessing the effectiveness of social or economic programmes implemented (e.g., family planning scheme) or for assessing impact of developmental projects (e.g. irrigation project) on the development of the project area. Suchman defines evaluation as “determination of the results attained by some activity (whether a programme, a drug or a therapy or an approach) designed to accomplish some valued goal or objective.”

Purpose:- Evaluative research is thus, directed to assess or appraise the quality and quantity of an activity and its performance and to specify its attributes and conditions required for its success. It is also concerned with change over time. As Suchman puts it, “evaluative research asks about the kind of change the program views as desirable, the means by which the change is to be brought about and the signs according to which such change can be recognized.”

Types of Evaluation:- Evaluations are of three types:

1 Concurrent evaluation : This is a continuous process and partakes the nature of an inspection or social audit of an on going programme. It aims at the evaluation of the quality implementation and services as a feed back for improving the performance.

2 Periodic evaluation : This is made after each distinct phase or state of a project has been completed. In the case a medium period time bound programme like 5 year plan, this evaluation may be done in the middle of the period and it may be called midterm/interim evaluation.

3 Terminal evaluation : This is done after the completion of a programme or project (e.g. an irrigation project). This is designed to assess the extent of the achievement of its goals or objectives. It may also involve a benefit-cost analysis. In the case of a project with long-gestation period (e.g. an irrigation project), the appropriate methodology for terminal evaluation will consist of a survey cum experimental design.

Action Research:

Meaning:- Action research is a type of evaluation study. It is a concurrent evaluation study of an action programme launched for solving a problem/for improving an existing situation.

Typologies of Action Research:- Prospero R. Covar categorizes action research in to five types:

- Type I - Classical design:- Research and action are separate and independent. The connection between research and action is not purposely sought. It may occur by chance. Action programme agency may not know/use the research finding. The researcher may not deliberately gear his work toward contributing to the effectiveness of an action programme.
- Type II - Interdependence of action and research:- Action is carried out by an agency not connected with a research institution. Research on action may be entrusted to an independent research body. For example, government may launch a development programme and a university social scientist may be welcomed to study the on going programme. The research may include in his report a section on implications for action, and give a copy of the report to the implementing agency, but he had no further obligation to the action programme.
- Type III – Evaluate research built into an action programme:- In this case, research is dependent upon action, and the action people define the scope of the research.
- Type IV – Action for research:- Here the activities of the action programme are designed and modified to carry out tests of hypotheses of research for example, a researcher may wish to test the relative effectiveness of three different methods of introducing family planning information personal contact with the wife, and impersonal contact through the mass media alone. For this research purpose, a family planning programme applying each approach to different groups of couples with similar characteristics and under similar circumstances has to be launched. Thus, the research requirements dictate how the action will be carried out.
- Type V – Research-cum-action:- Action and research go together as a joint endeavour. Researcher and decision makers jointly design and launch the action programme and research on it. Once the operational design is completed and action launched, they record what happens under specified conditions. They may vary the conditions if they want.

Experimental Research:

Introduction:- There are various phenomena such as motivation, productivity, development and operational efficiency, which are influenced by various variables. It may become necessary to assess the effect of one particular variable or one set of variables on a phenomenon. This need has given rise to experimental research.

Meaning:- Experimental research is designed to assess the effects of particular variables on a phenomenon by keeping the other variables constant or controlled. It aims at determining whether and in what manner variables are related to each other. The factor, which is influenced by other factors, is called a dependent variable. And the other factors, which influence it are known as independent variables. For example, agricultural productivity, i.e. crop yield per hectare is a dependent variable and

the factors such as soil fertility, irrigation, quality of seed, manuring and cultural practices which influence the yield are independent variables. The nature of relationship between independent variables and dependent variables is perceived and stated in the form of casual hypothesis. A closely controlled procedure is adopted to test them. The testing of the hypothesis is described in section 5.4 hypothesis of chapter 5 below.

Procedure:- Two identical groups are selected. These should be 'identical' in terms of the characteristics of the phenomenon under study. For example, in a farm productivity experiment, two plots of farmland with same soil composition, soil fertility, same size, same climate and same irrigation facility should be selected for the study. One of the groups is used as experimental group, and the other as control group. Experimental group is exposed to an experimental variable or stimulus. Control group is not exposed to the experimental variable. The difference between the experimental and control groups outcome is attributed to the effect of the experimental variable.

Analytical Study or Statistical Method:

Meaning:- Analytical study is a system of procedures and techniques of analysis applied to quantitative data. It may consist of a system of mathematical models or statistical techniques applicable to numerical data. Hence, it is also known as the statistical method. (for detailed discussion see chapter II: statistical analysis)

Aim:- This study aims at testing hypothesis and specifying and interpreting relationships. It concentrates on analyzing data in depth and examining relationships from angles by bringing in as many relevant variables as possible in the analysis plan.

Uses:- This method is extensively used in business and other fields in which quantitative numerical data are generated. It is used for measuring variables, comparing groups and examining association between factors. Data may be collected from either primary sources or secondary sources. There is vast scope for making analytical studies by using data published by various departments of Government and institutions like the RBI, Bureau of Public Enterprise, NABARD, and central statistical organization.

Analytical Study v/s Experimental Research:-

One way to distinguish analytical studies from experimental research is that the former rely heavily on the post-facto-analysis of data generally collected in a natural or real life setting or from records. Unlike descriptive studies, analytical studies are characterized by rigorous requirements of measurement and analysis, and design approximated to the model of an experimental design.

Historical Research:

Meaning:- Study is a study of past records and other information sources with a view to reconstructing the origin and development of an institution or a movement or a system and discovering the trends in the past. It is descriptive in nature. It is a difficult task; it must often depend upon inference and logical analysis of recorded data and indirect evidences rather than upon direct observation. Hence, it is aptly described as "the induction of principles through research in to past and social forces which have shaped the present."

Objective:- Its objective is to draw explanations and generalizations from the past trends in order to understand the present and to anticipate the future. It enables us to grasp our relationship with the past and to plan more intelligently for the future. The past contains the key to the present and the past and the present influences the future. Historical study helps us in visualizing the society as a dynamic organism and its structures and functions as evolving, steadily growing and undergoing change and transformation.

Sources of Data:- The sources of data for historical research consists of

- eye witness accounts narrated by an actual observer or participant in an event,
- oral testimony by elders,
- records and other documentary material and
- relics.

The data available from the above sources may be scattered and discontinuous and fragmented. Personal accounts are mostly subjective and so should be studied with great caution and corroborated with documentary evidences. The origin and genuineness of the sources and the validity of facts contained in them should be critically tested and examined. Their authenticity should be tested. Only authentic sources should be depended upon for collection of data. It is essential to check and cross-check the data from as many sources as possible

SURVEYS:

Meaning:- Survey is a 'fact finding' study. It is a method of research involving collection of data directly from a population or a sample thereof at particular time. It must not be confused with the mere clerical routine of gathering and tabulating figures. It requires expert and imaginative planning, careful analysis and rational interpretation of the findings. Data may be collected by observation, or interviewing or mailing questionnaires. The analysis of data may be made by using simple or complex statistical techniques depending upon the objectives of the study. The characteristics of survey

Method:- The survey method has certain characteristics:

- It is always conducted in a natural setting; it is a field study.
- It seeks responses directly from the respondents.
- It can cover a very large population, thanks to sampling techniques.
- A survey may involve an extensive study or an intensive study. An extensive study covers a wider sample.
- A survey covers definite geographical areas; a city, or a district, or a state.

An intensive one covers a few samples and tends to 'dig deeper'. These two approaches serve different ends; where generalization or estimation is necessary, the extensive approach is useful, but where one wants to make an in-depth study of some aspects of a subject – matter, the intensive approach is preferable. The quality of survey depends upon the thoroughness of the planning, the soundness of sampling. The adequacy and reliability of data, the quality of analysis and the interpretation of the findings.

Case Study:

Meaning:- A case study is an in-depth comprehensive study of a person, a social group, an episode, a process, a situation, a programme, a community an institution or any other social unit. It is one of the most popular types or research methods. Its purpose may be to understand the life cycle of the unit under study or the interaction between factors that explain the present status or the development over a period of time. Some examples of a case study are: a social – anthropological study of a rural or tribal community; a causative study of success full cooperative society; a study of the financial health of a business undertaking; a study of labour participation in management in a particular enterprise a study of juvenile delinquency; a study of life style of working women; a study of slum dwellers; a study of urban poor; a study of economic offenses;; a study of refugees from another country.

Function:- The case study method describes a case in terms of its peculiarities. It gives us an insight into the typical or extreme cases whose unique features are not reflected by the usual statistical method.

Case study v/s survey:-

Case study may be conducted as an independent study or a supplementary investigation to a survey. The primary distinctions between a case study and a survey lie in the intensity and depth of investigation and its coverage.

- While a survey is a broad based investigation of a phenomenon, a case study is an intensive investigation
- A survey covers a large number of units – all units of a universe or a sample of them; but a case study is a study of a single unit/group.
- The findings of a study can be generalized when it is based on a representative sample; but whereas the finds of a case study cannot be generalized.
- While a survey is useful for testing hypotheses about large social aggregates, a case study is useful for testing hypotheses about the structural and procedural characteristics (e.g. status relation, interpersonal behaviour, managerial style of a specific social unit (e.g. an organisation a small group or a community)

Field Studies:

Meaning:- Field studies are scientific enquiries aimed at discovering the relations and interactions among sociological, psychological and educational variables in social institutions and actual life situations like communities, schools, factories, organizations and institutions. A social or institutional situations is selected and the relations among the attitudes, values, perceptions and behaviours of individuals and groups in the selected situations are studied.

Field study v/s surveys:- Although it is not easy to draw a fine logical between survey and field study, there are practical differences between them. First, a survey attempts to be representative of the universe under study and thus calls for an adequate and representative sample. This emphasis on sampling may or may not be found in a field study, because it is more concerned with a thorough account of the processes under study than with their typicality in a large universe. Second, while a field study aims at directly studying the interrelations of the parts of social structure of a singly community r a singly group, a survey aims at covering a larger universe, and it may indirectly deal with social and psychological processes, though inference from the statistical analysis rather than through direct observation. Thus, field study will provide a more detailed natural picture of social interrelations of the group than does a survey

Sampling

It is the aggregate of elements about which we wish to make inferences a member of the population is an element. It is the subject on which measurement is taken. It is the unit of study. A part of the population is known as a simple. The process of drawing a sample from a larger population is called sampling. The list of sampling units from which a sample is taken is called the sampling frame, e.g. a map a telephone directory, a list of industrial undertakings a list of car licenses etc.

Aims of Sampling:

Well-selected sampling may reflect fairly accurately of the population. For example, with a survey of a sample of voters, one can predict the voting intentions of millions of voters. A specified value of the population, such as average of variance is named parameter; the corresponding value in the sample is termed a statistic. The chief of sampling is to make an inference about an unknown parameter from a measurable sample statistic. A second aim of sampling is to test a statistical hypothesis relating to population. A sample is drawn and the data collected from the sample informants are analysed and on the basis of the result the hypothesis may be accepted or rejected.

Characteristics of Good Sample:

Whether the results obtained from a sample survey would be accurate or not depends upon the quality of the sample.

The characteristics of a good sample are described below:

1. **Representative ness:** - A sample must be representative of the population. Probability sampling technique yields representative sample. In measurement terms, the sample must be valid. The validity of a sample depends upon its accuracy and precision.

2. **Accuracy:** - Accuracy is defined as the degree to which bias is absent from the sample. An accurate (unbiased) sample is one which exactly represents the population. It is free from any influence that causes any difference between sample value and population value (say, average).

3. **Precision:-** The sample must yield a precise estimate. Precision is measured by the standard error or standard deviation of the sample estimate. The smaller the standard error or estimate, the higher is the precision of the sample.

4. **Size:-** A good sample must be adequate in size in order to be reliable. The sample should be of such size that the inferences drawn from the sample are accurate to the given level of confidence.

Basis of Sampling:

Sampling is based on two premises.

- There is such similarity among the elements in a population that a few of these elements will adequately represent the characteristics of the total population. For example, the attitude of postgraduate students towards the examination system can be gauged by studying the attitudes of a few representative postgraduate students in a university.
- While the sample value (statistic) or some sample units may be more than the population value (parameter), the sample value of other sample units may be less than the population value. When the sample is drawn properly these differences tend to counteract each other with the result a sample value is generally close to the population value.

Advantages of Sampling:

Why is sampling used? What are its advantages? The advantages of sampling are many.

First, sampling reduces the time and cost and research studies. Thanks to the use of sampling, it has become possible to undertake even national or global studies at reasonable cost and time. Such economy in time and cost improves the viability of several field studies like credit surveys, poverty surveys and marketing surveys.

Second, sampling saves labour. Smaller staffs are required both for fieldwork and for processing and analyzing the data.

Third, the quality of a study is often better with sampling than with a complete coverage. The possibility of better interviewing, more thorough investigation of missing, wrong or suspicious information, better supervision, and better processing is greater in sampling than in complete coverage. No wonder that the accuracy of decennial population censuses in USA, India and other countries is checked by making sample surveys.

Fourth, sampling provides much quicker results than does a census. The speed of execution minimizes the time between the recognition of a need for information and the availability of that information. The speed of execution is vital in feasibility studies, evaluation studies and business research. Timely execution of a study is essential for making use of its findings.

Fifth, sampling is the only procedure possible, if the population is infinite e.g. throws of dice consumer behaviour surveys, etc.

Last, statistical sampling yields a crucial advantage over any other way of choosing a part of the population for a study. That is when the estimated of the population characteristics are made from the sample results, the precision of these estimates can also be gauged from the sample results themselves (for explanation, see section 6.4 below).

Limitations Of Sampling:

Sampling is however not free from limitations :

- Sampling demands a through knowledge of sampling methods and procedures and an exercise of greater care: otherwise the results obtained may be incorrect or misleading.
- When the characteristic to be measured occurs only rarely in the population, a very large sample is required to secure units that will give reliable information about it. A large sample has all the drawbacks of a census survey.
- A complicated sampling plan may require more labour than a complete coverage.
- It may not be possible to ensure the representatives of the sample even by the most perfect sampling procedures. Therefore sampling results in a certain degree of sampling errors i.e. there will be some difference between the sample value and the population value

Sampling Techniques of Methods:

Classification:- Sampling techniques or methods may be classified into two generic types

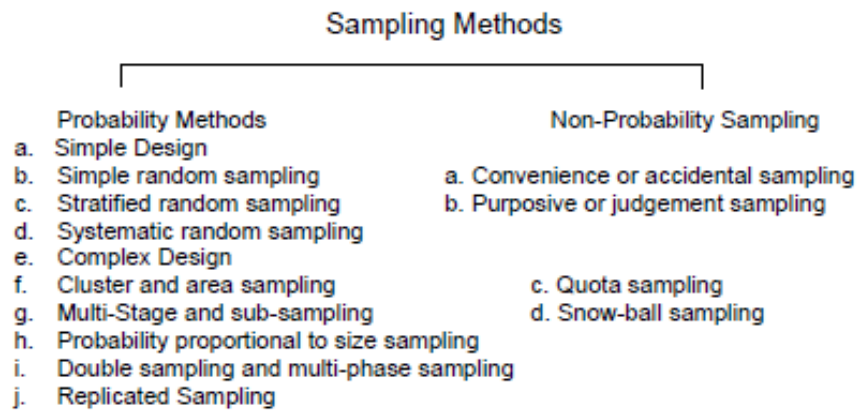
(a) probability or random sampling

- Simple random sampling
- Stratified random sampling
- Systematic random sampling
- Cluster sampling
- Area sampling

- Multi – stage and sub – sampling
- Random sampling with probability proportional to size.
- Double sampling and multiphase sampling
- Replicated or interpenetrating sampling

Non – probability sampling may be classified into:

- Convenience or accidental sampling
- Purposive (or judgement) sampling
- Quota sampling
- Snow – ball sampling



Probability v/s Non – probability Sampling:-

Probability sampling is based on the theory of probability. It is also known as random sampling. It provides a known non-zero chance of selection for each population element.

Probability sampling characteristics are:

- In probability sampling every population has a chance of being selected.
- Such chance is a known probability. For instance, if a sampling frame is a list of 100 students of a specific course of study in a simple random sample, each student has 1/100th chance of being selected.
- Probability sampling yields a representative sample, and hence, the findings of the sample survey are generalisable to the population.
- The closeness of a sample to the population can be determined by estimating sampling bias or error. Through randomization, the danger probability sampling bias can be minimized.

Probability sampling is preferable to nonprobability sampling probability sampling should be used when generalization is the objective of study, and a greater degree of accuracy of estimation of population parameters is required cost and time required for probability sampling may be large. Hence, the benefit derived from it should justify the cost.

Non-probability sampling or non-random sampling

- It is not based on the theory of probability.
- This sampling does not provide a chance of selection to each population element.
- The only merits of this type sampling are simplicity convenience and low cost.
- It does not ensure a selection chance to each population unit.
- The selection probability is unknown.

- A non-probability sample may not be a representative one.
- Non-probability sampling plan does not perform inferential function, i.e. the population parameters cannot be estimated from the sample values.
- It suffers from sampling bias, which will distort results. Therefore, non-random is not a desirable method.

Yet there are some practical **reasons for using it**. those reasons are:

- When there is no other feasible alternative due to nonavailability of a list of population, non-availability of some population elements for collection of data, etc.
- When the study does not aim at generalizing the findings to the population, but simply at feeling the range of conditions or nature for the phenomenon.
- When the cost required for probability sampling may be too large, and the benefit expected from it is not commensurate with such costs, and
- When probability sampling requires more time, but the time constraints and the time limit for completing the study do not permit it.

Probability Sampling Methods:

Random Sampling Procedures:- The importance of randomness in sampling needs no emphasis. It is a means for securing a representative sample. How can a random sample be drawn? The layman tends to think that random sampling means picking out units "at random," three basic procedures

- The lottery method
- table of random numbers
- Use of Computer

Simple Random Sampling:-

This sampling technique gives each element an equal and independent chance of being selected an equal chance means equal probability of selection

Procedure:- The procedure of drawing a simple random sample consists of:

- Enumeration of all elements in the population.
- Preparation of a list of all elements, a giving them numbers in a serial order 1, 2, 3... so on.
- Drawing sample numbers by using
 - (a) lottery method, (b) a table of random numbers or (c) a computer.

The simple random sampling is suitable only for a small homogenous population. It may yield a representative sample under the following conditions:

1. Where the population is a homogeneous group with reference to the specified characteristics, e.g. students studying in fifth standard in a boys school from a homogenous group as regards level of education and age group.
2. Where the population is relatively small
3. Where a complete list of all elements is available or can be prepared.

The simple random sampling is not suitable for drawing a simple from a large heterogeneous population, as it may not yield a representative sample of such population.

Advantages:- Some advantages of simple random sampling are:.

- 1 All elements in the population have an equal chance of being selected.
- 2 Of all the probability sampling techniques simple random sampling is the easiest to apply.
- 3 It is the most simple type of probability sampling to understand.
- 4 It does not require a prior knowledge of the true composition of the population.

5 The amount of sampling error associated with any sample drawn can easily be computed.

Disadvantages:- The simple random sampling techniques suffers from certain drawbacks.

1 It is often impractical, because of non-availability of population list or of difficulty in enumerating the population. For example, it is difficult to get a current accurate list of households in a city or a list of landless rural agricultural labourers who migrate from area to area in search of employment or a list of households of a nomadic tribe.

2 The use of simple random sampling may be wasteful because we fail to use all of the known information about the population

3 This technique does not ensure proportionate representation to various groups constituting the population.

4 The sampling error in this sampling is greater than that in other probability samples of the same size, because it is less precise than other methods.

5 The size of the simple required to ensure its representative ness is usually larger under this type of sampling than under other random sampling techniques.

6 A simple random design may be expensive in time and money.

Stratified Random Sampling:-

This is an improved type of random of probability sampling. In this method, the population is sub-divided into homogeneous groups or strata, and from each stratum, random sample is drawn. For example, university students may be divided on the basis of discipline and each discipline group may again be divided into juniors and seniors and employees of a business undertaking may be divided into managers and non-managers and each of those two groups may be sub-divided into salary grade wise strata.

Need for stratification:- Stratification is necessary for

- increasing a sample's statistical efficient
- providing adequate data for analyzing the various sub-populations, and
- applying different methods to different strata.

Stratification ensures representation to all relevant subgroups of the population, more efficient statistically than simple random sampling. Stratification is essential when the researcher wants to study the characteristics of population sub-groups e.g. male and female employees of an organization. Stratification is also useful when different methods of data collection etc. are used for different parts of the population e.g. interviewing for workers and self-administered questionnaire for executives.

Suitability:- The stratified random sampling is appropriate for a large heterogeneous population.

Stratification Process:- This involves three major decisions:

1) The stratification base or bases to be used should be decided. The ideal base would be the principal variable under study. For example, if the size of firms is a primary variable, the firms may be stratified on the basis of the block capital employed.

2) The number of strata: what should be the number of strata? There is no precise answer to this question. Larger the number of strata, greater may be the degree of representativeness on the number of sub-population group to be studied and the cost of stratification. Cochran suggests that there is little to be gained in estimating overall population values when the number of strata exceeds six.

3) Strata sample sizes: there are two alternatives: first, the strata sample sizes may be proportionate to strata's shares in the total population; second, they may be disproportionate to strata's shares

Advantages:- The principal advantages of proportionate stratified sampling are:

- It enhances the representativeness of the sample by giving proper representation to all

subgroups in the population.

- It gives higher statistical efficiency than that given by simple random sampling for a given sample size.
- it is easy to carry out this sample method.
- This method gives a self – weighing sample the population mean can be estimated simple by calculating the sample mean.

Disadvantages:- The drawbacks of the proportionate stratified random sampling are:

- 1 A prior knowledge of the composition of the population and the distribution of the population characteristics are required to adopt this method.
- 2 This method is very expensive in time and money of course its greater efficiency may offset the additional cost.
- 3 The identification of the strata might lead to classification errors. Some elements may be included into the wrong strata. This may vitiate the interpretation of survey results.

Cluster Sampling:-

Where the population elements are scattered over wider area and a list of population elements is not readily available, the use of simple or stratified random sampling method would be too expensive and time consuming. In such cases cluster sampling is usually adopted.

Meaning:- Cluster sampling means random selection of sampling units consisting of population elements. Each such sampling unit is a cluster of population elements. Then from each selected sampling unit a sample of population elements is drawn by either simple random selection or stratified random selection.

	Cluster Sampling	Stratified Sampling
1	The Sampling unit is a cluster or a group consisting of population elements	The population element itself is the sampling unit
2	The population is divided in to many clusters or subgroups, each with a few elements.	The population is divided into a few sub-groups or strata each with many elements.
3	Clustering is done on the basis of geographical area or administrative divisions (district/taluka) farm size etc.	Stratification is done on the basis of variables under study e.g. educational status, product line.
4	We try to secure heterogeneity with sub groups and homogenly between sub groups.	We aim at securing homogeneity within sub-groups and heterogeneity between sub-groups.
5	We make a random selection of sub-groups or cluster	We make a random selection of elements from each sub-group
6	The resulting sample may give a lower degree of representativeness for a given sample size	It yields a higher degree of representative sample for the same sample size.
7	The sampling error may be great	The sampling error will be less
8	The cost per element is lower	The cost per element is higher.

Area Sampling:-

This is an important form of cluster sampling. In large field surveys, clusters consisting of specific geographical areas like districts, talukas, villages or blocks in city are randomly drawn. As the geographical areas are selected as sampling units in such cases their sampling is called area sampling. It is not a separate method of sampling, but forms part of cluster sampling.

Multi-Stage Sampling:-

In this method sampling is carried out in two or more stages. The population is regarded as being composed of a number of first stage sampling units. Each of them is made up to a number of second stage units and so forth that is at each stage, a sampling units is a cluster of the sampling units of the subsequent stage.

First a simple of the first stage sampling units is drawn, then from each of the selected first stage sampling unit, a sample of the second stage sampling units is drawn the procedure continues down to the final sampling units or population elements. Appropriate random sampling method is adopted at each stage.

Usage:- Multi-stage sampling is appropriate where the population is scattered over a wider geographical area and no frame or list is available for sampling. It is also useful when a survey has to be made within a limited time and cost budget.

Non-Probability Sampling Methods:

Introduction:- As explained earlier, non-probability sampling does not adopt the theory of probability and it does not give a representative sample of the population. The primary methods of non-probability sampling are:

- Convenience sampling
- Purposive (or Judgement) sampling
- Quota sampling
- Accidental sampling
- Snow-ball sampling

Convenience or Accidental Sampling:-

This is non probability sampling. It means selecting sample units in a just hit and miss fashion e.g. interviewing people whom we happen to meet. This sampling also means selecting whatever sampling units are conveniently available e.g. a teacher may select student in his class. This method is also as accidental sampling because the respondents whom the researcher meets accidentally are included in the sample.

Usefulness:- Though convenience sampling has no status it may be used for simple purpose such as testing ideas or gaining ideas or rough impression about a subject of interest. It lays a groundwork for a subsequent probability sampling sometimes it may have to be necessarily used. For example, when a population cannot be defined or a list of population is not available there is not other alternative than to use convenient sampling.

Purposive or Judgement Sampling

This method means deliberate selection of sample units that confirm to same pre-determined criteria. This is also known as Judgement Sampling. This involves selection of cases which we judge as the most appropriate ones for the given study. It is based on the judgement of the researcher or some expert. The chance that a particular case be selected for the sample depends on the subjective judgement of the researcher for example a researcher may deliberately choose industrial

undertakings in which quality circles are believed to be functioning successfully and undertakings in which quality circles are believed to be total failure.

Application:- The method is appropriate when it is important to know the typicality and specific relevance of the sampling units to the study and not their overall representativeness to the population.

Quota Sampling:-

This is a form of convenient sampling involving selection of quota groups of accessible sampling units by traits such as sex, age, social class etc. when the population is known to consist of various categories by sex, age, religion, social classes, etc. in specific proportions, each investigator may be given an assignment of quota groups specified by the pre-determined traits in specific proportions. He can then select accessible persons belonging to those quota groups in the area assigned to him.

Quota sampling is therefore a method of stratified sampling in which selection within strata is non-random. It is this non-random element that constitutes its greatest weakness. Quotas are stratified by such variables as sex, age, social class and religion. It is easy to classify the accessible respondents under sex, age and religion, but it is very difficult to classify them into social categories. Since social class usually involves a combination of factors such as occupation, income and caste and the interviewer's subjective judgement and bias play some role in the social class classification of respondents.

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Snow-ball Sampling:-

This is the colourful name for a technique of building up a list or a sample of a special population by using an initial set of its members as informants. For example, if a researcher wants to study the problem faced by Indians through some source like Indian Embassy. Then he can ask each one of them to supply names of other Indians known to them and continue this procedure until he gets an exhaustive list from which he can draw a sample or make a census survey.

This sampling technique may also be used in socio-metric studies. For example, the members of a social group may be asked to name the persons with whom they have social contacts, each one of the persons so named may also be asked to do so and so on. The researcher may thus get a constellation of associates and analyse it.

Sample Size:- The size of sample to be drawn depends upon various factors like the population size, the size of population dispersion, the acceptable confidence level for the parameter estimate etc.

Formulation of Questionnaire

Questionnaire design is one of the important areas of research. It is most commonly used. The accuracy and relevancy of data collected depends upon the questionnaire. There are certain functions, which a questionnaire performs and these are:

- Given to the respondent clear idea and understanding of the questions. Questions should not be vague.
- Motivate the respondents to give answers
- Stimulate the responses
- How respondent should answer, clear cut instructions
- Information must be treated confidential

Questionnaire design has to produce a document which is:

- Easy to administer, read out or fill in by both an interviewer and an informant.
- Constructed in a way that answer the research hypothesis or research problem, but also has the capability to identify new issues.
- Easy to analyze and can provide all the characteristics of the informant being interviewed.

Question should be properly worded, simple, clear and not vague. It can be closed ended or open ended.

Sequence of questions is important. Lead questions should create interest. Difficult questions in the end. Personal questions in the end. They should be in a logical order

- Much of the data in clinical research is gathered using questionnaires or interviews.
- The reliability and validity of the results depends on the quality of these instruments
- Good questionnaires are difficult to construct; bad questionnaires are difficult to analyse.

Good Questionnaire Characteristics

- A Logical Sequence:
- Good Wording:
- Write a clear layout:
- A reasonable length:

Attitudes, opinions and image are generally measured by developing scale. Verbal scales are more easily understood than numerical scales or making a rating which takes a score out of ten.

There are also different options for scales:

- Unipolar scales, a five-point scale from 'good' to 'not very good'
- Bipolar scale. A five-point scale from 'very good' to 'very bad'
- Rating scale based on getting some type of agreement to statements. 'agree strongly, agree, neither agree nor disagree, disagree and disagree strongly provides this analysis.
- Smiley scales are used for children.

Types of Questions

a) Close Ended:

Question in which respondent selects one or more options from pre-determined set of responses.
YES NO

- (a) Two choices
- (b) Multiple choices a/b/c/d etc
- (c) Scale (likert)- here the amount of agreement or disagreement is shown
- (d) Semantic differential – a scale is given between 2 words and respondent shown his opinion, e.g.,

Open Ended:

Questions in which the respondent answers in his own words.

- Completely unstructured, e.g. what is your opinion of Indian Airlines?
- Word association

Questionnaire Construction

Conceptual framework questionnaire:

- Structured/unstructured
- Language
- Type of questions
- Administration

a) Questionnaire content to be kept in mind:

- Wording of questions
- General to specific (inverted funnel approach)
- Sequence of questions
- Easy question formats
- Personal questions at the end
- Double barrel question should be avoided
- Questions should be helpful in tabulations and analysis
- Questionnaire items

b) Questionnaire layout:

- Keep questionnaire short if possible, but too short they you sacrifice needed information
- Do not over crowd questionnaire
- Provide decent margin space
- Use multiple grid layout for questions with similar responses
- Use booklet form if possible
- Carefully craft the questionnaire title:
- Captures respondent's interest
- Shows importance of the study
- Shows interesting nature of the study.

Methods And Techniques of Data Collection

Primary Data:

Primary data is one which is collected by the investigator himself for the purpose of a specific inquiry or study. Such data is original in character and is generated by surveys conducted by individual or research institutions.

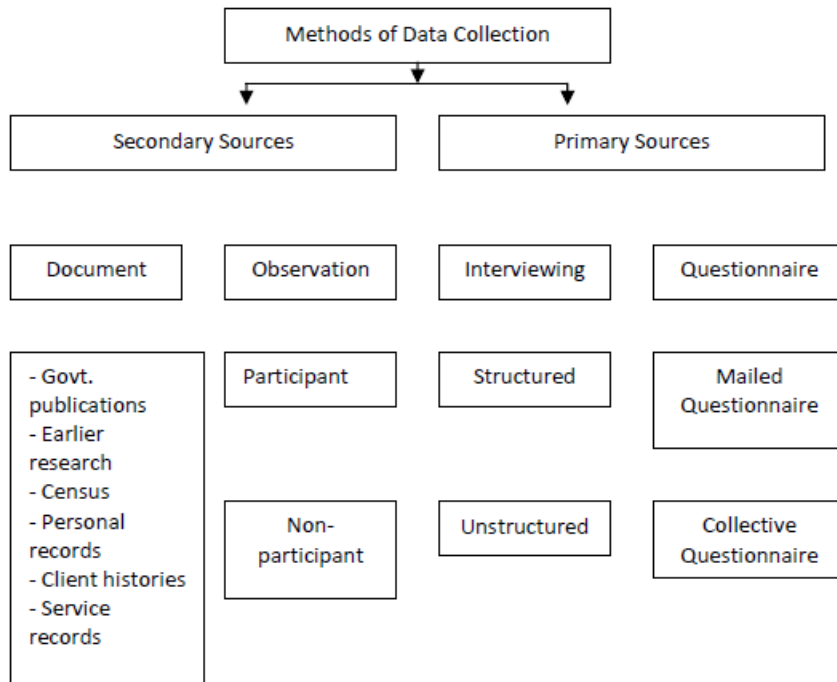
Secondary Data:

When an investigator uses the data which has already been collected by others, such data is called secondary data. This data is primary data for the agency that collected it and becomes secondary data for someone else who uses this data for his own purposes. The secondary data can be obtained from journals, reports, government publications, publication of professional and research organization and so on. For example, if a researcher desires to analyse the weather conditions of different regions, he can get the required information or data from the records of the meteorology department.

	Description	Primary Data	Secondary Data
1	Source	Original source	Secondary source
2	Methods of data collection	Observation method, questionnaire method, Trade Journal, etc	Published data of Govt. agencies
3	Statistical process	Not done	Done
4	Originality of Data	Original first time collected by user	No data are collected by some other agency
5	Use of data	For specific purpose data are compiled	Data are taken from other source and used for decision
6	Terms and definition of units	Incorporated	Not include
7	Copy of the schedule	Included	Excluded
8	Method of data collection	Given	Not given

9	Description of sample selection	Given	Not given
10	Timer	More	Less
11	Cost	Expensive	Cheaper
12	Efforts	More	Less
13	Accuracy	More accurate	Less accurate
14	Training personnel required	Expert/trained required	Less trained personnel

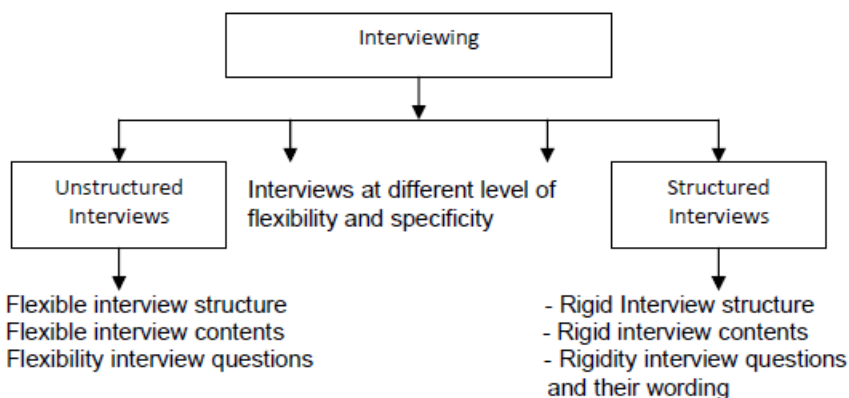
Methods of Data Collection:



The Interview:

Interviewing is a commonly used method of collecting information from people. In many walks of life we collect information through different forms of interaction with others. Any person-to-person interaction between two or more individuals with a specific purpose in mind is called an interview. On the other hand, interviewing can be very flexible, when the interviewer has the freedom to formulate question as they come to mind around the issue being investigated; and on the other hand, it can be inflexible, when the investigator has to keep strictly to the questions decided before hand. Interviews are classified according to the degree of flexibility as in follow.

Type of Interview:



Analysis of Data

The data collected may or may not in numerical form. Even if data is not in numerical form still we can carry out qualitative analysis based on the experiences of individual participants. When data

is collected in numerical form than through descriptive statistics findings can be summarised. This includes measure of central tendency like mean range etc. Another way to summarised finding is by means of graphs and charts. In any of the research study there is experimental hypothesis or null hypothesis one the basis of data of both hypothesis, various test have been devised to take decision. Where decision is taken on the basis statistical test, it is subject to error, and such correct decision is difficult. But some standard procedures followed to arrived at proper decision. Analysis involves estimating the values of unknown parameters of the population and testing hypothesis for drawing inferences.

Types of Analysis:

- a. Qualitative analysis
- b. Content analysis
- c. Quantitative analysis
- d. Descriptive analysis
- e. Bivariate analysis
- f. Sequential analysis
- g. Casual analysis
- h. Multivariate analysis
- i. Inferential analysis
- j. Statistical analysis.

a. Qualitative Analysis:

It is less influenced by theoretical assumption. The limitation of this type of analysis is that the findings tend to be unrealisable. The information categories and interpreted after, differ considerable from one investigator to another one. In this system researcher to go through, research cycle, to increase reliability, repeating the research cycle is of value in some ways, but it does not ensure that the findings will have high reliability. Qualitative analyses are carried out in several different kinds of study like interview, case studies and observational studies.

b. Content Analysis:

Content analysis is used where originally qualitative information is reduced to numerical terms. It is a method of analysis media output includes articles published in new papers, speeches made in radio, television and various type of propaganda. This method of analysis is applied to all most all form of communications.

c. Quantitative Analysis:

The numerical data collected in study through descriptive statistics analysis can be conducted through measure of central tendency.

d. Descriptive Analysis:

This analysis of one variable is called one dimensional analysis. This analysis measures condition at particular time.

e. Bivariate Analysis:

The analysis in respect of two variables is called bivariate analysis. In this analysis collected data in placed into tabular form, so that the meaning of the data can be derived. In this method simple dimensional data is developed and put into two or more categories.

f. Sequential Analysis:

When only factor is revel in the table at one time, this type of analysis is called sequential analysis is called sequential analysis. If we do the further analysis of the same data regard four going showed that person with leave travel concession facilities are more frequently going on tourism than those who are not gating facilities of casual analysis. It is concerned with study of one variable affecting another one.

h. Multivariate Analysis:

With an advancement of compute application there is fast development of multivariate analysis, in which statistical method simultaneously analysis more than two variables.

i. Inferential Analysis:

In order to decide the validity of data to indicate conclusion this analysis is concerned with tests for significance of hypothesis. On the basis of inferential analysis the task of interpretation is performed by estimating the population values.

Meaning And Purpose of a Research

Report:

A research report is a formal statement of the research process and its results. It narrates the problem studied, methods used for studying it and the findings and conclusions of the study. The purpose of a research report is to communicate to interested persons the methodology and the results of the study in such a manner as to enable them to understand the research process and to determine the validity of the conclusions. The aim of the report is not to convince the reader of the value of the result, but to convey to him what was done, why it was done, and what was its outcome. It is so written that the reader himself can reach his own conclusions as to the adequacy of the study and the validity of the reported results and conclusions.

Characteristics of A Report:

A research report is a narrative but authoritative document on the outcome of a research effort. It presents highly specific information for a clearly designated audience. It is non-persuasive as a form of communication. Extra caution is shown in advocating a course of action even subordinated to the matter being presented. It is a simple, readable and accurate form of communication.

FUNCTIONS OF A RESEARCH REPORT:

A well-written research report performs several functions:-

1. It serves as a means for presenting the problem studied, methods and techniques used for collecting and analysing data, the findings, conclusions and recommendations, in an organised manner.
2. It serves as a basic reference material for future use in developing research proposals in the same or related area.
3. A report serves as a means for judging the quality of the completed research project.
4. It is a means for evaluating the researcher's ability and competence to do research.
5. It provides a factual base for formulating policies and strategies relating to the subject matter studied.
6. It provides systematic knowledge on problems and issues analysed.

TYPES OF REPORTS

Research reports may be classified into

- (a) technical report
- (b) popular report,
- (c) interim report,
- (d) summary report,
- (e) research abstract,
- (f) research article.

These types of reports vary from one another in terms of the degree of formality, physical form, scope, style and size.

(a) Technical Report/Thesis:-

This is a comprehensive full report of the research process and its outcome. It is primarily meant for the academic community i.e. the scientists of the researcher's discipline and other researchers. It is a formal long report covering all the aspects of the research process: a description of the problem

studied, the objectives of the study, methods and techniques used a detailed account of sampling field and other research procedures, sources of data, tools of data collection, methods of data processing and analysis, detailed findings and conclusions and suggestions. There is also a technical appendix for methodological details, copies of measuring instruments and the like. It is so comprehensive and complete that the study can be replicated by others. The technical report is essentially technical in nature and scope and couched in technical language. It follows a specified pattern and consists of several prefatory section with appropriate heading and paragraphs.

(b) Popular Report:-

This type of report is designed for an audience of executives/administrators and other non- technical users. The requirement of this audience is different. The reader is less concerned with methodological details but more interested in studying quickly the major findings and conclusion. He is interested in applying the findings to decisions. The organization of this report is very important. The presentation can be more forceful and persuasive without of course, any distortion of fact. It should be clear, brief and straight forward complicated statistical techniques and tables need not be used. Instead pictorial devices may be extensively used. The format of this report is different from that of a technical report. After a brief introduction to the problem and the objectives of the study, an abstract of the findings, conclusions and recommendations is presented. The methodological details, data analysis and their discussions are presented in the second part. More headlines, underlining pictures and graphs may used. Sentences and paragraphs should be short. There can be a liberal use of margins and blank space. The style may be more journalistic but be precise and it should encourage rapid reading and quick comprehension.

(c) Interim Report:-

When there is a long time lag between data collection and the presentation of the results in the case of a sponsored project, the study may lose its significance and usefulness and the sponsor may also lose interest in it. One of the most effective ways to avoid such eventualities is to present an interim report. This short report may contain either the first results of the analysis or the final outcome of the analysis of some aspects completely analysed. Whatever may be the coverage of the interim report it fulfils certain functions. It facilitates the sponsoring agency to take action without waiting for the full report. It helps to keep alive the agency's interest in the study and prevent misunderstandings about the delay. In addition, it serves to spread over a longer period the time consuming process of discussion of research findings and their implication. The report also enables the researcher to find the appropriate style of reporting. The interim report contains a narration of what has been done so far and what was its outcome. It presents a summary of the findings of that part of analysis which has been completed.

(d) Summary Report:-

A summary report is generally prepared for the consumption of the lay audience, viz. the general public. The preparation for this type of report is desirable for any study whose findings are general interest. It is written in non-technical, simple language with a liberal use of pictorial charts. It just contains a brief reference to the objective of the study, its major findings and their implications. It is a short report of two or three pages. Its size so limited as to suitable for publication in daily newspaper.

(e) Research Abstract:-

This is a short summary of the technical report. It is usually prepared by a doctoral students on the eve of submitting, his thesis. Its copies are sent by the university along with the letters of request to the examiners invited to evaluate the thesis. It contains a brief presentation of the statements of the problem, the objectives of the study methods and techniques used and an overview of the report. A brief summary of the results of the study may also be added. This abstract is primarily meant for enabling the examiner invites to decide whether the study belongs to the area of their specialization and interest.

(f) Research Article:-

This is designed for publication in a professional journal. If a study has two or more aspects that can be discussed independently, it may be advisable to write separate articles rather than to crowd

too many things into single article. A research article must be clearly written in concise and unambiguous language. It must be logically organised, progressing from a statement of the problem and the purpose of study, through the analysis of evidence to the conclusions and implications. A professional journal may have its own special format for reporting research. It is important to find out in advance whether the publication does have specific format requirements. For example, the research articles submitted for publication in the journal of applied psychology should be prepared according to the publication manual of the American psychological association. The preferred format is:

1. Introduction:- A statement of the nature of the problem and a brief review of previous studies pertinent to the development of the specific questions or hypotheses to be tested.

2. Method:- A brief statement of what was done where and how it was done, and a statement of the specific techniques and tools used.

3. Results:- A presentation of the salient findings with tables or charts.

4. Discussions:- A discussion of the salient findings with tables or charts.

5. Conclusion:- A presentation of the contribution of the study to theory and /for practice and the brand implications of the findings.

The article must be accompanied by an abstract of 100-150 words typed on a separate sheet of paper.

References

Any reference to an article or other source is to be identified at an appropriate point in the text by the last name of the author year of publication and pagination where appropriate, all within parentheses e.g. Sherman (1980); Heller (1976 p. 701) no footnote is to be used for purpose of citation.

All references are to be listed alphabetically by author in an appendix titled 'Reference e.g. Grove, A.S. (1983) High Output Management, New York; Random House. Tannenbaum A & Schmidt. W (1958)

How to choose a leadership pattern. Harvard Business Review 36 95-10) Similarly, the Indian Society of Agricultural Economics, Mumbai has prescribed guidelines for submission of papers of publication in the Indian Journal of Agricultural Economics. The preferred format is:

1. Introduction,
2. Methodology,
3. Results and discussion, and
4. Policy Implications/conclusion, followed by references.

Only cited works should be included in the reference list. The style of citations to be followed is: A.S Kahlon and K. Singh: Managing Agricultural Finance: Theory and Practice, Allied Publishers Pvt. Ltd., New Delhi, 1984.

Jairam Krishna, "Focus on Wateland Development; Degradation and Poverty." The Economic Times, April 13, 1986.

C.H. Hanumantha Rao, "Current Agrarian Scene: policy alternatives," Economic and Political Weekly, Vol XXIII, no.13 March, 26, 1988.

An abstract not exceeding 100 words should be submitted along with the paper. The length of the article is limited to 20 (double space) typed pages (8 1/2 x 11m).
Regardless of the format followed, however, the style of writing should be the same as that used for technical report thesis

Research Report Format:

In this section, the format of a comprehensive technical report of doctoral thesis is discussed.

Report outline.

A. Prefatory Items

1. Title page
2. Researcher's declaration
3. The certificate of the research Supervisor
4. Preface/Acknowledgements
5. Table of contents
6. List of tables
7. List of graphs and charts
8. Abstracts or synopsis

1 Introduction

- a) Theoretical background of the topic
- b) Statement of the problem
- c) Review of Literature
- d) The scope of the present study
- e) The objectives of the study
- f) Hypotheses to tested
- g) Definition of concepts
- h) Model, if any.

B Body of the Report

The design of the study

- a) Methodology
 - overall typology
 - methods of data collection
- b) Sources of data
- c) Sampling plan
- d) Data collection instruments
- e) Filed work
- f) Data processing and analysis plan
- g) An overview of the report
- h) Limitations of the study

3 Results:- Findings and Discussion

4 Summary, conclusions and Recommendations

C Terminal Items

1 Bibliography

2 Appendix

- a) Copies of data collection instruments
- b) Technical details of sampling plan
- c) Complex tables
- d) Glossary of new terms used in the report.

Scaling Techniques

Scaling: Scaling is the assignment of objects to numbers or semantics according to a rule. In scaling, the objects are text statements, usually statements of attitude, opinion, or feeling. For example, consider a scale locating customers of a bank according to the characteristic “agreement to the satisfactory quality of service provided by the branch”. Each customer interviewed may respond with a semantic like ‘strongly agree’, or ‘somewhat agree’, or ‘somewhat disagree’, or ‘strongly disagree’. We may even assign each of the responses a number. For example, we may assign strongly agree as ‘1’, agree as ‘2’, disagree as ‘3’, and strongly disagree as ‘4’. Therefore, each of the respondents may assign 1, 2, 3 or 4.

Levels Of Measurement Scales

The level of measurement refers to the relationship among the values that are assigned to the attributes, feelings or opinions for a variable. For example, the variable ‘whether the taste of fast food is good’ has a number of attributes, namely, very good, good, neither good nor bad, bad and very bad. For the purpose of analysing the results of this variable, we may assign the values 1, 2, 3, 4 and 5 to the five attributes respectively. The level of measurement describes the relationship among these five values. Here, we are simply using the numbers as shorter placeholders for the lengthier text terms. We don’t mean that higher values mean ‘more’ of something or lower values mean ‘less’ of something. We don’t assume that ‘good’ which has a value of 2 is twice of ‘very good’ which has a value of 1. We don’t even assume that ‘very good’ which is assigned the value ‘1’ has more preference than ‘good’ which is assigned the value ‘2’. We simply use the values as a shorter name for the attributes, opinions, or feelings. The assigned values of attributes allow the researcher more scope for further processing of data and statistical analysis.

Typically, there are four levels of measurement scales or methods of assigning numbers:

- Nominal scale,
- Ordinal scale,
- Interval scale, and
- Ratio scale.

Nominal Scale is the crudest among all measurement scales but it is also the simplest scale. In this scale the different scores on a measurement simply indicate different categories. The nominal scale does not express any values or relationships between variables. For example, labelling men as ‘1’ and women as ‘2’ which is the most common way of labelling gender for data recording purpose does not mean women are ‘twice something or other’ than men. Nor it suggests that men are somehow ‘better’ than women. Another example of nominal scale is to classify the respondent’s income into three groups: the highest income as group

1. The middle income as group
2. The low-income as group
3. The nominal scale is often referred to as a categorical scale.

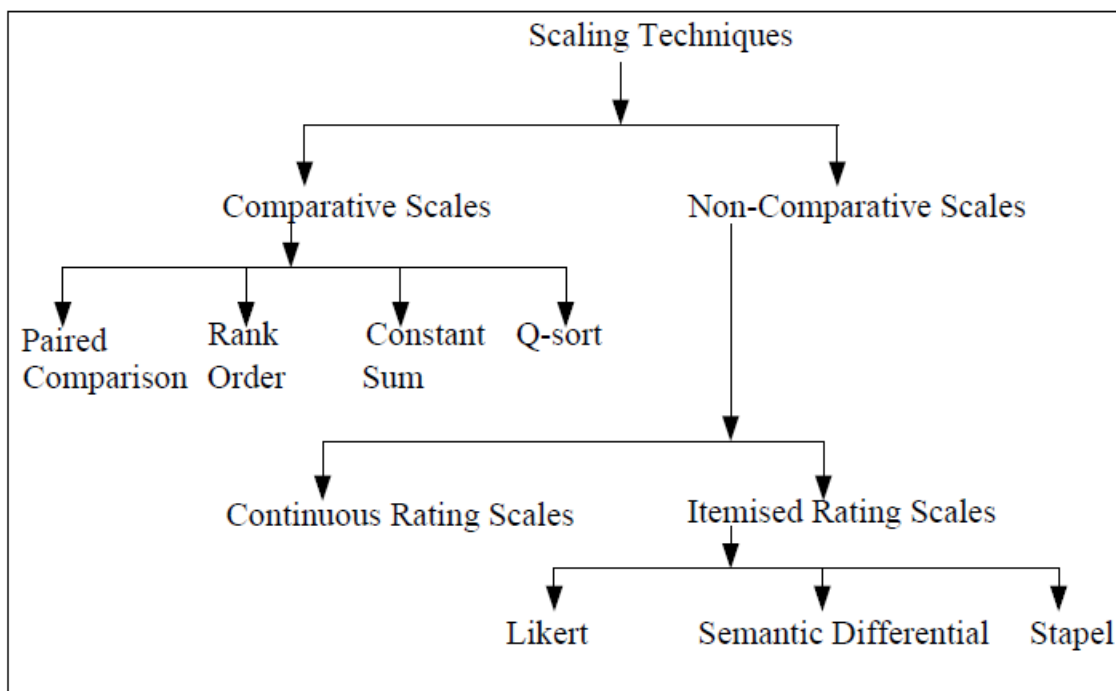
The assigned numbers have no arithmetic properties and act only as labels. The only statistical operation that can be performed on nominal scales is a frequency count. We cannot determine an average except mode.

Ordinal Scale involves the ranking of items along the continuum of the characteristic being scaled. In this scale, the items are classified according to Measurement and Scaling Techniques whether they have more or less of a characteristic. The main characteristic of the ordinal scale is that the categories have a logical or ordered relationship. This type of scale permits the measurement of degrees of difference, (that is, ‘more’ or ‘less’) but not the specific amount of differences (that is, how much ‘more’ or ‘less’). This scale is very common in marketing, satisfaction and attitudinal research

Interval Scale is a scale in which the numbers are used to rank attributes such that numerically equal distances on the scale represent equal distance in the characteristic being measured. An interval

scale contains all the information of an ordinal scale, but it also one allows to compare the difference/distance between attributes. For example, the difference between ‘1’ and ‘2’ is equal to the difference between ‘3’ and ‘4’. Further, the difference between ‘2’ and ‘4’ is twice the difference between ‘1’ and ‘2’. However, in an interval scale, the zero point is arbitrary and is not true zero. This, of course, has implications for the type of data manipulation and analysis. We can carry out on data collected in this form. It is possible to add or subtract a constant to all of the scale values without affecting the form of the scale but one cannot multiply or divide the values. Measuring temperature is an example of interval scale. We cannot say 400 C is twice as hot as 200 C. The reason for this is that 00 C does not mean that there is no temperature, but a relative point on the Centigrade Scale. Due to lack of an absolute zero point, the interval scale does not allow the conclusion that 400 C is twice as hot as 200 C.

Ratio Scale is the highest level of measurement scales. This has the properties of an interval scale together with a fixed (absolute) zero point. The absolute zero point allows us to construct a meaningful ratio. Examples of ratio scales include weights, lengths and times. In the marketing research, most counts are ratio scales. For example, the number of customers of a bank’s ATM in the last three months is a ratio scale. This is because you can compare this with previous three months. Ratio scales permit the researcher to compare both differences in scores and relative magnitude of scores. For example, the difference between 10 and 15 minutes is the same as the difference between 25 and 30 minutes and 30 minutes is twice as long as 15 minutes. Most financial research that deals with rupee values utilizes ratio scales. However, for most behavioural research, interval scales are typically the highest form of measurement. Most statistical data analysis procedures do not distinguish between the interval and ratio properties of the measurement scales and it is sufficient to say that all the statistical operations that can be performed on interval scale can also be performed on ratio scales.



Comparative Scales : In comparative scaling, the respondent is asked to compare one object with another.

Constant Sum Scale : In this scale, the respondents are asked to allocate a constant sum of units such as points, rupees, or chips among a set of stimulus objects with respect to some criterion.

Continuous Rating Scales : Here the respondents rate the objects by placing a mark at the appropriate position on a continuous line that runs from one extreme of the criterion variable to the other.

Itemised Rating Scales : Itemised rating scale is a scale having numbers or brief descriptions associated with each category.

Interval Scale : In this scale, the numbers are used to rank attributes such that numerically equal distances on the scale represent equal distances in the characteristic being measured.

Likert Scale : With the Likert scale, the respondents indicate their own attitudes by checking how strongly they agree or disagree with carefully worded statements that range from very positive to very negative towards the attitudinal object.

Measurement : Measurement is the process of observing and recording the observations that are collected as part of research.

Non-comparative Scales : In non-comparative scaling, respondents need only evaluate a single object.

Nominal Scale : In this scale, the different scores on a measurement simply indicate different categories.

Ordinal Scale : In this scale, the items are ranked according to whether they have more or less of a characteristic.

Paired Comparison Scale : This is a comparative scaling technique in which a respondent is presented with two objects at a time and asked to select one object according to some criterion.

Q-Sort Scale : This is a comparative scale that uses a rank order procedure to sort objects based on similarity with respect to some criterion.

Rank Order Scale : In this scale, the respondents are presented with several items simultaneously and asked to order or rank them according to some criterion.

Ratio Scale : Ratio scales permit the researcher to compare both differences in scores and relative magnitude of scores.

Scaling : Scaling is the assignment of objects to numbers or semantics according to a rule.

Semantic Differential Scale : This is a seven point rating scale with end points associated with bipolar labels (such as good and bad, complex and simple) that have semantic meaning.

Staple Scale : The Staple scale places a single adjective as a substitute for the Semantic differential when it is difficult to create pairs of bipolar adjectives.

DATA ANALYSIS AND DATA PREPARATION

Data analysis is simply the process of converting the gathered data to meaningful information. Different techniques such as modeling to reach trends, relationships, and therefore conclusions to address the decision-making process are employed in this process. However, the data needs to be prepared before being used in the data analysis process. Data preparation is the process in which data is converted to the numerical format which is machine-readable to be used in specific analyzing programs such as SAS or SPSS.

The steps to follow for the data preparation process are

- data coding,
- data entry,
- missing values,
- data transformation.

These steps are described briefly here:

Data Coding: Converting data to numerical values happens during the data coding process. It uses a codebook which is a document including different information such as an explanation of the variables, measures, and format of variables, the response, and finally coding them. In this process response means determining the types of scales for instance, whether the scale is chosen as nominal, ratio, ordinal, or interval; whether the scale is five-point, seven-point, etc. For example, to code the industry type, we can use a numerical form, and the coding scheme can be considered as 1 for healthcare, 2 for manufacturing, 3 for retailing, and 4 for financial.

Data entry: In this process, the coded data from the previous step is entered into text files or spreadsheets. It also can be directly added to the statistical program.

Missing data: As some respondents may not answer all the questions because of different reasons, a method should be used to face these missed values. For example, you need to add the value -1 or 999 in some programs, some of them automatically address the missed values, and others use a listwise deletion technique facing the missing values which drop all the answers even with a single missed value.

Data transformation: Transforming data is needed before interpreting them in some cases. Reverse coded items can be considered as an example that should be transformed before comparing or combining with not reversed ones. This concept is used where the meaning of the item is opposite to their underlying construct.

TYPES OF DATA ANALYSIS

In this section, we discuss the main types of data analysis methods in brief. For this purpose, the data analysis can be categorized into the following six main methods.

- Descriptive
- Exploratory
- Inferential
- Predictive
- Explanatory or Causal
- Mechanistic

A. Descriptive: Recognized as the first type of data analysis, it is known as the method with the least amount of effort. Thus, it can be used for large volumes of data. Here the data is used to perform a data set.

B. Exploratory: This method is used to explore the unknown relationships and discover new connections, and define future studies or questions.

C. Inferential: Inferential analyzing method uses a small sample to conclude a bigger population. It means, data from a subject sample of the world is used to test a general theory about its nature. The types of data sets that can be used in this method are observational, retrospective data set, and crosssectional time study.

D. Predictive: Predictive analysis utilizes historical and current facts to reach future predictions. It can also use data from a subject to predict the values of another subject. There are different predictive models; however, a simple model with more data can work better in general. Therefore, the prediction data set and also the determination of the measuring variables are important aspects to consider (MacGregor, 2013).

E. Explanatory: This analyzing method is used to determine the consequences happening to one variable when changing another one using randomized trial data sets.

F. Mechanistic: This method needs the most effort to determine the exact changes in the variables which can lead to changes in other ones using randomized trial data sets. It can be also concluded that mechanistic analysis is hardly inferable. Thus, when you need high precision in your result and you should minimize your errors, for example in the engineering and physical sciences, it can be a choice. Next, we will focus on the statistical analysis tools of three common data analysis types (descriptive, explanatory, and inferential)

Data Processing

Once the data is collected, following steps are taken to process the data into more measurable and concise manner:

a. **Editing** In the stage of editing all the raw data that is collected is checked for errors, omissions sometimes legibility and consistency as well. This ensure basic standard in the data collected and facilitate further processing.

b. **Coding** Coding refers to the process of assigning numerals or other symbols to answers so that responses can be put into a limited number of categories or classes. Such classes should be appropriate to the research problem under consideration. They must also be exhaustive (i.e., there must be a class for every data item) and also that of mutual exclusively which means that a specific answer can be placed in one and only one cell in a given category set. 2 Coding can also be pre or post. Pre coding meaning codes being assigned while the questionnaire or interview schedule is being prepared. In the case of post coding, codes are assigned to the answers after they are collected.

c. **Classification** Once the data is collected it is to be divided into homogeneous groups for further analysis on the basis of common characteristics.

d. **Tabulation** Tabulation is the process of summarizing raw data and displaying the same in compact form (i.e., in the form of statistical tables) for further analysis. In a broader sense, tabulation is an orderly arrangement of data in columns and rows.

Tabulation is essential because of the following reasons-

- It conserves space and reduces explanatory and descriptive statement to a minimum.
- It facilitates the process of comparison.
- It facilitates the summation of items and the detection of errors and omissions.
- It provides the basis for various statistical computations

Types of Software Packages for Quantitative Research

Researchers generally use five main software packages for quantitative research. A brief description of each follows.

Statistical Package for Social Science (SPSS): This is a very popular software program for quantitative analysis. It allows you to generate tabulated reports, charts, distribution and trend plots etc. It even provides factor analysis, discriminant analysis, clustering and multi-dimensional scaling. Its user-friendliness allows users to navigate menus and dialog boxes with ease. However, it is very costly and has a limit on the number of cases a researcher can analyse.

SPSS stands for Statistical Package for the Social Sciences. It was one of the earliest statistical packages with Version 1 being released in 1968, well before the advent of desktop computers. It is now on Version 23.

Merits

- Very easy to learn and use
- Can use either with menus or syntax files
- Quite good graphics
- Excels at descriptive statistics, basic regression analysis, analysis of variance, and some newer techniques such as Classification and Regression Trees (CART)
- Has its own structural equation modelling software AMOS, that dovetails with SPSS

Demerits

- Focus is on statistical methods mainly used in the social sciences, market research and psychology
- Has advanced regression modelling procedures such as LMM and GEE, but they are awful to use with very obscure syntax
- Has few of the more powerful techniques required in epidemiological analysis, such as competing risk analysis or standardised rates

Statistical Analysis System (SAS): For researchers who have a background in programming, SAS is very useful. It allows users to perform statistical analysis easily. Additionally, it provides features like graphics, report writing, forecasting, project management etc. Unlike SPSS, users need to navigate SAS through programming commands rather than menus.

SAS stands for Statistical Analysis System. It was developed at the North Carolina State University in 1966, so is contemporary with SPSS.

Merits

- Can use either with menus or syntax files
- Much more powerful than SPSS
- Commonly used for data management in clinical trials

Demerits

- Harder to learn and use than SPSS

STATA: A more economically viable option for research students, STATA is an interactive data analysis programs. It operates through the menu options (via the mouse) as well as programming commands. STATA's analysis features revolve around four windows. These are:

1. The Command Window – for entering analysis commands

2. The Review Window – for recording the commands entered
3. The Variables Window – for enlisting the variables available in the current data set along with their labels
4. The Results Window – for displaying the results

Stata is a more recent statistical package with Version 1 being released in 1985. Since then, it has become increasingly popular in the areas of epidemiology and economics, and probably now rivals SPSS and SAS in its user base. We are now on Version 14.

Merits

- Can use either with menus or syntax files
- Much more powerful than SPSS – probably equivalent to SAS
- Excels at advanced regression modelling
- Has its own in-built structural equation modelling
- Has a good suite of epidemiological procedures
- Researchers around the world write their own procedures in Stata, which are then available to all users

Demerits

- Harder to learn and use than SPSS
- Does not yet have some specialised techniques such as CART or Partial Least squares regression

R

S-plus is a statistical programming language developed in Seattle in 1988. R is a free version of S-plus developed in 1996.

Since then the original team has expanded to include dozens of individuals from all over the globe. Because it is a programming language and environment, it is used by giving the software a series of commands, often saved in text documents called syntax files or scripts, rather than having a menu-based system. Because of this, it is probably best used by people already reasonably expert at statistical analysis, or who have an affinity for computers.

Merits

- Very powerful – easily matches or even surpasses many of the models found in SAS or Stata
- Researchers around the world write their own procedures in R, which are then available to all users
- Free!

Demerits

- Much harder to learn and use than SAS or Stata

MS-Excel: By far, MS-Excel remains the easiest way to perform analysis. It is easily available and is perhaps, the cheapest of the software packages used for quantitative analysis. Excel places no limits on the volume of data analysed. The PivotTables allow quick generation of summaries and other reports. Above all, students can represent their conclusions with graphs of various kinds.

History

This is part of the Microsoft Office suite of programs. Excel version 1.0 was first released in 1985, with the latest version Excel 2016.

Merits

- Extremely easy to use and interchanges nicely with other Microsoft products
- Excel spreadsheets can be read by many other statistical packages
- Add on module which is part of Excel for undertaking basic statistical analyses
- Can produce very nice graphs

Demerits

- Excel is designed for financial calculations, although it is possible to use it for many other things
- Cannot undertake more sophisticated statistical analyses without purchase of expensive commercial add ons.

Minitab: This is a good software package with a nice output. However, because it is costly and it takes time to learn the software, researchers prefer other options.

Sl. No.	Tool	Function	Use
1	ANOVA	The ANOVA tools provide different types of variance analysis	Test of the hypothesis that each sample is drawn from the same underlying probability distribution.
2	Correlation Covariance	Calculate the correlation coefficient/ Covariance between two variables when measurements on each variable are observed for each of N subjects.	Examine each pair of measurement variables to determine whether the two measurement variables tend to move together
3	Descriptive Statistics	Generates a report of univariate statistics for data, providing information about the central tendency and variability of your data.	Describes the data in an interpretable format and show summary statistics like mean, mode, median, std. deviation, skewness, kurtosis and range etc.
4	Exponential Smoothing	Predicts a value based on the forecast for the prior period, adjusted for the error in that prior forecast	Forecast on the basis of a smoothing constant.
5	F-Test	Performs a two-sample F-test to compare two population variances.	Test that these two samples come from distributions with equal variances.
6	Moving Average	Projects values in the forecast period, based on the average value of the variable over a specific number of preceding periods.	Forecast trends on the basis of past figures.
7	Regression analysis	Performs linear regression analysis by using the "least squares" method to fit a line through a set of observations.	Analyse how a single dependent variable is affected by the values of one or more independent variables.
8	Sampling analysis	Creates a sample from a population by treating their input range as a population.	Infer about a population on the basis of a sample.
9	t-Test, z-Test	Determine whether the two samples are likely to have come from distributions with equal population means	Compare two population means when the population variances are known and unknown

Statistical Methods

Generally Needed to Researcher: The most commonly used statistical methods which can be generally needed by the researcher. The statistical software described here provide analysis of these techniques. Which is also available in the manual of the software development companies. Some of the commonly used statistical methods are described here.

Descriptive Statistics: Measures of Central Tendency, dispersion and their Relative measures.

Analysis of variance (ANOVA) : Balanced and unbalanced designs; multivariate analysis of variance and repeated measurements; linear and nonlinear mixed models.

Mixed models: Linear mixed models, Nonlinear mixed models., Generalize linear mixed models.

Correlation and Regression : Correlation, Least squares regression with nine model selection techniques, including stepwise regression, Diagnostic measures, Robust regression; Loess regression, Nonlinear regression and quadratic response surface models, Partial least squares. Categorical data analysis: Contingency tables and measures of association, Logistic regression and log linear models; generalized linear models, Bioassay analysis, generalized estimating equations. Weighted least squares regression. Exact methods.

Bayesian analysis: Bayesian modeling and inference for generalized linear models, accelerated life failure models, Cox regression models and piecewise exponential models, General procedure fits Bayesian models with arbitrary priors and likelihood functions.

Multivariate analysis: Factor analysis; principal components; canonical correlation and discriminate analysis; path analysis; structural equations.

Survival analysis: Comparison of survival distributions; accelerated failure time models; proportional hazards models.

Psychometric analysis: Multidimensional scaling; conjoint analysis with variable transformations; correspondence analysis.

Cluster Analysis: Hierarchical clustering of multivariate data or distance data; disjoint clustering of large data sets; nonparametric clustering with hypothesis tests for the number of clusters.

Nonparametric analysis : Nonparametric analysis of variance. Exact probabilities computed for many nonparametric statistics. Kruskal-Wallis, Wilcoxon-Mann-Whitney and Friedman tests.

Other rank tests for balanced or unbalanced one-way or two-way designs.

Survey data analysis: Sample selection; descriptive statistics and t-tests; linear and logistic regression; frequency table analysis Multiple imputation for missing values: Regression and propensity scoring for monotone missing patterns. MCMC method for arbitrary missing patterns. Combine results for statistically valid inferences. Study planning: Power and Sample Size application provides interface for computation of sample sizes and characterization of power for t-tests, confidence intervals, linear models, tests of proportions and rank tests for survival analysis.

Interpretation

After the data is collected and analysed using several data analysis methods, the next task is to draw Inferences from these data. In other words, Interpretation of data needs to be done, so as to derive certain conclusions, which is the whole purpose of the research study.

Definition "Interpretation refers to the process of making sense of numerical data that has been collected, analysed and presented"

Need of Interpretation

- Maintaining Continuity of Research
- Pointers for further Research
- Communicate Significance of Research
- Transition of Exploratory Research to Experimental Research

Techniques of Interpretation (Steps)

1. Explanations of the relations which the researcher has found during the research study
2. Interpretation of the lines of relationship in terms of the underlying processes
3. Finding thread of uniformity that lies beneath the diversified research findings and thereby, forming generalizations and theories.
4. Extraneous information, collected during the study, must also be considered while interpreting the final results of research study, as it may result in better understanding of the problem in hand.
5. Consulting an expert having an insight of the research study who points out omissions and errors in logical argumentation will result in correct interpretation and, add to usefulness of the research results.
6. All relevant factors affecting the problem must be considered before forming Interpretations or Generalizations. Otherwise, it may lead to incorrect conclusions.

Precautions in Interpretation

- Ensure Proper Data Collection
- Data Analysis
- Errors can Arise
- Results of Hypothesis Testing
- Statistical Measures
- Avoid Broad Generalizations
- Quality of Interpretation

Marketing research in:

Product Management: One of the major scope of marketing research is to manage the current products and new products. In product management Marketing Research is helpful in

- Competitive Intelligence – To understand the competitive product strategy.
- Prelaunch strategy for new products o
- Test Marketing – To monitor the performance of the brand by launching in a select area and then taking it across the country. In other words it is a small-scale product launch used to determine the likely acceptance of the product when it is introduced into a wider market. o
- Concept testing - to test the acceptance of a concept by target consumers. •

Sales analysis: Marketing research is used to study the sales trend and make suitable strategies when required. It is used to

- Assess market potential

- Estimation of demand for a product
- Market share estimation o Study seasonal variation for a product
- Market segmentation studies
- Estimate size of the market
- Need analysis to find out where the product fits in

Corporate Research: Marketing Research is used to analyse the corporate effectiveness. Some examples are:

- Assessing the image of the company
- Knowledge of the company activities

Advertising Research: Advertising is an arena in which Marketing Research is extensively used. Some scope are:

- Readership feedbacks – Mainly carried out for newspapers and magazines
- Advertising Recall – To assess the recall of television or other advertising and thereby assess its effectiveness.

Syndicated Research: This is compiled by agencies on a regular basis and sold to organisations on subscription basis.