## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### INTRODUCTION TO RESEARCH

#### UNIT-I

Introduction to Research: Meaning of research; Types of research- Exploratory research, Conclusive research; The process of research; Research applications in social and business sciences; Features of a Good research study. Defining the Research problem; Management Decision Problem vs Management Research Problem; Problem identification process; Components of the research problem; Formulating the research hypothesis- Types of Research hypothesis; Writing a research proposal- Contents of a research proposal and types of research proposals.

#### **MEANING OF RESEARCH**

Research is an endeavour to discover, develop and verify knowledge. It is an intellectual act that begins with the asking of questions and progressiveness through the critical examination of evidence that is both relevant and reliable to the revelation of truth. Research can be defined as the search for knowledge, or as any systematic investigation, with an open mind, to establish novel facts, solve new or existing problems, prove new ideas, or develop new theories, usually using a scientific method. The primary purpose of research is discovering, interpreting, and the development of methods and systems for the advancement of human knowledge on a wide variety of scientific matters of our world and the universe.

#### **DEFINITIONS OF RESEARCH**

Webster's New International Dictionary: "Research is careful critical enquiry or examination in seeking facts or principles, diligent investigation in order to ascertain something.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

**John W. Best**: Research may be defined as the systematic and objective analysis and recording to controlled observations that may lead to the development of generalization, principles of theories resulting in prediction and possible ultimate control of events

**Robert Ross**: Research is essentially an investigation, a recording and an analysis of evidence too the purpose of gaining knowledge

**Clifford Woody**: Research comprises of defining and redefining problems, formulating hypothesis or suggested solutions, collecting, organizing and evaluating data making deduction and reaching conclusion and at last carefully testing conclusions to determine whether they fit in formulating hypothesis.

**John Dewey**: Research is considered to be the formal, systematic, intensive process of carrying on the scientific method of analysis. It involves a more systematic structure of investigation, usually in some sort of formal record of procedures and a report of result or conclusions.

**Fred Kerlinger**: Research is an organized enquiry designed and carried out to provide information for solving a problem.

Redman and Mory: Systematized effort to gain new knowledge

#### PURPOSE OF RESEARCH

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet.

- 1. To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as *exploratory* or *formulative* research studies);
- 2. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as *descriptive* research studies);
- 3. To determine the frequency with which something occurs or with which it is associated with something else (studies with this object in view are known as

# CLASS: I MBACOURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

*diagnostic* research studies);

4. To test a hypothesis of a causal relationship between variables (such studies are known as *hypothesis-testing* research studies).

#### **TYPES OF RESEARCH**

#### 1) Descriptive Research

A descriptive study may be simple or complex. It determines who, what, where and how of a topic. It is concerned with describing the characteristics (e.g., the extent to which libraries are used) estimating the proportion of the people in a specified population who hold certain views or attitudes (e.g., how many favour the abolition of capital punishment?) predicting specifically (e.g., how may will cash their government bonds during a given period?) and discovering or testing whether certain variables are associated (e.g., people who spend a good deal of time for reading, go to movies often with each other)

Descriptive study may employ any of or all the methods of data collection such as interview, questionnaire, observation, tests and cumulative record cards. In the descriptive study the researcher must be careful to make a note of the bias and extravagance that may creep in at every stage of the study – formulating the objectives of the study; designing the methods of data collection; selecting the sample; collecting, processing and analyzing the data; and reporting the findings.

#### 1) Analytical Research

Analytical study makes use of available information by analyzing and doing critical evaluation. Analytical study makes use of higher level statistical tools which are not commonly used.

#### 2) Applied Research

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Applied research aims at finding a solution for an immediate problem faced by any business organization. This research deals with real life situations. Example: "Why have sales decreased during the last quarter"? Market research is an example of applied research. Applied research has a practical problem-solving emphasis. It brings out many new facts.

#### **Examples:**

- 1. Use of fibre glass body for cars instead of metal.
- 2. To develop a new market for the product.

#### 3) Fundamental Research

This is otherwise known as basic research or fundamental research. Gathering knowledge for knowledge's sake is known as fundamental research. It does not have any commercial potential. It is not connected to any practical problem. e.g. Theory of Relativity. It is only for the enrichment of the knowledge.

#### 4) Quantitative Research

Quantitative researches are based on the measurements of quantity or amounts. It means that these type of researches deals with items which are expressed in numbers.

## 5) Qualitative Research

Qualitative researches deals with the qualitative phenomena. i.e. anything which cannot be expressed in numerical terms. Motivation research is an example of qualitative research.

## 6) Conceptual Research

Conceptual research is that related to some abstract idea(s) or theory. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

## 7) Empirical Research

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Empirical research relies on experience or observation alone, often without due regard for system and theory. It is data-based research, coming up with conclusions which are capable of being verified by observation or experiment. We can also call it as experimental type of research. In such a research it is necessary to get at facts firsthand, at their source, and actively to go about doing certain things to stimulate the production of desired information. In such a research, the researcher must first provide himself with a working hypothesis or guess as to the probable results. He then works to get enough facts (data) to prove or disprove his hypothesis. He then sets up experimental designs which he thinks will manipulate the persons or the materials concerned so as to bring forth the desired information. Such research is thus characterized by the experimenter's control over the variables under study and his deliberate manipulation of one of them to study its effects. Empirical research is appropriate when proof is sought that certain variables affect other variables in some way. Evidence gathered through experiments or empirical studies is today considered to be the most powerful support possible for a given hypothesis.

#### 8) One-time research or Longitudinal Research

In the former case the research is confined to a single time-period, whereas in the latter case the research is carried on over several time-periods.

#### 2) Field Method

Field study is a scientific enquiry aimed at discovering the relations and interactions among sociological, physiological and educational variables in real social structures and life situations like communities, schools, factories, organizations and institutions. Hence, it is called field study.

#### 3) Exploratory Research

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Explanatory research is carried, when the reason for a problem is not clear. In exploratory research, all possible reasons which are very obvious are eliminated, thereby directing the research to proceed further with limited options.

**Example for Exploratory Research** 

#### Sales decline in a company may be due to:

- Inefficient service
- Improper price
- Inefficient sales force
- Ineffective promotion
- ➢ Improper quality

#### 4) Formalized Research

Formalized research studies are those with substantial structure and with specific hypotheses to be tested.

#### 5) Historical Research

This research is the induction of principles through research into the past and social forces which have shaped the present. Its aim is to apply reflective thinking to unsolved social problems by discovering past trends of events, facts and attitudes, and by tracing lines of development in human thought and action.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### 6) Decision Oriented Research

Decision-oriented research is always for the need of a decision maker and the researcher in this case is not free to embark upon research according to his own inclination.

#### 1) Individual and Group Research

The research undertaken by an individual is called individual research. The bulk of research activities in universities, and colleges are made by the individual. The individual research is done on the basis of one's own judgement, interest and capacity.

Group research is undertaken by several researchers. Their activities are coordinated by a director, Research conducted by a firm, trade association and government agency is performed by a team of researchers under a project director. Research in colleges and universities financed by grants is done on a group basis.

#### 2) Operations Research

This method of research has been done for solving problems by using scientific methods and quantitative techniques. While the researchers care to study the development of methods, the industrial operations researcher evinces interest in the applications of methods to solve the pressing or critical problems of their firm.

Research can also be classified as conclusion-oriented and decision-oriented. While doing conclusion-oriented research a researcher is free to pick up a problem, redesign the enquiry and is free to conceptualize as he wishes. Decision-oriented research always implies taking a rational decision. Operational research is an example of decision-oriented research.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### SIGNIFICANCE OF RESEARCH

"All progress is born of inquiry. Doubt is often better than overconfidence, for it leads to inquiry, and inquiry leads to invention" is a famous Hudson Maxim in context of which the significance of research can well be understood. Increased amounts of research make progress possible. Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organisation.

The role of research in several fields of applied economics, whether related to business or to the economy as a whole, has greatly increased in modern times. Theincreasingly complex nature of business and government has focused attention on the use of research in solving operational problems. Research, as an aid to economic policy, has gained added importance, both for government and business.

## 1) Research provides the basis for nearly all Government Policies in our Economic System

For instance, government's budgets rest in part on an analysis of the needs and desires of the people and on the availability of revenues to meet these needs. The cost of needs has to be equated to probable revenues and this is a field where research is most needed. Through research we can devise alternative policies and can as well examine the consequences of each of these alternatives. Decision-making may not be a part of research, but research certainly facilitates the decisions of the policy maker. Government has also to chalk out programmes for dealing with all facets of the country's existence and most of these will be related directly or indirectly to economic conditions. The plight of cultivators, the problems of big

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

and small business and industry, working conditions, trade union activities, the problems of distribution, even the size and nature of defense services are matters requiring research. Thus, research is considered necessary with regard to the allocation of nation's resources. Another area in government, where research is necessary, is collecting information on the economic and social structure of the nation. Such information indicates what is happening in the economy and what changes are taking place. Collecting such statistical information is by no means a routine task, but it involves a variety of research problems. These days nearly all governments maintain large staff of research technicians or experts to carry on this work. Thus, in the context of government, research as a tool to economic policy has three distinct phases of operation, viz., (i) investigation of economic structure through continual compilation of facts; (ii) diagnosis of events that are taking place and the analysis of the forces underlying them; and (iii) the prognosis, i.e., the prediction of future developments.

## 2) Research has its Special Significance in Solving various Operational and Planning Problems of Business and Industry

Operations research and market research, along with motivational research, are considered crucial and their results assist, in more than one way, in taking businessdecisions. Market research is the investigation of the structure and development of a market for the purpose of formulating efficient policies for purchasing, production and sales. Operations research refers to the application of mathematical, logical and analytical techniques to the solution of business problems of cost minimization or of profit maximization or what can be termed as optimization problems. Motivational research of determining why people behave as they do is mainly concerned with market characteristics. In other words, it is concerned with the determination of motivations underlying the consumer (market) behaviour. All these are of great help to people in business and industry who are responsible for taking

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### INTRODUCTION TO RESEARCH

business decisions. Research with regard to demand and market factors has great utility in business. Given knowledge of future demand, it is generally not difficult for a firm, or for an industry to adjust its supply schedule within the limits of its projected capacity. Market analysis has become an integral tool of business policy these days. Business budgeting, which ultimately results in a projected profit and loss account, is based mainly on sales estimates which in turn depend on business research. Once sales forecasting is done, efficient production and investment programmes can be set up around which are grouped the purchasing and financing plans. Research, thus, replaces intuitive business decisions by more logical and scientific decisions.

## 3) Research is equally important for social scientists in studying social relationships and in seeking answers to various social problems.

It provides the intellectual satisfaction of knowing a few things just for the sake of knowledge and also has practical utility for the social scientist to know for the sake of being able to do something better or in a more efficient manner. Research in social sciences is concerned both with knowledge for its own sake and with knowledge for what it can contribute to practical concerns. "This double emphasis is perhaps especially appropriate in the case of social science. On the one hand, its responsibility as a science is to develop a body of principles that make possible the understanding and prediction of the whole range of human interactions. On the other hand, because of its social orientation, it is increasingly being looked to for practical guidance. In addition to what has been stated above, the significance of research can also be understood keeping in view the following points:

- a) To those students who are to write a master's or Ph.D. thesis, research may mean careerism or a way to attain a high position in the social structure;
- b) To professionals in research methodology, research may mean a source of livelihood;

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

- c) To philosophers and thinkers, research may mean the outlet for new ideas and insights;
- d) To literary men and women, research may mean the development of new styles and creative work;
- e) To analysts and intellectuals, research may mean the generalizations of new theories.

Thus, research is the fountain of knowledge for the sake of knowledge and an important source of providing guidelines for solving different business, governmental and social problems. It is a sort of formal training which enables one to understand the new developments in one's field in a better way.

## **QUALITIES OF GOOD RESEARCH**

#### 1) Good research is Systematic

It means that research is structured with specified steps to be taken in a specified sequence in accordance with the well defined set of rules. Systematic characteristic of the research does not rule out creative thinking but it certainly does reject the use of guessing and intuition in arriving at conclusions.

#### 2) Good research is Logical

This implies that research is guided by the rules of logical reasoning and the logical process of induction and deduction are of great value in carrying out research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from some premise to a conclusion which follows from that very premise.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### 3) Good research is Empirical

It implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results.

#### 1) Good research is Replicable

This characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

#### **QUALITIES OF A GOOD RESEARCHER**

#### A) General Qualities

#### 1) Scientific Attitude

The first essential Quality of a successful research worker is that he must possess a scientific (systematic) frame (structure) of mind. He must have the determination (willpower / strength of mind) and ability to get the naked (hidden) facts and not to be influenced by one's own wishes.

As human beings he has certain praises (admiration) and prejudices (bias). He has also certain precarceived notions (ideas) about the problems being researched. He should keep all these things with him.

#### 2) Imagination and Insight

Researcher must possess high degree of imagination. He should be able to go deeper and deeper into the realm (area) of abstract social phenomena (fact / event) and visualize the intangible aspects (features) of the society

#### 3) Perseverance

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Work of scientific research requires steady of mind. Researcher should not get easily discouraged. It is equally possible that he might subsequently feel that the choice of the problem was wrong. Inspite of all this he must have more courage to face the difficulties and work patiently and continuously over long periods

#### 4) Quick Grasping Power

The researcher should possess the power to grasp the significance of things quickly

## 1) Clarity of Thinking

A good researcher should have clear idea about the terminology that he is going to

use.

# CLASS: I MBAMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### **B)** Specific Qualities

#### 1) Knowledge of the Subject

The researcher should be enough knowledge in his area of research. Such knowledge helps him in preparing questionnaire and schedule to get proper information. He can enter into face to face discussion and remove any doubts arising the minds of the people regarding the study

#### 2) Knowledge of the technique of Research

Researcher should have basic idea on tools used in his research

#### 3) Personal Taste in the Study

A personal taste in the study will inspire him and keep his morale (confidence) in times of difficulties. A forced work is often monotonous and very tiresome

#### 4) Familiarity about the Information

The researcher should be familiar with the people whom he is studying. Familiarity will help him to get intimate (close) information

#### 5) Unbiased Attitude

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

The researcher should have no preconceptions (idea / bias) about the subject under study. He should go to his research with absolutely a clean state. He should maintain an open mind and look for data which would substantiate (validate / verify) and give his theory a new meaning

#### **STEPS IN RESEARCH PROCESS**

Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps.

- 1. Formulating the Research Problem;
- 2. Extensive literature survey;
- 3. Developing the Hypothesis;
- 4. Preparing the Research Design;
- 5. Determining Sample Design;
- 6. Collecting the Data;
- 7. Execution of the Project;
- 8. Analysis of Data;
- 9. Hypothesis testing;
- 10. Generalizations and Interpretation, and
- 11. Preparation of the Report or Presentation of the Results

#### 1) Formulating the Research Problem

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

The best way of understanding the problem is to discuss it with one's own colleagues or with those having some expertise in the matter. In an academic institution the researcher can seek the help from a guide who is usually an experienced man and has several research problems in mind. Often, the guide puts forth the problem in general terms and it is up to the researcher to narrow it down and phrase the problem in operational terms. In private business units or in governmental organisations, the problem is usually earmarked by the administrative agencies with whom the researcher candiscuss as to how the problem originally came about and what considerations are involved in its possible solutions.

The researcher must at the same time examine all available literature to get himself acquainted with the selected problem. He may review two types of literature the conceptual literature concerning the concepts and theories, and the empirical literature consisting of

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

studies made earlier which are similar to the one proposed. The basic outcome of this review will be the knowledge as to what data and other materials are available for operational purposes which will enable the researcher to specify his own research problem in a meaningful context. After this the researcher rephrases the problem into analytical or operational terms i.e., to put the problem in as specific terms as possible. This task of formulating, or defining, a research problem is a step of greatest importance in the entire research process. The problem to be investigated must be defined unambiguously for that will help discriminating relevant data from irrelevant ones. Care must, however, be taken to verify the objectivity and validity of the background facts concerning the problem. Professor W.A. Neiswanger correctly states that the statement of the objective is of basic importance because it determines the data which are to be collected, the characteristics of the data which are relevant, relations which are to be explored, the choice of techniques to be used in these explorations and the form of the final report. If there are certain pertinent terms, the same should be clearly defined along with the task of formulating the problem. In fact, formulation of the problem often follows a sequential pattern where a number of formulations are set up, each formulation more specific than the preceding one, each one phrased in more analytical terms, and each more realistic in terms of the available data and resources.

#### 1) Extensive Literature Survey

Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals,

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be a great help to the researcher at this stage.

#### 1) Developing the Hypothesis

After extensive literature survey, researcher should state in clear terms the working hypothesis or hypotheses. Working hypothesis is tentative assumption made in order to draw out and test its logical or empirical consequences. As such the manner in which research hypotheses are developed is particularly important since they provide the focal point for research. They also affect the manner in which tests must be conducted in the analysis of data and indirectly the quality of data which is required for the analysis. In most types of research, the development of working hypothesis plays an important role. Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested. The role of the hypothesis is to guide the researcher by delimiting the area of research and to keep him on the right track. It sharpens his thinking and focuses attention on the more important facets of the problem. It also indicates the type of data required and the type of methods of data analysis to be used.

How does one go about developing working hypotheses? The answer is by using the following approach:

- a) Discussions with colleagues and experts about the problem, its origin and the objectives in seeking a solution;
- b) Examination of data and records, if available, concerning the problem for possible

## COURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

trends, peculiarities and other clues;

CLASS: I MBA

- c) Review of similar studies in the area or of the studies on similar problems; and
- d) Exploratory personal investigation which involves original field interviews on a limited scale with interested parties and individuals with a view to secure greater insight into the practical aspects of the problem.

Thus, working hypotheses arise as a result of a-priori thinking about the subject, examination of the available data and material including related studies and the counsel of experts and interested parties. Working hypotheses are more useful when stated in precise and clearly defined terms. It may as well be remembered that occasionally we may encounter a problem where we do not need working hypotheses, specially in the case of exploratory or formulative researches which do not aim at testing the hypothesis. But as a general rule, specification of working hypotheses in another basic step of the research process in most research problems.

#### 1) Preparing the Research Design

The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, i.e., he will have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

between variables, the suitable design will be one that minimises bias and maximises the reliability of the data collected and analysed.

There are several research designs, such as, experimental and non-experimental hypothesis testing. Experimental designs can be either informal designs (such as before- and-after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project.

The preparation of the research design, appropriate for a particular research problem, involves usually the consideration of the following:

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

#### 2) Determining Sample Design

All the items under consideration in any field of inquiry constitute a 'universe' or 'population'. A complete enumeration of all the items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Not only this, census inquiry is not possible in practice under many circumstances. For instance, blood testing is done only on sample basis. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample.

The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population. Thus, the plan to select 12 of a city's 200 drugstores in a certain way constitutes a sample design. Samples can be either probability samples or non-probability samples. With probability samples each element has a known probability of being included in the sample but the nonprobability samples do not allow the researcher to determine this probability. Probability samples are those based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling whereas non- probability samples are those based on convenience sampling, judgement sampling and quota sampling techniques. A brief mention of the important sample designs is as follows:

#### a) **Deliberate Sampling**

Deliberate sampling is also known as purposive or non-probability sampling. This sampling method involves purposive or deliberate selection of particular units of the universe for constituting a sample which represents the universe. When population elements are selected

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

for inclusion in the sample based on the ease of access, it can be called convenience sampling. If a researcher wishes to secure data from, say, gasoline buyers, he may select a fixed number of petrol stations and may conduct interviews at these stations. This would be an example of convenience sample of gasoline buyers. At times such a procedure may give very biased results particularly when the population is not homogeneous. On the other hand, in judgement sampling the researcher's judgement is used for selecting items which he considers as representative of the population. For example, a judgement sample of college students might be taken to secure reactions to a new method of teaching. Judgement sampling is used quite frequently in qualitative research where the desire happens to be to develop hypotheses rather than to generalise to larger populations.

#### b) Simple Random Sampling

This type of sampling is also known as chance sampling or probability sampling where each and every item in the population has an equal chance of inclusion in the sample and each one of the possible samples, in case of finite universe, has the same probability of being selected. For example, if we have to select a sample of 300 items from a universe of 15,000 items, then we can put the names or numbers of all the 15,000 items on slips of paper and conduct a lottery. Using the random number tables is another method of random sampling. To select the sample, each item is assigned a number from 1 to 15,000. Then, 300 five digit random numbers are selected from the table. To do this we select some random starting point and then a systematic pattern is used in proceeding through the table. We might start in the 4th row, second column and proceed down the column to the bottom of the table and then move to the top of the next column to the right. When a number exceeds the limit of the numbers in the frame, in our case over 15,000, it is simply passed over and the next number selected that does fall within the

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

relevant range. Since the numbers were placed in the table in a completely random fashion, the resulting sample is random. This procedure gives each item an equal probability of being selected. In case of infinite population, the selection of each item in a random sample is controlled by the same probability and that successive selections are independent of one another.

#### a) Systematic Sampling

In some instances the most practical way of sampling is to select every 15th name on a list, every 10th house on one side of a street and so on. Sampling of this type is known as systematic sampling. An element of randomness is usually introduced into this kind of sampling by using random numbers to pick up the unit with which to start. This procedure is useful when sampling frame is available in the form of a list. In such a design the selection process starts by picking some random point in the list and then every nth element is selected until the desired number is secured.

#### b) Stratified Sampling

If the population from which a sample is to be drawn does not constitute a homogeneous group, then stratified sampling technique is applied so as to obtain a representative sample. In this technique, the population is stratified into a number of non-overlapping subpopulations or strata and sample items are selected from each stratum. If the items selected from each stratum is based on simple random sampling the entire procedure, first stratification and then simple random sampling, is known as stratified random sampling.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### c) **Quota Sampling**

In stratified sampling the cost of taking random samples from individual strata is often so expensive that interviewers are simply given quota to be filled from different strata, the actual selection of items for sample being left to the interviewer's judgement. This is called quota sampling. The size of the quota for each stratum is generally proportionate to the size of that stratum in the population. Quota sampling is thus an important form of non-probability sampling. Quota samples generally happen to be judgement samples rather than random samples.

#### a) Cluster Sampling and Area Sampling

Cluster sampling involves grouping the population and then selecting the groups or the clusters rather than individual elements for inclusion in the sample. Suppose some departmental store wishes to sample its credit card holders. It has issued its cards to 15,000 customers. The sample size is to be kept say 450. For cluster sampling this list of 15,000 card holders could be formed into 100 clusters of 150 card holders each. Three clusters might then be selected for the sample randomly. The sample size must often be larger than the simple random sample to ensure the same level of accuracy because is cluster sampling procedural potential for order bias and other sources of error is usually accentuated. The clustering approach can, however, make the sampling procedure relatively easier and increase the efficiency of field work, specially in the case of personal interviews.

Area sampling is quite close to cluster sampling and is often talked about when the total geographical area of interest happens to be big one. Under area sampling we first divide the

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

total area into a number of smaller non-overlapping areas, generally called geographical clusters, then a number of these smaller areas are randomly selected, and all units in these small areas are included in the sample. Area sampling is specially helpful where we do not have the list of the population concerned. It also makes the field interviewing more efficient since interviewer can do many interviews at each location.

#### b) Multi-stage Sampling

This is a further development of the idea of cluster sampling. This technique is meant for big inquiries extending to a considerably large geographical area like an entire country. Under multi-stage sampling the first stage may be to select large primary sampling units such as states, then districts, then towns and finally certain families within towns. If the technique of random-sampling is applied at all stages, the sampling procedure is described as multi-stage random sampling.

## c) Sequential Sampling

This is somewhat a complex sample design where the ultimate size of the sample is not fixed in advance but is determined according to mathematical decisions on the basis of information yielded as survey progresses. This design is usually adopted under acceptance sampling plan in the context of statistical quality control.

In practice, several of the methods of sampling described above may well be used in the same study in which case it can be called mixed sampling. It may be pointed out here that normally one should resort to random sampling so that bias can be eliminated and sampling error can be estimated. But purposive sampling is considered desirable when the universe

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

happens to be small and a known characteristic of it is to be studied intensively. Also, there are conditions under which sample designs other than random sampling may be considered better for reasons like convenience and low costs. The sample design to be used must be decided by the researcher taking into consideration the nature of the inquiry and other related factors.

#### 1) Collecting the Data

In dealing with any real life problem it is often found that data at hand are inadequate, and hence, it becomes necessary to collect data that are appropriate. There are several ways of collecting the appropriate data which differ considerably in context of money costs, time and other resources at the disposal of the researcher.

Primary data can be collected either through experiment or through survey. If the researcher conducts an experiment, he observes some quantitative measurements, or the data, with the help of which he examines the truth contained in his hypothesis. But in the case of a survey, data can be collected by any one or more of the following ways:

#### a) By Observation

This method implies the collection of information by way of investigator's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by either the past behaviour or future intentions or attitudes of respondents. This method is no doubt an expensive method and

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

the information provided by this method is also very limited. As such this method is not suitable in inquiries where large samples are concerned.

#### a) Through Personal Interview

The investigator follows a rigid procedure and seeks answers to a set of pre- conceived questions through personal interviews. This method of collecting data is usually carried out in a structured way where output depends upon the ability of the interviewer to a large extent.

#### b) Through Telephone Interview

This method of collecting information involves contacting the respondents on telephone itself. This is not a very widely used method but it plays an important role in industrial surveys in developed regions, particularly, when the survey has to be accomplished in a very limited time.

#### c) By Mailing of Questionnaire

The researcher and the respondents do come in contact with each other if this method of survey is adopted. Questionnaires are mailed to the respondents with a request to return after completing the same. It is the most extensively used method in various economic and business surveys. Before applying this method, usually a Pilot Study for testing the questionnaire is conduced which reveals the weaknesses, if any, of the questionnaire.

## COURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Questionnaire to be used must be prepared very carefully so that it may prove to be effective in collecting the relevant information.

#### d) Through Schedules

CLASS: I MBA

Under this method the enumerators are appointed and given training. They are provided with schedules containing relevant questions. These enumerators go to respondents with these schedules. Data are collected by filling up the schedules by enumerators on the basis of replies given by respondents. Much depends upon the capability of enumerators so far as this method is concerned. Some occasional field checks on the work of the enumerators may ensure sincere work.

The researcher should select one of these methods of collecting the data taking into consideration the nature of investigation, objective and scope of the inquiry, financial resources, available time and the desired degree of accuracy. Though he should pay attention to all these factors but much depends upon the ability and experience of the researcher. In this context Dr A.L Bowley very aptly remarks that in collection of statistical data commonsense is the chief requisite and experience the chief teacher.

#### 1) Execution of the Project

Execution of the project is a very important step in the research process. If the execution of the project proceeds on correct lines, the data to be collected would be adequate and dependable. The researcher should see that the project is executed in a systematic manner and in time. If the survey is to be conducted by means of structured questionnaires, data can be readily machine-processed. In such a situation, questions as well as the possible answers may be coded. If the data are to be collected through interviewers, arrangements

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

should be made for proper selection and training of the interviewers. The training may be given with the help of instruction manuals which explain clearly the job of the interviewers at each step. Occasional field checks should be made to ensure that the interviewers are doing their assigned job sincerely and efficiently. A careful watch should be kept for unanticipated factors in order to keep the survey as much realistic as possible. This, in other words, means that steps should be taken to ensure that the survey is under statistical control so that the collected information is in accordance with the pre-defined standard of accuracy. If some of the respondents do not cooperate, some suitable methods should be designed to tackle this problem. One method of dealing with the non-response problem is to make a list of the non-respondents and take a small sub-sample of them, and then with the help of experts vigorous efforts can be made for securing response.

#### 2) Analysis of Data

After the data have been collected, the researcher turns to the task of analyzing them. The analysis of data requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through

coding, tabulation and then drawing statistical inferences. The unwieldy data should necessarily be condensed into a few manageable groups and tables for further analysis. Thus, researcher should classify the raw data into some purposeful and usable categories. Coding operation is usually done at this stage through which the categories of data are transformed into symbols that may be tabulated and counted. Editing is the procedure that improves the quality of the data for coding. With coding the stage is ready for tabulation. Tabulation is a part of the technical procedure wherein the classified data are put in the form of tables. The mechanical devices can be made use of at this juncture. A great deal of

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

data, specially in large inquiries, is tabulated by computers. Computers not only save time but also make it possible to study large number of variables affecting a problem simultaneously.

Analysis work after tabulation is generally based on the computation of various percentages, coefficients, etc., by applying various well defined statistical formulae. In the process of analysis, relationships or differences supporting or conflicting with original or new hypotheses should be subjected to tests of significance to determine with what validity data can be said to indicate any conclusion(s). For instance, if there are two samples of weekly wages, each sample being drawn from factories in different parts of the same city, giving two different mean values, then our problem may be whether the two mean values are significantly different or the difference is just a matter of chance. Through the use of statistical tests we can establish whether such a difference is a real one or is the result of random fluctuations. If the difference happens to be real, the inference will be that the two samples come from different universes and if the difference is due to chance, the conclusion would be that the two samples belong to the same universe. Similarly, the technique of analysis of variance can help us in analysing whether three or more varieties of seeds grown on certain fields yield significantly different results or not. In brief, the researcher can analyse the collected data with the help of various statistical measures.

#### 1) Hypothesis Testing

After analysing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis-testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypotheses to start with, generalisations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

#### **3)** Generalizations and Interpretation

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, i.e., to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalisations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

#### 4) Preparation of the Report or Presentation of the Results

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

1) The layout of the report should be as follows: (i) the preliminary pages; (ii) the main text, and (iii) the end matter.

In its preliminary pages the report should carry title and date followed by acknowledgements

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts, if any, given in the report.

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

- a) Introduction: It should contain a clear statement of the objective of the research and an explanation of the methodology adopted in accomplishing the research. The scope of the study along with various limitations should as well be stated in this part.
- b) **Summary of Findings**: After introduction there would appear a statement of findings and recommendations in non-technical language. If the findings are extensive, they should be summarised.
- c) **Main Report**: The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections.
- d) **Conclusion**: Towards the end of the main text, researcher should again put down the results of his research clearly and precisely. In fact, it is the final summing up.

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

2) Report should be written in a concise and objective style in simple language avoiding vague expressions such as 'it seems,' 'there may be', and the like.

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

3) Charts and illustrations in the main report should be used only if they present the information more clearly and forcibly.

4) Calculated 'confidence limits' must be mentioned and the various constraints experienced in conducting research operations may as well be stated.

#### **RESEARCH DESIGN**

The formidable problem that follows the task of defining the research problem is the preparation of the design of the research project, popularly known as the "research design". Decisions regarding what, where, when, how much, by what means concerning an inquiry or a research study constitute a research design. "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 with economy in procedure."1 In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. More explicitly, the desing decisions happen to be in respect of:

- 1. What is the study about?
- 2. Why is the study being made?
- 3. Where will the study be carried out?
- 4. What type of data is required?
- 5. Where can the required data be found?

## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

- 6. What periods of time will the study include?
- 7. What will be the sample design?
- 8. What techniques of data collection will be used?
- 9. How will the data be analyzed?
- 10. In what style will the report be prepared?

Keeping in view the above stated design decisions, one may split the overall research design into the following parts:

- a) the sampling design which deals with the method of selecting items to be observed for the given study;
- b) the observational design which relates to the conditions under which the observations are to be made;
- c) the statistical design which concerns with the question of how many items are to be observed and how the information and data gathered are to be analysed; and
- d) the operational design which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

From what has been stated above, we can state the important features of a research design as under:

- i) It is a plan that specifies the sources and types of information relevant to the research problem.
- ii) It is a strategy specifying which approach will be used for gathering and analysing the data.
- iii) It also includes the time and cost budgets since most studies are done under these

# CLASS: I MBACOURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

two constraints.

In brief, research design must, at least, contain—(a) a clear statement of the research problem; (b) procedures and techniques to be used for gathering information;

(c) the population to be studied; and (d) methods to be used in processing and analyzing data.

#### COMPONENTS OF RESEARCH DESIGN

#### 1) Title of the Study

Enough information should be given in the title, to identify the study. The researcher should consider the following while selecting a title

- ✤ The title should be specific to the area of the study
- The title should indicate the topic of the study
- The language of the title should be professional in nature but not pedantic (dull)
- The title should be as brief as possible

#### 2) Introduction

Under this heading a brief explanation of the genesis of the problem should be given.

# CLASS: I MBACOURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### 3) Statement of the Problem

After a brief introduction explaining the genesis of the problem, the researcher should state the problem. While stating the problem use of clear, simple and concise statement is preferable

#### 4) Review of Previous Studies

Under this head the researcher presents what is so far known about the problem under consideration. All related studies need not be discussed. The researcher may describe the most important ones. A review of the previous studies enables the researcher to know the different areas covered by various studies, to concentrate on the areas where little research has been carried out, to look into various merits and shortcomings of certain studies already completed and to verify the present findings with that of the previous ones

#### 1) Scope of the Study

This heading gives an idea about the extend of the study. The scope of the study is dependent on several factors such as the time and money available with the investigator, availability of the sample, co-operation of the respondents and the like

#### 2) Objectives of the Study
## CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

The task of the researcher is to lay down the objectives precisely. The objectives enlighten the researcher's own mind and lead to more efficient enquiry. Once the objectives are selected, the study can be undertaken with required accuracy and within the given resources. The objectives mentioned should be well within the scope of the study

#### 3) Hypothesis to be Tested

Hypothesis is a proposition, condition or principle which is assumed, perhaps without belief in order to draw logical conclusions. Hypotheses are formulated to explain observed facts, conditions, or behaviours and to serve as a guide in the research process. Each hypothesis is individually tested to determine whether it is tenable (reasonable) or not. Hypothesis should be stated in clear, concise and understandable language

#### 4) Operational Definition of Concepts

All terms that might be ambiguous should be clarified. A clear understanding of the terms used in the study is important. It is necessary to identify and label the variables. The variables can be labeled as independent variable and dependent variable. An independent variable is the factor which is measured, manipulated or selected by the experiments. A dependent variable is that factor which is measured to determine the effect of independent variable

#### 1) Geographical Area to be Covered

# CLASS: I MBAMETHODOLOGY FOR MANAGEMENTCOURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Under this head the area to be covered by the study is mentioned

#### 2) Reference Period

The period of study can be mentioned under this heading

#### 3) Methodology

The researcher should first determine the kind of information needed to answer the research questions. Secondly he must know the sources of data and finally he must know the means by which he will gather information which is known as methodology

#### 4) Sampling

Sampling involves taking a portion of population, making observation on this smaller group and then generalizing the findings to be applied to a large population. The small group that is observed is called the sample and the large group is called population. The sample is the portion of the population and it must be representative of the population. If the sample is biased, the findings of the study cannot be generalized

#### 5) Tools for Collection of Data

The choice of method for collecting the data is governed by the subject matter, the unit of enquiry and the scale of the study. A study of the behavior of a group would call for

# COURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

observational techniques, for a simple enquiry among the cross section of population, a questionnaire is adequate. A survey of general population entailing many complicated questions would call for personal interviewing

#### 6) Plan of Analysis

CLASS: I MBA

Once the data have been collected, they must be reduced to meaningful results by statistical analysis so that the conclusions for generalization can be drawn from them. The researcher should describe how he plans to organize the data. He should decide the statistical treatment. The appropriateness of the technique should be discussed. He must discuss the procedure for treating the data

#### 5) Research Report

The results should be communicated. The format consists of three parts

- Part I Preliminary Pages, which contain title page, approval sheet, preface (if any), table of contents, list of tables (if any) and list of figures (if any)
- Part II Body of the report, which covers content chapters
- Part III Supplementary pages which included bibliography appendix (if any) and index (if any)

#### 6) Time Schedule

The researcher has to work out a time schedule for his research work. The time required

### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

includes the following:

- > Time to be used for preparing the theoretical background
- Time to be used for preparing the data gathering devices such as questionnaire, interview schedule, record sheet, interviewer's manual and time and expenses sheets
- Time to be used for data collection
- Time to be used for processing the data
- Time to be used for writing the report
- Time to be used for submitting the thesis

#### 7) Financial Budget

It is desirable to work out the budget which gives an idea about the money needed to complete the project. The cost estimates of the project will include stationery, printing, sample selection, field work, mailing, processing, tabulating, preparation of report and overheads.

The research design will differ depending on the research purpose. The research purposes may purport to gain familiarity with a phenomenon, portray accurately the characteristics of a particular individual, situation or group, determine the frequency with which something occurs and test a hypothesis of casual relationship between variables. In practice, these different types of studies are not always sharply distinguishable. The research design will be more or less the same for any type of study

In research process, the first and foremost step happens to be that of selecting and properly defining a research problem.\* A researcher must find the problem and formulate it so that it becomes susceptible to research. Like a medical doctor, a researcher must examine all the symptoms

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

(presented to him or observed by him) concerning a problem before he can diagnose correctly. To define a problem correctly, a researcher must know: what a problem is?

#### WHAT IS A RESEARCH PROBLEM?

A research problem, in general, refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation and wants to obtain a solution for the same. Usually we say that a research problem does exist if the following conditions are met with:

- (i) There must be an individual (or a group or an organisation), let us call it '*I*,' to whom the problem can be attributed. The individual or the organisation, as the case may be, occupies an environment, say '*N*', which is defined by values of the uncontrolled variables,  $Y_j$ .
- (ii) There must be at least two courses of action, say  $C_1$  and  $C_2$ , to be pursued. A course of action is defined by one or more values of the controlled variables. For example, the number

of items purchased at a specified time is said to be one course of action.

- (iii) There must be at least two possible outcomes, say  $O_1$  and  $O_2$ , of the course of action, of which one should be preferable to the other. In other words, this means that there must be at least one outcome that the researcher wants, i.e., an objective.
- (iv) The courses of action available must provides some chance of obtaining the objective, but they cannot provide the same chance, otherwise the choice would not matter. Thus, if  $P(O_j | I, C_j, N)$  represents the probability that an outcome  $O_j$  will occur, if *I* select  $C_j$  in *N*,

Prepared by Dr.S.S.Shanthakumari, Assistant Professor, Department of Management, KAHE

Page 41

# COURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

then  $P bO_1 | I, C_1, N g \Box \Box P bO_1 | I, C_2, N g$ . In simple words, we can say that the choices

must have unequal efficiencies for the desired outcomes.

CLASS: I MBA

Over and above these conditions, the individual or the organisation can be said to have the problem only if 'T does not know what course of action is best, i.e., 'T', must be in doubt about the solution. Thus, an individual or a group of persons can be said to have a problem which can be technically described as a research problem, if they (individual or the group), having one or more desired outcomes, are confronted with two or more courses of action that have some but not equal efficiency for the desired objective(s) and are in doubt about which course of action is best.

We can, thus, state the components<sup>1</sup> of a research problem as under:

- (i) There must be an individual or a group which has some difficulty or the problem.
- (ii) There must be some objective(s) to be attained at. If one wants nothing, one cannot have a problem.
- (iii) There must be alternative means (or the courses of action) for obtaining the objective(s) one wishes to attain. This means that there must be *at least two means* available to a researcher for if he has no choice of means, he cannot have a problem.
- (iv) There must remain some doubt in the mind of a researcher with regard to the selection of alternatives. This means that research must answer the question concerning the relative efficiency of the possible alternatives.
- (v) There must be some environment(s) to which the difficulty pertains.

Thus, a research problem is one which requires a researcher to find out the best solution for the given problem, i.e., to find out by which course of action the objective can be attained optimally in the context of a given environment. There are several factors which may result in

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021 INTRODUCTION TO RESEARCH

making the problem complicated. For instance, the environment may change affecting the efficiencies of the courses of action or the values of the outcomes; the number of alternative courses of action may be very large; persons not involved in making the decision may be affected by it and react to it favourably or unfavourably, and similar other factors. All such elements (or at least the important ones) may be thought of in context of a research problem.

#### SELECTING THE PROBLEM

The research problem undertaken for study must be carefully selected. The task is a difficult one, although it may not appear to be so. Help may be taken from a research guide in this connection. Nevertheless, every researcher must find out his own salvation for research problems cannot be borrowed. A problem must spring from the researcher's mind like a plant springing from its own seed. If our eyes need glasses, it is not the optician alone who decides about the number of the lens we require. We have to see ourselves and enable him to prescribe for us the right number by cooperating with him. Thus, a research guide can at the most only help a researcher choose a subject. However, the following points may be observed by a researcher in selecting a research problem or a subject for research:

(i) Subject which is overdone should not be normally chosen, for it will be a difficult task to throw any new light in such a case.

- (ii) Controversial subject should not become the choice of an average researcher.
- (iii) Too narrow or too vague problems should be avoided.
- (iv) The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach. Even then it is quite difficult to supply definitive ideas concerning how a researcher should obtain ideas for his research. For this purpose, a researcher should contact an expert or a professor in the University who is already engaged in research. He may as well

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

read articles published in current literature available on the subject and may think how the techniques and ideas discussed therein might be applied to the solution of other problems. He may discuss with others what he has in mind concerning a problem. In this way he should make all possible efforts in selecting a problem.

- (v) The importance of the subject, the qualifications and the training of a researcher, the costs involved, the time factor are few other criteria that must also be considered in selecting a problem. In other words, before the final selection of a problem is done, a researcher must ask himself the following questions:
  - (a) Whether he is well equipped in terms of his background to carry out the research?
  - (b) Whether the study falls within the budget he can afford?
  - (c) Whether the necessary cooperation can be obtained from those who must participate in research as subjects?

If the answers to all these questions are in the affirmative, one may become sure so far as the practicability of the study is concerned.

(vi) The selection of a problem must be preceded by a preliminary study. This may not be necessary when the problem requires the conduct of a research closely similar to one that has already been done. But when the field of inquiry is relatively new and does not have available a set of well developed techniques, a brief feasibility study must always be undertaken.

If the subject for research is selected properly by observing the above mentioned points, the research will not be a boring drudgery, rather it will be love's labour. In fact, zest for work is a must. The subject or the problem selected must involve the researcher and must have an upper most place in his mind so that he may undertake all pains needed for the study.

#### NECESSITY OF DEFINING THE PROBLEM

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

**INTRODUCTION TO RESEARCH** 

Quite often we all hear that a problem clearly stated is a problem half solved. This statement signifies the need for defining a research problem. The problem to be investigated must be defined unambiguously for that will help to discriminate relevant data from the irrelevant ones. A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles. Questions like: What data are to be collected? What characteristics of data are relevant and need to be studied? What relations are to be explored. What techniques are to be used for the purpose? and similar other questions crop up in the mind of the researcher who can well plan his strategy and find answers to all such questions only when the research problem has been well defined. Thus, defining a research problem properly is a prerequisite for any study and is a step of the highest importance. In fact, formulation of a problem is often more essential than its solution. It is only on careful detailing the research problem that we can work out the research design and can smoothly carry on all the consequential steps involved while doing research.

#### **TECHNIQUE INVOLVED IN DEFINING A PROBLEM**

Let us start with the question: What does one mean when he/she wants to define a research problem? The answer may be that one wants to state the problem along with the bounds within which it is to be studied. In other words, defining a problem involves the task of laying down boundaries within which a researcher shall study the problem with a pre-determined objective in view.

How to define a research problem is undoubtedly a herculean task. However, it is a task that must be tackled intelligently to avoid the perplexity encountered in a research operation. The usual approach is that the researcher should himself pose a question (or in case someone else wants the researcher to carry on research, the concerned individual, organisation or an authority should pose the question to the researcher) and set-up techniques and procedures for throwing light on the question concerned for formulating or defining the research problem. But such an approach generally does not produce definitive results because the question

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

phrased in such a fashion is usually in broad general terms and as such may not be in a form suitable for testing.

Defining a research problem properly and clearly is a crucial part of a research study and must in no case be accomplished hurriedly. However, in practice this a frequently overlooked which causes a lot of problems later on. Hence, the research problem should be defined in a systematic manner, giving due weightage to all relating points. The technique for the purpose involves the undertaking of the following steps generally one after the other: (i) statement of the problem in a general way; (ii) understanding the nature of the problem; (iii) surveying the available literature (iv) developing the ideas through discussions; and (v) rephrasing the research problem into a working proposition.

A brief description of all these points will be helpful.

(i) Statement of the problem in a general way: First of all the problem should be stated in a broad general way, keeping in view either some practical concern or some scientific or intellectual interest. For this purpose, the researcher must immerse himself thoroughly in the subject matter concerning which he wishes to pose a problem. In case of social research, it is considered advisable to do some field observation and as such the researcher may undertake some sort of preliminary survey or what is often called *pilot survey*. Then the researcher can himself state the problem or he can seek the guidance of the guide or the subject expert in accomplishing this task. Often, the guide puts forth the problem in general terms, and it is then up to the researcher to narrow it down and phrase the problem in operational terms. In case there is some directive from an organisational authority, the problem then can be stated accordingly. The problem stated in a broad general way may contain various ambiguities which must be resolved by cool thinking and rethinking over the problem. At the same time the feasibility of a particular solution has to be considered and the same should be kept in view while stating the problem.

(ii) Understanding the nature of the problem: The next step in defining the problem is

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

to understand its origin and nature clearly. The best way of understanding the problem is to discuss it with those who first raised it in order to find out how the problem originally came about and with what objectives in view. If the researcher has stated the problem himself, he should consider once again all those points that induced him to make a general statement concerning the problem. For a better understanding of the nature of the problem involved, he can enter into discussion with those who have a good knowledge of the problem concerned or similar other problems. The researcher should also keep in view the environment within which the problem is to be studied and understood.

(iii) Surveying the available literature: All available literature concerning the problem at hand must necessarily be surveyed and examined before a definition of the research problem is given. This means that the researcher must be well-conversant with relevant theories in the field, reports and records as also all other relevant literature. He must devote sufficient time in reviewing of research already undertaken on related problems. This is done to find out what data and other materials, if any, are available for operational purposes. "Knowing what data are available often serves to narrow the problem itself as well as the technique that might be used."<sup>2</sup>. This would also help a researcher to know if there are certain gaps in the theories, or whether the existing theories applicable to the problem under study are inconsistent with each other, or whether the findings of the different studies do not follow a pattern consistent with the theoretical expectations and so on. All this will enable a researcher to take new strides in the field for furtherance of knowledge i.e., he can move up starting from the existing premise. Studies on related problems are useful for indicating the type of difficulties that may be encountered in the present study as also the possible analytical shortcomings. At times such studies may also suggest useful and even new lines of approach to the present problem.

(iv) Developing the ideas through discussions: Discussion concerning a problem often produces useful information. Various new ideas can be developed through such an exercise.

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

Hence, a researcher must discuss his problem with his colleagues and others who have enough experience in the same area or in working on similar problems. This is quite often known as an *experience survey*. People with rich experience are in a position to enlighten the researcher on different aspects of his proposed study and their advice and comments are usually invaluable to the researcher. They help him sharpen his focus of attention on specific aspects within the field. Discussions with such persons should not only be confined to the formulation of the specific problem at hand, but should also be concerned with the general approach to the given problem, techniques that might be used, possible solutions, etc.

(v) **Rephrasing the research problem:** Finally, the researcher must sit to rephrase the research problem into a working proposition. Once the nature of the problem has been clearly understood, the environment (within which the problem has got to be studied) has been defined, discussions over the problem have taken place and the available literature has been surveyed and examined, rephrasing the problem into analytical or operational terms is not a difficult task. Through rephrasing, the researcher puts the research problem in as specific terms as possible so that it may become operationally viable and may help in the development of working hypotheses.

In addition to what has been stated above, the following points must also be observed while defining a research problem:

- (a) Technical terms and words or phrases, with special meanings used in the statement of the problem, should be clearly defined.
- (b) Basic assumptions or postulates (if any) relating to the research problem should be clearly stated.
- (c) A straight forward statement of the value of the investigation (i.e., the criteria for the selection of the problem) should be provided.
- (d) The suitability of the time-period and the sources of data available must also be considered by the researcher in defining the problem.

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

(e) The scope of the investigation or the limits within which the problem is to be studied must be mentioned explicitly in defining a research problem.

**Research hypothesis:** When a prediction or a hypothesised relationship is to be tested by scientific methods, it is termed as research hypothesis. The research hypothesis is a predictive statement that relates an independent variable to a dependent variable. Usually a research hypothesis must contain, at least, one independent and one dependent variable. Predictive statements which are not to be objectively verified or the relationships that are assumed but not to be tested, are not termed research hypotheses.

#### WHAT IS A HYPOTHESIS?

Ordinarily, when one talks about hypothesis, one simply means a mere assumption or some supposition to be proved or disproved. But for a researcher hypothesis is a formal question that he intends to resolve. Thus a hypothesis may be defined as a proposition or a set of proposition set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as aprovisional conjecture to guide some investigation or accepted as highly probable in the light of established facts. Quite often a research hypothesis is a predictive statement, capable of being tested by scientific methods, that relates an independent variable to some dependent variable. For example, consider statements like the following ones:

"Students who receive counselling will show a greater increase in creativity than students not receiving counselling" Or the automobile A is performing as well as automobile B. These are hypotheses capable of being objectively verified and tested. Thus, we may conclude that a hypothesis states what we are looking for and it is a proposition which can be put to a test to determine its validity.

#### **Characteristics of hypothesis:**

Hypothesis must possess the following characteristics:

(i) Hypothesis should be clear and precise. If the hypothesis is not clear and precise, the inferences drawn on its basis cannot be taken as reliable.

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

(ii)Hypothesis should be capable of being tested. In a swamp of untestable hypotheses, manya time the research programmes have bogged down. Some prior study may be done by researcher in order to make hypothesis a testable one. A hypothesis "is testable if other deductions can be made from it which, in turn, can be confirmed or disproved by observation."

(iii) Hypothesis should state relationship between variables, if it happens to be a relational hypothesis.

(iv) Hypothesis should be limited in scope and must be specific. A researcher must remember that narrower hypotheses are generally more testable and he should develop such hypotheses.

(v) Hypothesis should be stated as far as possible in most simple terms so that the same is easily understandable by all concerned. But one must remember that simplicity of hypothesis has nothing to do with its significance.

(VI)Hypothesis should be consistent with most known facts i.e., it must be consistent with a substantial body of established facts. In other words, it should be one which judges accept as being the most likely.

(vii)Hypothesis should be amenable to testing within a reasonable time. One should not use even an excellent hypothesis, if the same cannot be tested in reasonable time for one cannot spend a life-time collecting data to test it.

(viii)Hypothesis must explain the facts that gave rise to the need for explanation. This means that by using the hypothesis plus other known and accepted generalizations, one should be able to deduce the original problem condition. Thus hypothesis must actually explain what it claims to explain; it should have empirical reference.

#### **TYPES OF RESEARCH HYPOTHESIS**

Basic concepts in the context of testing of hypotheses need to be explained.

(a) Null hypothesis and alternative hypothesis:

In the context of statistical analysis, we often talk about null hypothesis and alternative hypothesis. If we are to compare method A with method B about its superiority and if we proceed on the assumption that both methods are equally good, then this assumption is termed as

# CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206 UNIT: I BATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

the null hypothesis. As against this, we may think that the method A is superior or the method B is inferior, we are then stating what is termed as alternative hypothesis. The null hypothesis is generally symbolized as H0 and the alternative hypothesis as Ha.

The null hypothesis and the alternative hypothesis are chosen before the sample is drawn (the researcher must avoid the error of deriving hypotheses from the data that he collects and then testing the hypotheses from the same data). In the choice of null hypothesis, the following considerations are usually kept in view:

(a) Alternative hypothesis is usually the one which one wishes to prove and the null hypothesis is the one which one wishes to disprove. Thus, a null hypothesis represents the hypothesis we are trying to reject, and alternative hypothesis represents all other possibilities.

(b) If the rejection of a certain hypothesis when it is actually true involves great risk, it is taken as null hypothesis because then the probability of rejecting it when it is true is  $\alpha$  (the level of significance) which is chosen very small.

(c) Null hypothesis should always be specific hypothesis i.e., it should not state about or approximately a certain value.

# **RESEARCH PROPOSAL**

A research proposal is a written account that should make this all clear, not only to yourself, but to your supervisor, client or pro- moter. I therefore give some useful guidance about how to formulate and structure the proposal. The written report, paper, dissertation or thesis that marks the end of the research is an essential part of the research process. After all, what is the point of doing research if no one is told of the outcomes? I explain the art and science of writing up the account of the project, and provide some useful advice on the techniques you can use to make this process easier.

# CLASS: I MBAMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### POSSIBLE OUESTIONS

#### PART-B (2 Marks)

- 1. Define Research
- 2. Describe on Descriptive Research.
- 3. What do you mean by Analytical Research?
- 4. Briefly narrate on Analytical Research.
- 5. What do you mean by Research Design?
- 6. Briefly explain on Applied Research.
- 7. What do you understand by Fundamental Research?
- 8. Describe on (i) Quantitative Research and (ii) Qualitative Research
- 9. Briefly explicate on Empirical Research.
- 10. What is Conceptual Research?
- 11. Discuss on (i) One-time and (ii) Longitudinal Research
- 12. What is Historical Research?
- 13. What do you mean by Research Process?
- 14. What is Hypothesis?
- 15. Define Sampling.

# CLASS: I MBAMETHODOLOGY FOR MANAGEMENTCOURSE NAME: RESEARCHMETHODOLOGY FOR MANAGEMENTCOURSE CODE: 19MBAP206UNIT: IBATCH: 2019-2021

#### **INTRODUCTION TO RESEARCH**

#### Part-C (8 Marks)

- 1. Elucidate on various components of Research Design.
- 2. Explain in detail on various kinds of research.
- 3. Define Research. Explain its significance in modern times.
- 4. Explain in detail on Qualities required for a Good Researcher.
- 5. Explain in detail on different steps involved in a research process.
- 6. Describe some of the important research designs used in experimental hypothesistesting research study.
- 7. Describe in detail on different types of research.
- 8. Discuss in detail on the procedures involved in carrying out a research work.
- 9. Explain in detail on the significance of research.
- 10. Elucidate in detail on various methods of research design.

# Karpagam Academy of Higher Education Department of Management Research Methodology for Management – 19MBAP206

Unit I

# Multiple Choice Questions - Each Question Carries ONE Mark

S.No.	Questions	Option 1	Option 2	Option 3	Option 4	Answer
1	is an endeavour to discover, develop and verify knowledge	Hypothesis	Research	Character	Sample	Research
2	study may be simple or complex	Descriptive	Analytical	Applied	Fundamental	Descriptive
3	study makes use of available information by analyzing and doing critical evaluation	Qualitative	Quantitative	Analytical	Applied	Analytical
4	research aims at finding a solution for an immediate problem	Applied	Analytical	Longitudinal	Case Study	Applied
5	research is an example of applied research	Production	Market	Operations	Business	Market
6	research is otherwise known as basic research	Fundamental	Operations	Individual	Decision Oriented	Fundamental
7	research are based on the measurements of quantity or amounts	Qualitative	Conceptual	Empirical	Quantitative	Quantitative
8	research, is concerned with qualitative phenomenon	Quantitative	Qualitative	Conceptual	Empirical	Qualitative
9	research is an important type of qualitative research.	Basic	Motivation	Pure	Decision Oriented	Motivation
10	research is that related to some abstract idea or theory	Empirical	Conceptual	Field Method	Exploratory	Conceptual
11	research relies on experience or observation alone, often without due regard for system and theory	Empirical	Conceptual	Field Method	Exploratory	Empirical
12	research is confined to a single time- period	One time	Longitudinal	Descriptive	Analytical	One time
13	research is carried on over several time-periods	One time	Longitudinal	Descriptive	Analytical	Longitudinal

14	research depends upon the environment in which it is to be carried out.	Field Setting	Exploratory	Formalized	Historical	Field Setting
15	research studies are those with substantial structure and with specific hypotheses to be tested	Exploratory	Formalized	Historical	Decision Oriented	Formalized
16	research is carried, when the reason for a problem is not clear	Exploratory	Formalized	Historical	Decision Oriented	Exploratory
17	research is the induction of principles through research into the past and social forces which have shaped the present	Formalized	Historical	Decision Oriented	Exploratory	Historical
18	research is always for the need of a decision maker	Decision oriented	Qualitative	Historical	Conceptual	Decision oriented
19	research is done on the basis of one's own judgement, interest and capacity	Descriptive	Analytical	Group	Individual	Individual
20	research is undertaken by several researchers	Group	Descriptive	Analytical	Applied	Group
21	research has been done for solving problems by using scientific methods and quantitative techniques	Quantitative	Applied	Descriptive	Operations	Operations
22	research is the investigation of the structure and development of a market for the purpose of formulating efficient policies for purchasing, production and	Market	Motivation	Operations	Production	Market
23	consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps	Planning	Research Process	Research Process	Transcription	Research Process
24	determines the data which are to be collected	Objective of Study	Research Design	Review of Literature	Hypothesis	Objective of Study
25	is nothing but an assumption	Research	Hypothesis	Editing	Transcription	Hypothesis
26	is a blue print of research	Research Process	Objectives of the Study	Research Design	Hypothesis	Research Design
27	A research design is considered appropriate if the purpose of the research study is that of exploration	Flexible	Rigid	Experimental	Non-experimental	Flexible

28	When the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will beresearch design	Latin	Rigid	Complex	Factorial	Rigid
29	A complete enumeration of all the items in the 'population' is known as	Probability Sample	Non- Probability	Census	Cluster	Census
30	is a very important step in the research process	Review of Literature	Data Collection	Analysis work	Execution of the Project	Execution of the Project
31	requires a number of closely related operations such as establishment of categories, the application of these categories to raw data through coding, tabulation and then drawing statistical inferences	Analysis of Data	Data Verification	Transcription	Classification	Analysis of Data
32	operation where the categories of data are transformed into symbols that may be tabulated and counted	Editing	Coding	Tabulation	Analysis of Data	Coding
33	is the procedure that improves the quality of the data for coding	Editing	Coding	Tabulation	Analysis of Data	Editing
34	is a part of the technical procedure wherein the classified data are put in the form of tables	Analysis of Data	Editing	Coding	Tabulation	Tabulation
35	The process of may quite often trigger off new questions which in turn may lead to further researches	Generalization	Interpretation	Hypothesis Testing	Analysis of Data	Interpretation
36	is a blue print of research	Research Design	Research Process	Objectives of the Study	Hypothesis	Research Design
37	is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure	Research Process	Objectives of the Study	Hypothesis	Research Design	Research Design

38	gives an idea about the extend of the study	Scope of Study	Objectives of the Study	Hypothesis of the Study	Operational Definitions of the Study	Scope of Study
39	research studies are also termed as formulative research studies	Exploratory	Descriptive	Analytical	Applied	Exploratory
40	is careful critical enquiry or examination in seeking facts or principles, diligent investigation in order to ascertain something	Enquiry	Inquiry	Research	Investigation	Research
41	research is mainly concerned with generalisations and with the formulation of a theory.	Fundamental	Operations	Individual	Decision Oriented	Fundamental
42	research has a practical problem- solving emphasis	Applied	Exploratory	Formalized	Group	Applied
43	is the process of induction and deduction are of great value in carrying out research	Systematic	Logical	Empirical	Replicable	Logical
44	research is structured with specified steps to be taken in a specified sequence in accordance with the well defined set of rules	Systematic	Logical	Empirical	Replicable	Systematic
45	research implies that research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity to research results	Systematic	Logical	Replicable	Empirical	Empirical
46	characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions	Systematic	Logical	Replicable	Empirical	Replicable
47	contain a clear statement of the objective of the research and an explanation of the methodology adopted in accomplishing the research	Introduction Chapter	Review of Literature Chapter	Analysis and Interpretation Chapter	Summary of Findings Chapter	Introduction Chapter

48	should be very specific and limited to the piece of research in hand because it has to be tested	Transcription	Classification	Hypothesis	Sample Design	Hypothesis
49	research is appropriate when proof is sought that certain variables affect other variables in some way	Formalized	Historical	Empirical	Individual	Empirical
50	research of determining why people behave as they do is mainly concerned with market characteristics	Production	Market	Motivation	Operations	Motivation
51	literature concerning the concepts and theories	Conceptual	Empirical	Historical	Theoretical	Conceptual
52	literature consisting of studies made earlier which are similar to the one proposed	Conceptual	Empirical	Historical	Theoretical	Empirical
53	is discovering, interpreting, and the development of methods and systems for the advancement of human knowledge on a wide variety of scientific matters of our world and the universe	Interpretation	Investigation	Enquiry	Research	Research
54	Gathering knowledge for knowledge's sake is known as research	Applied	Analytical	Descriptive	Fundamental	Fundamental
55	research refers to the application of mathematical, logical and analytical techniques for cost minimization or of profit maximization	Production	Market	Motivation	Operations	Operations
56	is the focal point for research	Observation	Questionnaire	Objectives of the Study	Hypothesis	Hypothesis
57	should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis	Introduction	Review of Literature	Conclusion	Analysis and Interpretation	Conclusion
58	Drawing of inferences for statistical computations is known as	Interpretation	Generalization	Hypothesis Testing	Analysis of Data	Interpretation

59	is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money	Hypothesis	Research Process	Objectives of the Study	Research Design	Research Design
60	research discovers or tests whether certain variables are associated	Historical	One time	Conceptual	Descriptive	Descriptive

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-2021

#### **RESEARCH AND SAMPLING DESIGN**

#### **UNIT-II**

Research Design: Meaning of Research Designs; Nature and Classification of Research Designs; Exploratory Research Designs: Secondary Resource analysis, Case study Method, Expert opinion survey, Focus group discussions; Descriptive Research Designs: Cross-sectional studies and Longitudinal studies; Experimental Designs, Errors affecting Research Design.

Sampling: Sampling concepts- Sample vs Census, Sampling vs Non Sampling error; Sampling Design-Probability and Non Probability Sampling design; Determination of Sample size- Sample size for estimating population mean, Determination of sample size for estimating the population proportion.

#### **METHODS OF RESEARCH DESIGN**

Different research designs can be conveniently described if we categorize them as: (1) research design in case of exploratory research studies; (2) research design in case of descriptive and diagnostic research studies, and (3) research design in case of hypothesis-testing research studies.

#### 1) Research design in case of exploratory research studies

Exploratory research studies are also termed as formulative research studies. The main purpose of such studies is that of formulating a problem for more precise (accurate) investigation or of developing the working hypotheses from an operational point of view. The major emphasis in such studies is on the discovery of ideas and insights. As such the research design appropriate for such studies must be flexible enough to provide opportunity for considering different aspects of a problem under study. Inbuilt flexibility in research design is needed because the research problem, broadly defined initially, is transformed into one with more precise meaning in exploratory studies, which fact may necessitate changes in the research procedure for gathering relevant data. Generally, the following three methods in the context of research design for such studies are talked about: (a) the survey of concerning literature; (b) the experience survey and (c) the analysis of 'insight-stimulating' examples.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

**UNIT: II** 

The survey of concerning literature happens to be the most simple and fruitful method of formulating precisely the research problem or developing hypothesis. Hypotheses stated by earlier workers may be reviewed and their usefulness be evaluated as a basis for further research. It may also be considered whether the already stated hypotheses suggest new hypothesis. In this way the researcher should review and build upon the work already done by others, but in cases where hypotheses have not yet been formulated, his task is to review the available material for deriving the relevant hypotheses from it.

Besides, the bibliographical survey of studies, already made in one's area of interest may as well as made by the researcher for precisely formulating the problem. He should also make an attempt to apply concepts and theories developed in different research contexts to the area in which he is himself working. Sometimes the works of creative writers also provide a fertile ground for hypothesis-formulation and as such may be looked into by the researcher.

Experience survey means the survey of people who have had practical experience with the problem to be studied. The object of such a survey is to obtain insight into the relationships between variables and new ideas relating to the research problem. For such a survey people who are competent and can contribute new ideas may be carefully selected as respondents to ensure a representation of different types of experience. The respondents so selected may then be interviewed by the investigator. The researcher must prepare an interview schedule for the systematic questioning of informants. But the interview must ensure flexibility in the sense that the respondents should be allowed to raise issues and questions which the investigator has not previously considered. Generally, the experience-collecting interview is likely to be long and may last for few hours. Hence, it is often considered desirable to send a copy of the questions to be discussed to the respondents well in advance. This will also give an opportunity to the respondents for doing some advance thinking over the various issues involved so that, at the time of interview, they may be able to contribute effectively. Thus, an experience

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

survey may enable the researcher to define the problem more concisely (briefly) and help in the formulation of the research hypothesis. This survey may as well provide information about the practical possibilities for doing different types of research.

Analysis of 'insight-stimulating' examples is also a fruitful method for suggesting hypotheses for research. It is particularly suitable in areas where there is little experience to serve as a guide. This method consists of the intensive study of selected instances of the phenomenon in which one is interested. For this purpose the existing records, if any, may be examined, the unstructured interviewing may take place, or some other approach may be adopted. Attitude of the investigator, the intensity of the study and the ability of the researcher to draw together diverse information into a unified interpretation are the main features which make this method an appropriate procedure for evoking insights.

Now, what sort of examples is to be selected and studied? There is no clear cut answer to it. Experience indicates that for particular problems certain types of instances

are more appropriate than others. One can mention few examples of 'insight-stimulating' cases such as the reactions of strangers, the reactions of marginal individuals, the study of individuals who are in transition from one stage to another, the reactions of individuals from different social strata and the like. In general, cases that provide sharp contrasts or have striking features are considered relatively more useful while adopting this method of hypotheses formulation.

Thus, in an exploratory of formulative research study which merely leads to insights or hypotheses, whatever method or research design outlined above is adopted, the only thing essential is that it must continue to remain flexible so that many different facets of a problem may be considered as and when they arise and come to the notice of the researcher.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

UNIT: II

**BATCH: 2019-**

#### 2021RESEARCH AND SAMPLING DESIGN

#### 1) Research design in case of descriptive and diagnostic research studies

- a. Descriptive research studies are those studies, which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occurs or its association with something else. The studies concerning whether certain variables are associated are examples of diagnostic research studies. As against this, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies. Most of the social research comes under this category. From the point of view of the research design, the descriptive as well as diagnostic studies share common requirements and as such we may group together these two types of research studies. In descriptive as well as in diagnostic studies, the researcher must be able to define clearly, what he wants to measure and must find adequate methods for measuring it along with a clear cut definition of 'population' he wants to study. Since the aim is to obtain complete and accurate information in the said studies, the procedure to be used must be carefully planned. The research design must make enough provision for protection against bias and must maximize reliability, with due concern for the economical completion of the research study. The design in such studies must be rigid and not flexible and must focus attention on the following: Formulating the objective of the study (what the study is about and why is it being made?)
- b. Designing the methods of data collection (what techniques of gathering data will be adopted?)
- c. Selecting the sample (how much material will be needed?)
- d. Collecting the data (where can the required data be found and with what time period should the data be related?)

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

**UNIT: II** 

e. Processing and analyzing the data.

f. Reporting the findings.

In a descriptive/diagnostic study the first step is to specify the objectives with sufficient precision (accuracy) to ensure that the data collected are relevant. If this is not done carefully, the study may not provide the desired information.

Then comes the question of selecting the methods by which the data are to be obtained. In other words, techniques for collecting the information must be devised. Several methods (viz., observation, questionnaires, interviewing, examination of records, etc.), with their merits and limitations, are available for the purpose and the researcher may user one or more of these methods which have been discussed in detail in later chapters. While designing data-collection procedure, adequate safeguards against bias and unreliability must be ensured. Whichever method is selected, questions must be well examined and be made unambiguous; interviewers must be instructed not to express their own opinion; observers must be trained so that they uniformly record a given item of behaviour. It is always desirable to pretest the data collection instruments before they are finally used for the study purposes. In other words, we can say that "structured instruments" are used in such studies.

In most of the descriptive/diagnostic studies the researcher takes out sample(s) and then wishes to make statements about the population on the basis of the sample analysis or analyses. More often than not, sample has to be designed. Here we may only mention that the problem of designing samples should be tackled in such a fashion that the samples may yield accurate information with a minimum amount of research effort. Usually one or more forms of probability sampling, or what is often described as random sampling, are

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

BA

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

**UNIT: II** 

used.

To obtain data free from errors introduced by those responsible for collecting them, it is necessary to supervise closely the staff of field workers as they collect and record information. Checks may be set up to ensure that the data collecting staff perform their duty honestly and without prejudice. "As data are collected, they should be examined for completeness, comprehensibility, consistency and reliability."

The data collected must be processed and analysed. This includes steps like coding the interview replies, observations, etc.; tabulating the data; and performing several statistical computations. To the extent possible, the processing and analysing procedure should be planned in detail before actual work is started. This will prove economical in the sense that the researcher may avoid unnecessary labour such as preparing tables for which he later finds he has no use or on the other hand, re-doing some tables because he failed to include relevant data. Coding should be done carefully to avoid error in coding and for this purpose the reliability of coders needs to be checked. Similarly, the accuracy of tabulation may be checked by having a sample of the tables re-done. In case of mechanical tabulation the material (i.e., the collected data or information) must be entered on appropriate cards, which is usually done by punching holes corresponding to a given code. The accuracy of punching is to be checked and ensured. Finally, statistical computations are needed and as such averages, percentages and various coefficients must be worked out. Probability and sampling analysis may as well be used. The appropriate statistical operations, along with the use of appropriate tests of significance should be carried out to safeguard the drawing of conclusions concerning the study.Last of all comes the question of reporting the findings. This is the task of communicating the findings to others and the researcher must do it in an efficient manner. The layout of the report needs to be well planned so that all things relating to the research study may be well presented in simple and effective style. Thus, the

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

research design in case of descriptive/diagnostic studies is a comparative design throwing light on all points narrated above and must be prepared keeping in view the objective(s) of the study and the resources available. However, it must ensure the minimisation of bias and maximisation of reliability of the evidence collected. The said design can be appropriately referred to as a *survey design* since it takes into account all the steps involved in a survey concerning a phenomenon to be studied.

#### 2) Research design in case of hypothesis-testing research studies

Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationships between variables. Such studies require procedures that will not only reduce bias and increase reliability, but will permit drawing inferences about causality. Usually experiments meet this requirement. Hence, when we talk of research design in such studies, we often mean the design of experiments.

Professor R.A. Fisher's name is associated with experimental designs. Beginning of such designs was made by him when he was working at Rothamsted Experimental Station (Centre for Agricultural Research in England). As such the study of experimental designs has its origin in agricultural research. Professor Fisher found that by dividing agricultural fields or plots into different blocks and then by conducting experiments in each of these blocks, whatever information is collected and inferences drawn from them, happens to be more reliable. This fact inspired him to develop certain experimental designs for testing hypotheses concerning scientific investigations. Today, the experimental designs are being used in researches relating to phenomena of several disciplines. Since experimental designs originated in the context of agricultural

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

operations, we still use, though in a technical sense, several terms of agriculture (such as treatment, yield, plot, block etc.) in experimental designs..

#### CENSUS

All items in any field of inquiry constitute a 'Universe' or 'Population.' A complete enumeration of all items in the 'population' is known as a census inquiry. It can be presumed that in such an inquiry, when all items are covered, no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observation increases. Moreover, there is no way of checking the element of bias or its extent except through a resurvey or use of sample checks. Besides, this type of inquiry involves a great deal of time, money and energy. Therefore, when the field of inquiry is large, this method becomes difficult to adopt because of the resources involved. At times, this method is practically beyond the reach of ordinary researchers. Perhaps, government is the only institution which can get the complete enumeration carried out. Even the government adopts this in very rare cases such as population census conducted once in a decade. Further, many a time it is not possible to examine every item in the population, and sometimes it is possible to obtain sufficiently accurate results by studying only a part of total population. In such cases there is no utility of census surveys. Then, the researcher may make use of Sampling.

#### SAMPLING

Sampling is nothing but a proportion of Population. However, it needs to be emphasised that when the universe is a small one, it is no use resorting to a sample survey. When field studies are undertaken in practical life, considerations of time and cost almost invariably lead to a selection of respondents i.e., selection of only a few items. The respondents selected should be as representative of the total population as possible in order to produce a miniature cross-section. The selected respondents constitute what is technically called a 'sample' and the selection process is called 'sampling technique.' The

### CLASS: I MBA

# COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

survey so conducted is known as 'sample survey'. Algebraically, let the population size be N and if a part of size n (which is  $\leq$  N) of this population is selected according to some rule for studying some characteristic of the population, the group consisting of these n units is known as 'sample'. Researcher must

prepare a sample design for his study i.e., he must plan how a sample should be selected and of what size such a sample would be.

#### CHARACTERISTICS OF A GOOD SAMPLE PLAN

- 1. Sample design must result in a truly representative sample.
- 2. Sample design must be such which results in a small sampling error.
- 3. Sample design must be viable in the context of funds available for the research study.
- 4. Sample design must be such so that systematic bias can be controlled in a better way.
- 5. Sample should be such that the results of the sample study can be applied, in general, for the universe with a reasonable level of confidence.

#### **STEPS IN SAMPLING**

#### 1) Type of Universe

The first step in developing any sample design is to clearly define the set of objects, technically called the universe, to be studied. The universe can be finite or infinite. In finite universe the number of items is certain, but in case of an infinite universe the number of items is infinite, i.e. we cannot have any idea about the total number of items. The population of a city, the number of workers in a factory and the like are examples of finite universes, whereas the number of stars in the sky, listeners of a specific radio programme, throwing a dice etc. are examples of infinite universes.

#### 2) Sampling Unit

A decision has to be taken concerning a sampling unit before selecting sample. Sampling unit may be a geographical one such as state, district, village, etc., or a construction

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

unit such as a house, flat, etc., or it may be a social unit such as family, club, school, etc., or it may be an individual. The researcher will have to decide one or more of such units that he has to select for his study.

#### 3) Source List

It is also known as 'sampling frame' from which sample is to be drawn. It contains the names of all items of universe. If source list is not available, researcher has to prepare it. Such a list should be comprehensive, correct, reliable and appropriate. It is extremely important for the source list to be as representative of the population as possible.

#### 4) Size of Sample

This refers to the number of items to be selected from the universe to constitute a sample. This is a major problem before a researcher. The size of sample should neither be excessively large, nor too small. It should be optimum. An optimum sample is one which fulfills the requirements of efficiency, representativeness, reliability and flexibility. While deciding the size of sample, researcher must determine the desired precision as also an acceptable confidence level for the estimate. The size of population variance needs to be considered as in case of larger variance usually a bigger sample is needed. The size of population must be kept in view for this also limits the sample size. The parameters of interest in a research study must be kept in view, while deciding the size of sample. Costs too dictate the size of sample that we can draw. As such, budgetary constraint must invariably be taken into consideration when we decide the sample size.

#### 5) Parameters of Interest

In determining the sample design, one must consider the question of the specific population parameters which are of interest. For instance, we may be interested in estimating

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

the proportion of persons with some characteristics in the population or we may be interested in knowing some average or the other measure concerning the population. There may be important sub-groups in the population about whom we would like to make estimates. All this has a strong impact upon the sample design we would accept.

#### 6) Budgetary Constraint

Cost considerations, from practical point of view, have a major impact upon decisions relating to not only the size of the sample but also to the type of sample. This fact can even lead to the use of a non-probability sample.

#### 7) Sampling Procedure

Finally, the researcher must decide the type of sample he will use i.e. he must decide about the technique to be used in selecting the items for the sample. In fact, this technique or procedure stands for the sample design itself. There are several sample designs out of which the researcher must choose one for his study. Obviously, he must select that design which, for a given sample size and for a given cost, has a smaller sampling error.

#### **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", i.e., in a haphazard or hit-and-miss way. Experience shows that the human being is an extremely poor instrument for the conduct of a random selection. To ensure true randomness the method of selection must be independent of human judgement. There are basic procedures.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

#### 1) Lottery Method

This is the simplest and most familiar procedure of random sampling. If a sample of 10 students is to be drawn out of a list of 50 students in a section, take 50 equal size chips or slips of paper; number them from 1 to 50 each bearing only one number. Roll each slip. Put the rolled slips in a global container and thoroughly shuffle or mix them. Take 10 chips from the container one after another. Each time before drawing a chip, mix the chips in the container thoroughly. The units bearing the numbers of chips drawn constitute the random sample.

#### (i) Sampling with Replacement

After a number is selected by draw, it may be replaced and consequently it has a chance of being selected again. Such method is known as sampling with replacement. This is usually referred to as unrestricted random sampling.

#### (ii) Sampling without Replacement

Selected numbers is set aside, and so in subsequent draws, it does not get a chance of being selected again. This type of sampling is known as sampling without replacement. This is a form of restricted sampling.

#### 2) Use of Table o Random Numbers

This is a less cumbersome, but equally valid procedure of sample selection. Tables of random numbers have been developed by Kendall and Smith (1939), Fisher and Yates (1963) and Tippett (1927). To select a random sample out of a given frame, one should simply start to read numbers from a Table of Random Numbers at any randomly selected point and pick out numbers within the range of the frame. Let us suppose that random sample of 50

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

is to be selected from a College populations of 500 Commerce Students. We can use any table of random numbers.

10	09	73	25	33	76	52	01
37	54	20	48	05	64	89	47
08	42	26	89	53	19	64	50
09	01	90	25	29	09	37	67
12	80	79	99	70	80	15	73
66	06	57	47	17	34	07	27
31	06	01	08	05	45	57	18
85	26	97	76	02	02	05	16
63	57	33	21	35	05	32	54
73	79	64	57	53	03	52	96

Let us suppose, we start at the top of the left hand second column. As the population consists of a three-digit figure, read three-digit columns, i.e., read 097, 542, 422, 019 and so on. All the numbers within the range of 1 to 500 may be picked out. Then the sample will consist of:

097, 422, 019, 065. 060, 269 and so on. In the above reading, 542, 807, 573, etc., are rejected because they are over 500.

When the researcher reaches the bottom of a column, he can simply move one digit to the right and start at the top of the column again, and read numbers in three- digits: 973, 420, 226, 190, 079 and so on.

The main advantage of the use of a Table of Random Numbers are: Easy to use and ready accessibility

The Table of Random numbers is ideal for obtaining a random sample from
#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

relatively small populations. When populations are quite large say lakhs or crores, drawing numbers from the table becomes tedious.

#### 3) Use of Computer

If the population is very large and if computer facilities are available, a computer may be used for drawing a random sample. The computer can be programmed to print out a series of random numbers as the researcher desires.

#### **TYPES OF SAMPLING**

#### 1) Probability Sampling

In probability sample, every unit in the population has equal chances for being selected as a sample unit.

#### 2) Non-probability Sampling

In non probability sampling, units in the population has unequal or zero chances for being selected as a sample unit.

#### **A) Probability Sampling**

#### 1) 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, e.g., in a population of 300, each element theoretically has 1/300<sup>th</sup> chance of being selected. In a population of 1000, each element has 1/1000<sup>th</sup> chance of being selected. Equal probability selection method is described as Epsem sampling. An independent choice

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

means that the draw of one element will not affect the chances of other elements being selected.

Where some elements are purposely excluded from the sample, the resulting sample is not a random one, Hence, all elements should be included in the sample frame to draw a random sample.

#### Merits

- 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 required 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

#### Demerits

- 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 of 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

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

same size, because it is less precise than other methods

- 5. The size of the sample required to ensure its representativeness is equally larger under this type of sampling than under other random sampling techniques
- 6. A simple random design may be expensive in time and money

#### 2) Stratified Random Sampling

This is an improved type of random sampling. In this method, the population is subdivided into homogenous 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 the employees of a business undertaking may be divided into managers and non-managers and each of those two groups may be subdivided into salary-grade wise strata.

#### a) Proportionate Stratified Sampling

This sampling involves drawing a sample from each stratum in proportion to the latter's share in the total population.

Specialization	No. of Students	Proportion of Each Stream	
Production	40	0.4	
Finance	20	0.2	
Marketing	30	0.3	
Rural Development	10	0.1	
Total	100	1.0	

#### Merits

1. It enhances the representativeness of the sample by giving proper representation to all subgroups in the population

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

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

#### Demerits

- 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 maybe included into the wrong strata. This may vitiate the interpretation of survey results.

#### b) Disproportionate Stratified Sampling

This method does not give proportionate representation to strata (group). It necessarily involves giving over representation to some strata and under representation to others. There may be several disproportionate schemes. All strata may be given equal weight, even though their shares in the total population vary. Alternatively some substrata may be given greater weight and others lesser weight. When is such disproportionate weighing preferable? **Example :** Drawing one per cent as sample irrespective on the numbers of members in the sample

#### Merits

1. It is less time consuming compared with proportionate sampling, because the researcher is not necessarily concerned about the proportionate representativeness of his resulting sample

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

as in the latter method

2. It facilitates giving appropriate weighting to particular groups, which are small but more important

#### Demerits

- 1. This method does not give each stratum proportionate representation. Hence, the resulting sample may be less representative
- 2. This method requires a prior knowledge of the composition of the population, which is not always possible
- 3. This method is also subject to classification errors. It is possible that the researcher may misclassify certain elements
- 4. Though disproportionate sampling is a means for developing an optimal stratification scheme, its practical feasibility is doubtful because one generally does not know the relative variability in the strata nor the relative costs
- 3) Systematic Sampling

This method of sampling is an alternative to random sampling. It consists of taking every  $K^{th}$  item in the population after a random start with an item form 1 to K. For **example**, suppose it is desired to select a sample of 20 students, from a list of 300 students, divide the population total of 300 by 20, the quotient is 15. Select a number at random between 1 and 15, using lottery method or a table of random numbers. Suppose the selected number is 9. Then the students numbered 9, 24, 39 are selected as the sample.

As the interval between sample units is fixed, this method is also known as fixed interval method.

#### Merits

- 1. It is much simpler than random sampling. It is easy to use
- 2. It is easy to instruct to field investigators to use this method

Prepared by Dr.S.S.Shanthakumari, Assistant Professor, Department of

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- 3. This method may require less time. A researcher operating on a limited time schedule will prefer this method
- 4. This method is cheaper than simple random sampling
- 5. It is easier to check whether every 'k'th has been included in the sample
- 6. Sample is spread evenly over the population
- 7. It is statistically more efficient than a simple random sample when population elements are ordered chronologically, by size, class, etc., Then systematic sampling gives a better representative sample

#### Demerits

- 1. This method ignores all elements between two 'k'th elements selected. Further, except the first element, other selected elements are not chosen at random. Hence, this sampling cannot be considered to be a probably sampling in the strict sense of the term
- 2. As each element does not have an equal chance of being selected, the resulting sample is not a random one. For studies aiming at estimation or generalizations, this disadvantage would be serious one
- 3. This method may sometimes give a biased sample. If by chance, several 'k' th elements chosen represent a particular group, that group would be over-represented in the sample

#### 4) Cluster Sampling

Where the population elements are scattered over a 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.

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

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

selection or stratified random selection.

**Example:** Suppose a researcher wants to select a random sample of 1000 households out of 40000 estimated households in a city for a survey. A direct sample of individual households would be difficult to select, because a list of households does not exist and would be too costly to prepare. Instead, he can select a random sample of a few blocks / wards. The number of blocks to be selected depends upon the average number of estimated households per block. Suppose the average number of households per block is 200, then 5 blocks comprise the sample. Since the number of households per block varies, the actual sample size depends on the block which happen to be selected. Alternatively, he can draw a sample of more blocks and from each blocks a certain number of households may be selected by systematic sampling.

#### Merits

- 1. This method is much easier and more convenient to apply when large populations are studied or large geographical areas are covered. Even a ready list of population elements is not necessary. A researcher can simply draw a random sample of geographical sections and adopt single or multistage sampling depending on the vastness of the area covered by the study
- 2. The cost of this method is much less when compared with other sampling methods
- 3. This method promotes the convenience of field work at it could be done in compact places
- 4. Sampling under this method does not require more time
- 5. Units of study can be readily substituted for other units within the same random section
- 6. This method is flexible. Where it involves multistage sampling, it is possible to employ different types of sampling in successive stages

#### Demerits

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- The cluster size may vary and this variation could increase the bias of the resulting sample. For example, if the researcher were to interview all adults in households in each selected street the number of adults would vary from house to house. There would be certain bias resulting from the large coverage of big families
- 2. The sampling error in this method of sampling is greater. Thus, this method is statistically less efficient than other probability sampling methods
- Adjacent units of study (e.g. households) tend to have more similar characteristics than do units distantly apart. This affects the 'representativeness' of the sample and this effect is reflected in a greater sampling error.

#### 5) Area Sampling

This is an important form of cluster sampling. In larger field surveys, clusters consisting of specific geographical areas like districts, taluks, villages or blocks in a 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 a part of cluster sampling.

In a country like India where a state (previously known as province) is divided into districts, districts into talukas and talukas into towns and villages, area sampling is done on the basis of these administrative units in multi-stages.

#### 6) 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 of a number of second stage units and so forth. That is, at each stage, a sampling unit is a cluster of the sampling units of the subsequent stage. First, a sample of the first stage sampling units is drawn, then from each of the selected first stage sampling unit, a sample of

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

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.

#### Merits

It results in concentration of fieldwork in compact small areas and consequently in a saving of time, labour and money

- 1. It is more convenient, efficient and flexible than single-stage sampling
- 2. It obviates the necessity of having a sampling frame covered the entire population

#### **Demerits**

The major disadvantage of the multi-stage sampling is that the procedure of estimating sampling error and cost advantage is complicated. It is difficult for a non-statistician to follow estimation procedure.

#### **B.** Non-Probability Sampling

#### 1) Convenience Sampling

This is non-probability sampling. It means selecting sample units in a just 'hit an 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 students in his class. This method is also known as accidental sampling because the respondents whom the researcher meets accidentally are included in the sample.

#### Merits

1. Cheapest and simplest

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- 2. It does not require a list of population
- 3. It does not require any statistical expertise

#### Demerits

- 1. Convenience sampling is highly biased, because of the researcher's subjectivity, and so it does not yield a representative sample
- 2. It is the least reliable sampling method. There is no way of estimating the representativeness of the sample
- 3. The findings cannot be generalized

#### 2) Purposed or Judgement Sampling

This method means deliberate selection of sample units that conform to some predetermined criteria. This is 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. It does not aim at securing a cross section of a population.

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 a total failure

#### Merits

- 1. It is less costly and more convenient
- 2. It guarantees inclusion of relevant elements in the sample. Probability sampling plans cannot give such guarantee

#### Demerits

1. This does not ensure the representativeness of the sample

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- 2. This is less efficient for generalizing when compared with random sampling
- This method requires more prior extensive information about the population one studies. Without such information, it is not possible to adjudge the suitability of the sample items to be selected
- 4. The method does not lend itself for using inferential statistics, because, this sampling does not satisfy the underlying assumption of randomness.

#### 3) 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 class, 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.

#### Example

Sex	Numbers	Age		Social Class	
Male	11	20-40	5	Higher	3
Female	9	41-50	8	Middle	10
	20	51-60	4	Lower	7
		Above 60	3		20
			20		

#### Merits

- 1. It is considerably less costly than probability sampling
- 2. It takes less time
- 3. There is no need for a list of population. Thus, quota sampling is a suitable method of sampling a population for which no suitable frame is available
- 4. Field work can easily be organized. Strict supervision need not be required

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

#### Demerits

- It may not yield a precise representative sample, and it is impossible to estimate sampling error. The findings, therefore, are not generalizable to any significant extent
- 2. Interviewers may tent to choose the most accessible persons; they may ignore slums or areas difficult to reach. Thus, they may fail to secure a representative sample within their quota groups
- 3. Strict control of field work is difficult
- quota of sampling is subject to higher degree of classification error, because the investigators are likely to base their classification of respondents' social status and economic status mostly on their impressions about them
- 5. It is difficult for sampling on more than three variable dimensions. This is because the number of categories to be selected is a multiplication of the number of values in each variable. For instances, if we want to sample proportionate number of persons by sex, social status and age and these variables consist of two, three and three categories respectively.

#### 4) Snowball 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

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT

COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

# 2021RESEARCH AND SAMPLING DESIGN

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.

#### Merits

- 1. It is very useful in studying social groups, informal group in a formal organization, and diffusion of information among professionals of various kinds
- 2. It is useful for smaller populations for which no frames are readily available

#### Demerits

- 1. The major disadvantages of snowball sampling is that it does not allow the use of probability statistical methods. Elements included are dependent on the subjective choice of the original selected respondents
- 2. It is difficult to apply this method when the population is large
- 3. It does not ensure the inclusion of all elements in the lists

# CONCEPT OF STANDARD ERROR

The standard deviation of sampling distribution of a statistic is known as its standard error (S.E) and is considered the key to sampling theory. The utility of the concept of standard error in statistical induction arises on account of the following reasons:

1. The standard error helps in testing whether the difference between observed and expected frequencies could arise due to chance. The criterion usually adopted is that if a difference is less than 3 times the S.E., the difference is supposed to exist as a matter of chance and if the difference is equal to or more than 3 times the S.E., chance fails to account for it, and we conclude the difference as significant difference. This criterion is based on the fact that at  $X \pm 3$  (S.E.) the normal curve covers an area of 99.73 per cent. Sometimes the criterion of 2 S.E. is also used in place of 3 S.E. Thus the standard error is an important measure in significance tests or in examining hypotheses. If the estimated parameter differs from the calculated statistic by more than 1.96 times the S.E., the difference is taken as significant at 5 per cent level of significance. This, in other words, means that the difference is outside the limits i.e., it lies in the 5 per cent area (2.5

CLASS: I MBA

#### COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### **UNIT: II BATCH: 2019-**

#### 2021RESEARCH AND SAMPLING DESIGN

per cent on both sides) outside the 95 per cent area of the sampling distribution. Hence we can say with 95 per cent confidence that the said difference is not due to fluctuations of sampling. In such a situation our hypothesis that there is no difference is rejected at 5 per cent level of significance. But if the difference is less than 1.96 times the S.E., then it is considered not significant at 5 per cent level and we can say with 95 per cent confidence that it is because of the fluctuations of sampling. In such a situation our null hypothesis stands true. 1.96 is the critical value at 5 per cent level. The product of the critical value at a certain level of significance and the S.E. is often described as 'Sampling Error' at that particular level of significance. We can test the difference at certain other levels of significance as well depending upon our requirement. The following table gives some idea about the criteria at various levels for judging the significance of the difference between observed and expected values:

# ESTIMATING THE POPULATION MEAN

# ()

U

So far as the point estimate is concerned, the sample mean

#### Х

is the best estimator of the population

mean,

# μ

, and its sampling distribution, so long as the sample is sufficiently large, approximates the

normal distribution. If we know the sampling distribution of

# Х

, we can make statements about any

estimate that we may make from the sampling information. Assume that we take a sample of 36

students and find that the sample yields an arithmetic mean of 6.2 i.e.,

Х

=

62

. Replace these

#### CLASS: I MBA

# COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

## UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

student names on the population list and draw another sample of 36 randomly and let us assume that

we get a mean of 7.5 this time. Similarly a third sample may yield a mean of 6.9; fourth a mean of 6.7,

and so on. We go on drawing such samples till we accumulate a large number of means of samples

of 36. Each such sample mean is a separate point estimate of the population mean. When such

means are presented in the form of a distribution, the distribution happens to be quite close to normal.

This is a characteristic of a distribution of sample means (and also of other sample statistics). Even

if the population is not normal, the sample means drawn from that population are dispersed around

the parameter in a distribution that is generally close to normal; the mean of the distribution of sample

means is equal to the population mean. This is true in case of large samples as per the dictates of the central limit theorem.

# ESTIMATING POPULATION PROPORTION

So far as the point estimate is concerned, the sample proportion (

р

) of units that have a particular

characteristic is the best estimator of the population proportion

#### \$ p

# bg

and its sampling distribution, so

long as the sample is sufficiently large, approximates the normal distribution. Thus, if we take a

random sample of 50 items and find that 10 per cent of these are defective i.e.,

р

= .10, we can use

this sample proportion (

р

= .10) as best estimator of the population proportion

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

# UNIT: II

BATCH: 2019-

# 2021RESEARCH AND SAMPLING DESIGN

\$

. nr

рр ==

10

# bg . In

case we want to construct confidence interval to estimate a population poportion, we should use the

binomial distribution with the mean of population

# ₿g

## np

, where

# n

= number of trials,

р

#### Р =

probability of a success in any of the trials and population standard deviation =

# npq

. As the

sample size increases, the binomial distribution approaches normal distribution which we can use for

our purpose of estimating a population proportion. The mean of the sampling distribution of the

proportion of successes

0

μ p

is taken as equal to p and the standard deviation for the proportion of successes, also known as the standard error of proportion, is taken as equal to pq n.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

#### **DATA COLLECTION**

The task of data collection begins after a research problem has been defined and research design/ plan chalked out. While deciding about the method of data collection to be used for the study, the researcher should keep in mind two types of data viz., primary and secondary. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. The secondary data, on the other hand, are those which have already been collected by someone else and which have already been passed through the statistical process. The researcher would have to decide which sort of data he would be using (thus collecting) for his study and accordingly he will have to select one or the other method of data are to be originally collected, while in case of secondary data the nature of data collection work is merely that of compilation.

#### 1) Primary Data

Data directly collected by the researcher, with respect to problem under study, is known as primary data. Primary data is also the first hand data collected by the researcher for the immediate purpose of the study.

#### 2) Secondary Data

Secondary data are statistics that already exists. They have been gathered not for immediate use. This may be described as "Those data that have been compiled by some agency other than the user".

#### METHODS OF COLLECTING DATA OBSERVATION

The observation method is the most commonly used method specially in studies relating to behavioural sciences. In a way we all observe things around us, but this sort of

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

observation is not scientific observation. Observation becomes a scientific tool and the method of data collection for the researcher, when it serves a formulated research purpose, is systematically planned and recorded and is subjected to checks and controls on validity and reliability. Under the observation method, the information

way of investigator's own direct observation without asking from the respondent. For instance, in a study relating to consumer behaviour, the investigator instead of asking the brand of wrist watch used by the respondent, may himself look at the watch.

#### **Advantages of Observation**

- 1. The main advantage of this method is that subjective bias is eliminated, if observation is done accurately.
- 2. Secondly, the information obtained under this method relates to what is currently happening; it is not complicated by either the past behaviour or future intentions or attitudes.
- 3. Thirdly, this method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the interview or the questionnaire method.
- 4. This method is particularly suitable in studies which deal with subjects (i.e., respondents) who are not capable of giving verbal reports of their feelings for one reason or the other **Limitations of Observation**
- 1. Firstly, it is an expensive method.
- 2. Secondly, the information provided by this method is very limited.
- 3. Thirdly, sometimes unforeseen factors may interfere with the observational task.
- 4. At times, the fact that some people are rarely accessible to direct observation creates obstacle for this method to collect data effectively.

#### Precautions before Adopting Observation Method of Data Collection

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- While using this method, the researcher should keep in mind things like:
- ➤ What should be observed?
- ➤ How the observations should be recorded? Or
- How the accuracy of observation can be ensured?

#### **Types of Observation**

#### 1) Structured Observation

In case the observation is characterised by a careful definition of the units to be observed, the style of recording the observed information, standardised conditions of observation and the selection of pertinent data of observation, then the observation is called as structured observation. Structured observation is considered appropriate in descriptive studies

#### 2) Unstructured Observation

But when observation is to take place without these characteristics to be thought of in advance, the same is termed as unstructured observation. Whereas in an exploratory study the observational procedure is most likely to be relatively unstructured.

#### 3) Participant Observation

We often talk about participant and non-participant types of observation in the context of studies, particularly of social sciences. This distinction depends upon the observer's sharing or not sharing the life of the group he is observing. If the observer observes by making himself, more or less, a member of the group he is observing so that he can experience what the members of the group experience, the observation is called as the

#### CLASS: I MBA

# COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

**BATCH: 2019-**

#### 2021RESEARCH AND SAMPLING DESIGN

participant observation.

#### **Merits of Participant Observation**

- 1. The researcher is enabled to record the natural behaviour of the group.
- 2. The researcher can even gather information which could not easily be obtained if he observes in a disinterested fashion.
- 3. The researcher can even verify the truth of statements made by informants in the context of a questionnaire or a schedule.

#### D emerits of Participant Observation

The observer may lose the objectivity to the extent he participates emotionally; the problem of observation-control is not solved; and it may narrow-down the researcher's range of experience.

#### 4) Non-Participant Observation

But when the observer observes as a detached emissary without any attempt on his part to experience through participation what others feel, the observation of this type is often termed as non-participant observation. (When the observer is observing in such a manner that his presence may be unknown to the people he is observing, such an observation is described as disguised observation.)

#### 5) Uncontrolled Observation

If the observation takes place in the natural setting, it may be termed as uncontrolled observation, In non-controlled observation, no attempt is made to use precision instruments. The major aim of this type of observation is to get a spontaneous picture of life and persons. It has a tendency to supply naturalness and completeness of behaviour, allowing sufficient

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

time for observing it. The main pitfall of non-controlled observation is that of subjective interpretation. There is also the danger of having the feeling that we know more about the observed phenomena than we actually do. Uncontrolled observation is resorted to in case of exploratory researches.

#### 6) Controlled Observation

When observation takes place according to definite pre-arranged plans, involving experimental procedure, the same is then termed controlled observation. But in controlled observation, we use mechanical (or precision) instruments as aids to accuracy and standardisation. Such observation has a tendency to supply formalised data upon which generalisations can be built with some degree of assurance. Generally, controlled observation takes place in various experiments that are carried out in a laboratory or under controlled conditions

#### INTERVIEW SCHEDULE

The interview method of collecting data involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. This method can be used through personal interviews and, if possible, through telephone interviews. Interview is one of the popular methods of data collection. The term interview can be dissected into two terms as, 'inter' and 'view.'. The essence of interview is that one mind tries to read the other. The interviewer tries to assess the interviewed in terms of the aspects studied or issues analysed.

Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. (At times the interviewee may also ask certain questions and the interviewer responds to these, but usually the interviewer initiates the interview and collects the information.) This sort of interview may be in the form of direct personal investigation or it may be indirect oral investigation. In the case of direct personal investigation the interviewer has to collect the information personally from the sources concerned. He has to be on the spot and has to meet people from whom data have to be collected. This method is particularly suitable for intensive

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

investigations.

But in certain cases it may not be possible or worthwhile to contact directly the persons concerned or on account of the extensive scope of enquiry, the direct personal investigation technique may not be used. In such cases an indirect oral examination can be conducted under which the interviewer has to cross-examine other persons who are supposed to have knowledge about the problem under investigation and the information, obtained is recorded. Most of the commissions and committees appointed by government to carry on investigations make use of this method.

#### **Types of Interview**

#### 1) Structured Interview

The method of collecting information through personal interviews is usually carried out in a structured way. As such we call the interviews as structured interviews.Such interviews involve the use of a set of predetermined questions and of highly standardised techniques of recording. Thus, the interviewer in a structured interview follows a rigid procedure laid down, asking questions in a form and order prescribed. But in case of descriptive studies, we quite often use the technique of structured interview because of its being more economical, providing a safe basis for generalisation and requiring relatively lesser skill on the part of the interviewer.

#### 2) Unstructured Interview

As against it, the unstructured interviews are characterised by a flexibility of approach to questioning. Unstructured interviews do not follow a system of pre- determined questions and standardised techniques of recording information. In a non- structured interview, the interviewer is allowed much greater freedom to ask, in case of need, supplementary questions or at times he may omit certain questions if the situation so requires. He may even change the sequence of questions. He has relatively greater freedom while recording the responses to include some aspects and exclude others. But this sort of

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

flexibility results in lack of comparability of one interview with another and the analysis of unstructured responses becomes much more difficult and time-consuming than that of the structured responses obtained in case of structured interviews. Unstructured interviews also demand deep knowledge and greater skill on the part of the interviewer. Unstructured interview, however, happens to be the central technique of collecting information in case of exploratory or formulative research studies.

#### **3) Focused Interview**

Focussed interview is meant to focus attention on the given experience of the respondent and its effects. Under it the interviewer has the freedom to decide the manner and sequence in which the questions would be asked and has also the freedom to explore reasons and motives. The main task of the interviewer in case of a focussed interview is to confine the respondent to a discussion of issues with which he seeks conversance. Such interviews are used generally in the development of hypotheses and constitute a major type of unstructured interviews.

#### 4) Clinical Interview

The clinical interview is concerned with broad underlying feelings or motivations or with the course of individual's life experience. The method of eliciting information under it is generally left to the interviewer's discretion.

#### 5) Non-directive Interview

In case of non-directive interview, the interviewer's function is simply to encourage the respondent to talk about the given topic with a bare minimum of direct questioning. The interviewer often acts as a catalyst to a comprehensive expression of the respondents' feelings and beliefs and of the frame of reference within which such feelings and beliefs take

# CLASS: I MBA

# COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II

BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

on personal significance.

#### **Merits of Interview**

- 1. More information and that too in greater depth can be obtained.
- 2. Interviewer by his own skill can overcome the resistance, if any, of the respondents; the interview method can be made to yield an almost perfect sample of the general population.
- 3. There is greater flexibility under this method as the opportunity to restructure questions is always there, specially in case of unstructured interviews.
- 4. Observation method can as well be applied to recording verbal answers to various questions.
- 5. Personal information can as well be obtained easily under this method.
- 6. Samples can be controlled more effectively as there arises no difficulty of the missing returns; non-response generally remains very low.
- 7. The interviewer can usually control which person(s) will answer the questions. This is not possible in mailed questionnaire approach. If so desired, group discussions may also be held.
- 8. The interviewer may catch the informant off-guard and thus may secure the most spontaneous reactions than would be the case if mailed questionnaire is used.
- 9. The language of the interview can be adopted to the ability or educational level of the person interviewed and as such misinterpretations concerning questions can be avoided.
- 10. The interviewer can collect supplementary information about the respondent's personal characteristics and environment which is often of great value in interpreting results.

#### Demerits or Weakness of Interview

- 1. It is a very expensive method, specially when large and widely spread geographical sample is taken.
- 2. There remains the possibility of the bias of interviewer as well as that of the respondent; there

# CLASS: I MBA

# COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

also remains the headache of supervision and control of interviewers.

- 3. Certain types of respondents such as important officials or executives or people in high income groups may not be easily approachable under this method and to that extent the data may prove inadequate.
- 4. This method is relatively more-time-consuming, specially when the sample is large and recalls upon the respondents are necessary.
- 5. The presence of the interviewer on the spot may over-stimulate the respondent, sometimes even to the extent that he may give imaginary information just to make the interview interesting.
- 6. Under the interview method the organisation required for selecting, training and supervising the field-staff is more complex with formidable problems.
- 7. Interviewing at times may also introduce systematic errors.
- 8. Effective interview presupposes proper rapport with respondents that would facilitate free and frank responses. This is often a very difficult requirement.

#### Pre-requisites and Basic Tenets of Interviewing

- 1. For successful implementation of the interview method, interviewers should be carefully selected, trained and briefed.
- 2. They should be honest, sincere, hardworking, impartial and must possess the technical competence and necessary practical experience.
- 3. Occasional field checks should be made to ensure that interviewers are neither cheating, nor deviating from instructions given to them for performing their job efficiently.
- 4. In addition, some provision should also be made in advance so that appropriate action may be taken if some of the selected respondents refuse to cooperate or are not available when an interviewer calls upon them.
- 5. In fact, interviewing is an art governed by certain scientific principles. Every effort should be made to create friendly atmosphere of trust and confidence, so that respondents may feel at

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

ease while talking to and discussing with the interviewer.

- 6. The interviewer must ask questions properly and intelligently and must record the responses accurately and completely. At the same time, the interviewer must answer legitimate question(s), if any, asked by the respondent and must clear any doubt that the latter has.
- 7. The interviewers approach must be friendly, courteous, conversational and unbiased.
- 8. The interviewer should not show surprise or disapproval of a respondent's answer but he must keep the direction of interview in his own hand, discouraging irrelevant conversation and must make all possible effort to keep the respondent on the track.

#### QUESTIONNAIRE

This method of data collection is quite popular, particularly in case of big enquiries. It is being adopted by private individuals, research workers, private and public organisations and even by governments. In this method a questionnaire is sent (usually by post) to the persons concerned with a request to answer the questions and return the questionnaire. A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The questionnaire is mailed to respondents who are expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself. The respondents have to answer the questions on their own.

The method of collecting data by mailing the questionnaires to respondents is most extensively employed in various economic and business surveys

#### Merits of Questionnaire

- 1. There is low cost even when the universe is large and is widely spread geographically.
- 2. It is free from the bias of the interviewer; answers are in respondents' own words.
- 3. Respondents have adequate time to give well thought out answers.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

4. Respondents, who are not easily approachable, can also be reached conveniently.

5. Large samples can be made use of and thus the results can be made more dependable and reliable.

#### **Demerits of Questionnaire**

- 1. Low rate of return of the duly filled in questionnaires; bias due to no-response is often indeterminate.
- 2. It can be used only when respondents are educated and cooperating.
- 3. The control over questionnaire may be lost once it is sent.
- 4. There is inbuilt inflexibility because of the difficulty of amending the approach once questionnaires have been despatched.
- 5. There is also the possibility of ambiguous replies or omission of replies altogether to certain questions; interpretation of omissions is difficult.
- 6. It is difficult to know whether willing respondents are truly representative.
- 7. This method is likely to be the slowest of all.

Before using this method, it is always advisable to conduct 'pilot study' (Pilot Survey) for testing the questionnaires. In a big enquiry the significance of pilot survey is felt very much. Pilot survey is infact the replica and rehearsal of the main survey. Such a survey, being conducted by experts, brings to the light the weaknesses (if any) of the questionnaires and also of the survey techniques. From the experience gained in this way, improvement can be effected.

#### Main Aspects of a Questionnaire

Quite often questionnaire is considered as the heart of a survey operation. Hence it should be very carefully constructed. If it is not properly set up, then the survey is bound

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

to fail. This fact requires us to study the main aspects of a questionnaire viz., the general form, question sequence and question formulation and wording. Researcher should note the following with regard to these three main aspects of a questionnaire:

#### 1) General form

So far as the general form of a questionnaire is concerned, it can either be structured or unstructured questionnaire. Structured questionnaires are those questionnaires in which there are definite, concrete and pre-determined questions. The questions are presented with exactly the same wording and in the same order to all respondents. Resort is taken to this sort of standardisation to ensure that all respondents reply to the same set of questions. The form of the question may be either closed (i.e., of the type 'yes' or 'no') or open (i.e., inviting free response) but should be stated in advance and not constructed during questioning. Structured questionnaires may also have fixed alternative questions in which responses of the informants are limited to the stated alternatives. Thus a highly structured questionnaire is one in which all questions and answers are specified and comments in the respondent's own words are held to the minimum. When these characteristics are not present in a questionnaire, it can be termed as unstructured or non-structured questionnaire. More specifically, we can say that in an unstructured questionnaire, the interviewer is provided with a general guide on the type of information to be obtained, but the exact question formulation is largely his own responsibility and the replies are to be taken down in the respondent's own words to the extent possible; in some situations tape recorders may be used to achieve this goal.

Structured questionnaires are simple to administer and relatively inexpensive to analyse. The provision of alternative replies, at times, helps to understand the meaning of the question clearly. But such questionnaires have limitations too. For instance, wide range of data and that too in respondent's own words cannot be obtained with structured

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

questionnaires. They are usually considered inappropriate in investigations where the aim happens to be to probe for attitudes and reasons for certain actions or feelings. They are equally not suitable when a problem is being first explored and working hypotheses sought. In such situations, unstructured questionnaires may be used effectively. Then on the basis of the results obtained in pretest (testing before final use) operations from the use of unstructured questionnaires, one can construct a structured questionnaire for use in the main study.

#### 2) Question Sequence

In order to make the questionnaire effective and to ensure quality to the replies received, a researcher should pay attention to the question-sequence in preparing the questionnaire. A proper sequence of questions reduces considerably the chances of individual questions being misunderstood. The question-sequence must be clear and smoothly-moving, meaning thereby that the relation of one question to another should be readily apparent to the respondent, with questions that are easiest to answer being put in the beginning. The first few questions are particularly important because they are likely to influence the attitude of the respondent and in seeking his desired cooperation. The opening questions should be such as to arouse human interest. The following type of questions should generally be avoided as opening questions in a questionnaire:

- > Questions that put too great a strain on the memory or intellect of the respondent;
- Questions of a personal character
- > Questions related to personal wealth, etc.

Following the opening questions, we should have questions that are really vital to the research problem and a connecting thread should run through successive questions. Ideally, the question-sequence should conform to the respondent's way of thinking. Knowing what

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

information is desired, the researcher can rearrange the order of the questions (this is possible in case of unstructured questionnaire) to fit the discussion in each particular case. But in a structured questionnaire the best that can be done is to determine the question-sequence with the help of a Pilot Survey which is likely to produce good rapport with most respondents. Relatively difficult questions must be relegated (tranfered) towards the end so that even if the respondent decides not to answer such questions, considerable information would have already been obtained. Thus, question-sequence should usually go from the general to the more specific and the researcher must always remember that the answer to a given question is a function not only of the question itself, but of all previous questions as well. For instance, if one question deals with the price usually paid for coffee and the next with reason for preferring that particular brand, the answer to this latter question may be couched (understood) largely in terms of price-differences.

#### 3) Question Formulation and Wording

With regard to this aspect of questionnaire, the researcher should note that each question must be very clear for any sort of misunderstanding can do irreparable harm to a survey. Question should also be impartial in order not to give a biased picture of the true state of affairs. Questions should be constructed with a view to their forming a logical part of a well thought out tabulation plan. In general, all questions should meet the following standards—(a) should be easily understood; (b) should be simple i.e., should convey only one thought at a time; (c) should be concrete and should conform as much as possible to the respondent's way of thinking. (For instance, instead of asking. "How many razor blades do you use annually?" The more realistic question would be to ask, "How many razor blades did you use last week?"

Multiple Choice Question and the Open-End Questions. In the former the respondent selects one of the alternative possible answers put to him, whereas in the latter he has to

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BAT

#### **BATCH: 2019-**

#### 2021RESEARCH AND SAMPLING DESIGN

supply the answer in his own words. The question with only two possible answers (usually 'Yes' or 'No') can be taken as a special case of the multiple choice question, or can be named as a 'closed question.' There are some advantages and disadvantages of each possible form of question. Multiple choice or closed questions have the advantages of easy handling, simple to answer, quick and relatively inexpensive to analyse. They are most amenable to statistical analysis. Sometimes, the provision of alternative replies helps to make clear the meaning of the question. But the main drawback of fixed alternative questions is that of "putting answers in people's mouths" i.e., they may force a statement of opinion on an issue about which the respondent does not infact have any opinion. They are not appropriate when the issue under consideration happens to be a complex one and also when the interest of the researcher is in the exploration of a process. In such situations, open-ended questions which are designed to permit a free response from the respondent rather than one limited to certain stated alternatives are considered appropriate. Such questions give the respondent considerable latitude in phrasing a reply. Getting the replies in respondent's own words is, thus, the major advantage of open-ended questions. But one should not forget that, from an

analytical point of view, open-ended questions are more difficult to handle, raising problems of interpretation, comparability and interviewer bias.

In practice, one rarely comes across a case when one questionnaire relies on one form of questions alone. The various forms complement each other. As such questions of different forms are included in one single questionnaire. For instance, multiple-choice questions constitute the basis of a structured questionnaire, particularly in a mail survey. But even there, various open-ended questions are generally inserted to provide a more complete picture of the respondent's feelings and attitudes.

Researcher must pay proper attention to the wordings of questions since reliable and

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

meaningful returns depend on it to a large extent. Since words are likely to affect responses, they should be properly chosen. Simple words, which are familiar to all respondents, should be employed. Words with ambiguous meanings must be avoided. Similarly, danger words, catch-words or words with emotional connotations should be avoided. Caution must also be exercised in the use of phrases which reflect upon the prestige of the respondent. Question wording, in no case, should bias the answer. In fact, question wording and formulation is an art and can only be learnt by practice.

#### **Essentials of Good Questionnaire**

- 1. To be successful, questionnaire should be comparatively short and simple i.e., the size of the questionnaire should be kept to the minimum
- 2. Questions should proceed in logical sequence moving from easy to more difficult questions
- 3. Personal and intimate questions should be left to the end
- 4. Technical terms and vague expressions capable of different interpretations should be avoided in a questionnaire
- 5. Questions may be dichotomous (yes or no answers), multiple choice (alternative answers listed) or open-ended. The latter type of questions are often difficult to analyse and hence should be avoided in a questionnaire to the extent possible
- 6. There should be some control questions in the questionnaire which indicate the reliability of the respondent. For instance, a question designed to determine the onsumption of particular material may be asked first in terms of financial expenditure and later in terms of weight. The control questions, thus, introduce a cross-check to see whether the information collected is correct or not
- 7. Questions affecting the sentiments of respondents should be avoided
- 8. Adequate space for answers should be provided in the questionnaire to help editing and tabulation

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

- 9. There should always be provision for indications of uncertainty, e.g., "do not know," "no preference" and so on
- 10. Brief directions with regard to filling up the questionnaire should invariably be given in the questionnaire itself
- 11. Finally, the physical appearance of the questionnaire affects the cooperation the researcher receives from the recipients and as such an attractive looking questionnaire, particularly in mail surveys, is a plus point for enlisting cooperation.
- 12. The quality of the paper, along with its colour, must be good so that it may attract the attention of recipients

#### **Types of Questionnaire**

#### 1) Structured non disguised Questionnaire

Here, questions are structured so as to get the facts. The interviewer will ask the questions strictly as per the pre arranged order. Structured, non disguised is widely used in market research. Questions are presented with exactly the same wording and same order to all the respondents. The reason for standardizing question is, to ensure that all respondents reply the same question. The purpose of the question is clear. The researcher wants the respondent to choose one of the five options given above. This type of questionnaire is easy to administer. The respondents have no difficulty in answering. Because it is structured, the frame of reference is obvious. In a non-disguised type, the purpose of the questionnaire is known to the respondent.

#### 2) Structured disguised Questionnaire

This type of questionnaire is least used in Marketing research. This type of Questionnaire is used to find, peoples' attitude, when a direct undisguised question produces a bias. In this type of questionnaire what comes out is "What does the respondent know rather than what he feels". Therefore attempt in this method is to find the respondent's attitude.

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

#### 3) Non-Structured and disguised Questionnaire

The main objective is to conceal the topic of enquiry by using a disguised stimulus. Though the stimulus is standardized by researcher, respondent is allowed to answer in an unstructured manner. The assumption made here is that individuals reaction is an indication of respondent's basic perception. Projective techniques are examples of Non structured disguised technique. The techniques involve the use of a vague stimulus, that an individual is asked to expand or describe or build a story, three common types under this category are (a) Word association (b) Sentence completion (c) Story telling.

#### 4) Non structured - Non disguised Questionnaire

Here the purpose of the study is clear, but the responses to the question is open ended. Example: "How do you feel about the cyber law currently in practice and its need for further modification"? The initial part of the question is constant. After presenting the initial question, the interview becomes very unstructured as the interviewer probes more deeply. Respondents subsequent answer determines the direction the interviewer takes next. The question asked by interviewer varies from person to person. This method is called "Depth interview". The major advantage of this method is freedom permitted to the interviewer. By not restricting the respondents for a set of replies, the experienced interviewers will be above to get the information from the respondent fairly and accurately. The main disadvantage of this method of interviewing is that, it takes time, and respondents may not co-operate. Another disadvantage is that coding of open ended question may pose a challenge. E.g.: When a researcher asked the respondent "Tell me something about your experience in this hospital". The answer may be "Well, the nurses are "slow" to attend and Doctor is "rude". 'Slow' and 'rude' are different qualities needing separate coding. This type of interviewing is extremely helpful in exploratory studies.

#### **SCHEDULES**

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

This method of data collection is very much like the collection of data through questionnaire, with little difference which lies in the fact that schedules (proforma containing a set of questions) are being filled in by the enumerators who are specially appointed for the purpose. These enumerators along with schedules, go to respondents, put to them the questions from the proforma in the order the questions are listed and record the replies in the space meant for the same in the proforma.

In certain situations, schedules may be handed over to respondents and enumerators may help them in recording their answers to various questions in the said schedules. Enumerators explain the aims and objects of the investigation and also remove the difficulties which any respondent may feel in understanding the implications of a particular question or the definition or concept of difficult terms. This method requires the selection of enumerators for filling up schedules or assisting respondents to fill up schedules and as such enumerators should be very carefully selected

The enumerators should be trained to perform their job well and the nature and scope of the investigation should be explained to them thoroughly so that they may well understand the implications of different questions put in the schedule. Enumerators should be intelligent and must possess the capacity of cross-examination in order to find out the truth. Above all, they should be honest, sincere, hardworking and should have patience and perseverance. This method of data collection is very useful in extensive enquiries and can lead to fairly reliable results. It is, however, very expensive and is usually adopted in investigations conducted by governmental agencies or by some big organisations. Population census all over the world is conducted through this method.

#### DIFFERENCE BETWEEN QUESTIONNAIRE AND INTERVIEW SCHEDULE

1. The questionnaire is generally sent through mail to informants to be answered as

#### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

specified in a covering letter, but otherwise without further assistance from the sender. The schedule is generally filled out by the research worker or the enumerator, who can interpret questions when necessary.

- 2. To collect data through questionnaire is relatively cheap and economical since we have to spend money only in preparing the questionnaire and in mailing the same to respondents. Here no field staff required. To collect data through schedules is relatively more expensive since considerable amount of money has to be spent in appointing enumerators and in importing training to them. Money is also spent in preparing schedules.
- 3. Non-response is usually high in case of questionnaire as many people do not respond and many return the questionnaire without answering all questions. Bias due to non- response often remains indeterminate. As against this, non-response is generally very low in case of schedules because these are filled by enumerators who are able to get answers to all questions. But there remains the danger of interviewer bias and cheating.
- 4. In case of questionnaire, it is not always clear as to who replies, but in case of schedule the identity of respondent is known.
- 5. The questionnaire method is likely to be very slow since many respondents do not return the questionnaire in time despite several reminders, but in case of schedules the information is collected well in time as they are filled in by enumerators.
- 6. Personal contact is generally not possible in case of the questionnaire method as questionnaires are sent to respondents by post who also in turn return the same by post. But in case of schedules direct personal contact is established with respondents.
- 7. Questionnaire method can be used only when respondents are literate and cooperative, but in case of schedules the information can be gathered even when the respondents happen to be illiterate.
- 8. Wider and more representative distribution of sample is possible under the questionnaire method, but in respect of schedules there usually remains the difficulty in sending
### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

enumerators over a relatively wider area.

- 9. Risk of collecting incomplete and wrong information is relatively more under the questionnaire method, particularly when people are unable to understand questions properly. But in case of schedules, the information collected is generally complete and accurate as enumerators can remove the difficulties, if any, faced by respondents in correctly understanding the questions. As a result, the information collected through schedules is relatively more accurate than that obtained through questionnaires.
- 10. The success of questionnaire method lies more on the quality of the questionnaire itself, but in the case of schedules much depends upon the honesty and competence of enumerators.
- 11. In order to attract the attention of respondents, the physical appearance of questionnaire must be quite attractive, but this may not be so in case of schedules as they are to be filled in by enumerators and not by respondents.
- 12. Along with schedules, observation method can also be used but such a thing is not possible while collecting data through questionnaires.

#### SECONDARY DATA

Secondary data means data that are already available i.e., they refer to the data which have already been collected and analysed by someone else. When the researcher utilises secondary data, then he has to look into various sources from where he can obtain them. In this case he is certainly not confronted with the problems that are usually associated with the collection of original data.

Secondary data may either be published data or unpublished data. Usually published data are available in: (a) various publications of the central, state are local governments; (b) various publications of foreign governments or of international bodies and their subsidiary organisations; (c) technical and trade journals; (d) books, magazines and newspapers; (e) reports and publications of various associations connected with business and industry, banks, stock exchanges, etc.; (f) reports prepared by research scholars,

Prepared by Dr.S.S.Shanthakumari, Assistant Professor, Department of Management Page 50

### CLASS: I MBA COURSE NAME: RESEARCH METHODOLOGY FOR MANAGEMENT COURSE CODE: 19MBAP206

#### UNIT: II BATCH: 2019-

#### 2021RESEARCH AND SAMPLING DESIGN

universities, economists, etc. in different fields; and (g) public records and statistics, historical documents, and other sources of published information.

The sources of unpublished data are many; they may be found in diaries, letters, unpublished biographies and autobiographies and also may be available with scholars and research workers, trade associations, labour bureaus and other public/ private individuals and organisations. Researcher must be very careful in using secondary data. He must make a minute scrutiny because it is just possible that the secondary data may be unsuitable or may be inadequate in the context of the problem which the researcher wants

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II

BATCH: 2017-2019

#### SAMPLING DESIGN

to study. In this connection Dr. A.L. Bowley very aptly observes that it is never safe to take published statistics at their face value without knowing their meaning and limitations and it is always necessary to criticise arguments that can be based on them.

### SOURCES OF SECONDARY DATA

Secondary data are obtained from personal documents and public documents.

#### **1) Personal Documents**

These documents are recorded by the individuals. An individual may record his views and thoughts about various problems and without knowing for these documents at a latter data so formed a subject or source of study.

Kinds of Personal Documents: Personal documents may be categorised or divided under the following heads for the convenience of the study; (i) Life History, (ii) Dairy,

(iii) Letters, and (iv) Memoirs.

#### a) Life History

Life history, generally speaking contains all kinds of biographical, material, from the point of view of personal documents only an autobiography which contains description and views about social and personal events is a life history. It may be further classified under the following three sub-heads: Spontaneous Autobiography, Voluntary Autobiography of self record, and Compiled life history.

## b) Diaries

Many people keep diaries in which they record the daily events of their life and their feelings and reactions relating to those events. Some of the diaries are also published later on.

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II

BATCH: 2017-2019

#### SAMPLING DESIGN

Diaries are the most important source of knowing the life history of a person. If they have been written continuously over long periods.

### c) Letters

Letters also provide useful and reliable material on many social problems. They throw light upon more intimate aspects of an event, and clarity the stand taken by a person regarding it. They are helpful in giving an idea of the attitudes of a person and the trend of his mind. The validity of letters is beyond all doubt and they should be accepted

as prima facie proof of the attitude of the writer. In such social problems as love, marriage or divorce the letters can supply much revealing information.

#### d) Memoirs

Some people write memoirs of their travels, important events of their life and other significant phenomena that they come across. These memoirs provide useful material in the study of many a social phenomena. Memoirs are different from dairies in the sense that they describe only some events and are more elaborate than the dairy. Memoirs of travelers have provided us with useful information regarding the language, social customs, religious faiths, culture and many other social aspects of the people they visited.

## **2. Public Documents**

Public documents are quite different from personal documents. They deal with the matters of different interest. Public' documents may be divided into the following two categories: (i) Unpublished Records, (ii) Published Records.

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II

BATCH: 2017-2019

#### SAMPLING DESIGN

#### a) Unpublished Records

Unpublished records give matters of public interest not available to people in published form. Everybody cannot have access to them. Proceedings of the meetings, noting on the files and memoranda etc., form the category of unpublished records. It is said that these records are reliable. Since there is no fear of their being made public the writers give out their views clearly.

#### **b)** Published Records

Published records are available to people for investigation and perusal. Survey, reports, report of survey enquiries and such other documents fall under this category. The data contained in these documents are considered by some people as quite reliable because the collecting agency knows that it shall be difficult to test, while others are of the view that if the data are to be published the collecting or publishing agency does some window dressing, as a result of which the accuracy is sometimes postulated.

Now most of the information that is available to people and researchers in regard to social problems is to be found in form of reports. The reports published by Government are considered as more dependable. On the other hand some people think that the reports that are published by certain individuals and agencies are more dependable and reliable.

Journals and Magazines: Journals and magazines are important public documents including a wide variety of information which .can be usefully utilised in social research. Most of these information are very much reliable. Letters to the editors published in various magazines and journals are an important source of information.

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II

BATCH: 2017-2019

#### SAMPLING DESIGN

#### c) Newspapers

Newspapers publish news, discussion on contemporary issues, reports of meetings and conferences, essays and articles on living controversies and the letters of the readers to the editors. All this is an important source of formation for different kinds of social research.

#### d) Other Sources

Besides the above mentioned public documents, film, television, radio and public speeches etc., are other important sources of information. They supply useful information - about contemporary issues. The investigator, however, should be capable of sorting out the reliable material and distinguishing it from the unreliable material advanced by these sources.

## PRECAUTIONS WHILE USING SECONDARY DATA

Since secondary data have already been obtained, it is highly desirable that a proper scrutiny of such data is made before they are used by the investigator. In fact the user has to be extra-cautious while using secondary data. In this context Prof. Bowley rightly points out that "Secondary data should not be accepted at their face value." The reason being that data may be erroneous (mistaken / wrong) in many respects due to bias, inadequate size of the sample, substitution, errors of definition, arithmetical errors etc.

Even if there is no error such data may not be suitable and adequate for the purpose of the enquiry.

Prof. Simon Kuznet's view in this regard is also of great importance. According to him, "The degree of reliability of secondary source is to be assessed from the source, the

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II BAT

BATCH: 2017-2019

#### SAMPLING DESIGN

compiler and his capacity to produce correct statistics and the users also, for the most part, tend to accept a series particularly one issued by a government agency at its face value without enquiring its reliability".

Therefore, before using the secondary data the investigators should consider the following factors:

## 1) Reliability of Data

The reliability can be tested by finding out such things about the said data: (a) Who collected the data? (b) What were the sources of data? (c) Were they collected by using proper methods? (d) At what time were they collected?(e) Was there any bias of the compiler? (f) What level of accuracy was desired? Was it achieved?

#### 2) Suitability of Data

The data that are suitable for one enquiry may not necessarily be found suitable in another enquiry. Hence, if the available data are found to be unsuitable, they should not be used by the researcher. In this context, the researcher must very carefully scrutinize the definition of various terms and units of collection used at the time of collecting the data from the primary source originally. Similarly, the object, scope and nature of the original enquiry must also be studied. If the researcher finds differences in these, the data will remain unsuitable for the present enquiry and should not be used

## 3) Adequacy of Data

If the level of accuracy achieved in data is found inadequate for the purpose of the present enquiry, they will be considered as inadequate and should not be used by the researcher. The data will also be considered inadequate, if they are related to an area which may be either narrower or wider than the area of the present enquiry. It is not enough to have baskets of data in hand. In

## CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

#### UNIT: II

BATCH: 2017-2019

#### SAMPLING DESIGN

fact, data in a raw form are nothing but a handful of raw material waiting for proper processing so that they can become useful.

from primary or secondary source, the next step in a statistical investigation is to edit the data i.e. to scrutinize the same. The chief objective of editing is to detect possible errors and irregularities. The task of editing is a highly specialized one and requires great

## POSSIBLE QUESTIONS

# PART-B (2 Marks)

- 1. Define Sampling.
- 2. Explain the term 'Census',
- 3. What do you mean by Probability Sampling?
- 4. What do you mean by Random Sampling?
- 5. Explain the term 'Non-probability Sampling'.
- 6. What do you understand by Non Random Sampling?
- 7. Briefly explain on Stratified Random Sampling.
- 8. What is Systematic Sampling?
- 9. Briefly narrate on Cluster Sampling.
- 10. What is Convenience Sampling?
- 11. What do you understand by 'Snowball Sampling'?
- 12. What is Primary Data and Secondary Data?
- 13. What do you mean by Structured and Unstructured observation?
- 14. Describe on Interview.
- 15. What do you understand by Focused and Non-directive interview?
- 16. What do you mean by Questionnaire?
- 17. What is Structured and Unstructured Questionnaire?

Prepared by Dr.S.S.Shanthakumari, Assistant Professor, Department of Management

CLASS: II M.Com / II M.Com CA COURSE NAME: BUSINESS RESEARCH METHODS AND TECHNIQUES COURSE CODE: 17CMP302/17CCP302

### UNIT: II

BATCH: 2017-2019

## SAMPLING DESIGN

## PART C (6 MARKS)

1. Define Sample. Explain its types.

2. How Questionnaire method differs from Interview Schedule method?

3. Explain the steps involved in Sampling.

4. Differentiate between Questionnaire and Interview Schedule.

5. Elucidate in detail on various techniques on Probability Sampling.

6. Explain in detail on various types of observation.

7. Explicate in detail on various Non-Probability Sampling Techniques.

8. Explain the sources through which secondary data is collected.

9. Elucidate on important aspects to be considered, while constructing a Questionnaire.

10. Explain in details on various types of Questionnaire.

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Page 58

# Karpagam Academy of Higher Education

# **Department of Management**

## **Research Methodology for Management - 19MBAP206**

# Unit II

# Multiple Choice Questions - Each Question Carries ONE Mark

S.No.	Questions	Option 1	Option 2	Option 3	Option 4	Answer
1	is a blue print of research	Research Process	Objectives of the Study	Research Design	Hypothesis	Research Design
2	Identify the correct statement from the following –	a logical and systematic representation of the	keeps the researcher in action.	cannot be concerned with data availability.	has to be kept within manageable limits.	has to be kept within manageable limits.
3	While defining a problem, the next steps in the process after developing a title are –	conceptual model and defining the study objectives	conditions and training investigators	details and verifying evidence	and analysing variables in the problem	conceptual model and defining the study objectives
4	The research problem should define in amanner.	Statement of the problem in general way.	Understanding the nature of the problem.	available literature and developing ideas	All the stated Manner	All the stated Manner
5	is the conceptual structure within which the research is conducted	Research Process	Objectives of the Study	Research Design	Hypothesis	Research Design
6	deals with the method of selecting items to be observed for the given study	Sampling design	observational design	operational design	statistical design	Sampling design
7	Design which relates to the conditions under which the observations are made	Sampling design	observational design	operational design	statistical design	observational design

	Studying only a part of total population		~			
8	in known as	Sampling	Census	Field Enquiry	Observation	Sampling
	contains the names of all items of	<b>a b b b</b>				<b>a b b b</b>
9	universe	Source List	Sampling Unit	Sample Design	Census Data	Source List
10	Source list otherwise known as	Sampling Unit	Sample Design	Census Data	Sampling Frame	Sampling Frame
	refers to the number of items to be					
	selected from the universe to constitute a		Parameters of			
11	sample	Size of Sample	Interest	Source List	Sampling Unit	Size of Sample
	Insample, every unit in the					
	population has equal chances for being					
12	selected as a sample unit	Probability	Non-Probability	Area	Judgement	Probability
	The design which and					
	maximizes the reliability of the data				minimum	
13	collected is considered a good design	minimises bias	maximisies bias	have no bias	information	minimises bias
			Should be given	Sets out the		
	A research plan	Should be detailed	to others for	rationale for a		
14			review and	research study	Definite	Definite
	is the arrangement of conditions		Research	Research	Operational	
15	for collection and analysis of data.	Research design.	methods.	analysis.	research.	Research analysis.
	A number calculated with complete					
	population data and quantifies a	A parameter	A datum	A statistic	A population	A parameter
16	characteristic of the population is called					
	Which of the following group that does					
	not receive the experimental treatment		Experimental	Treatment group		
17	condition?	Control group	group		Independent group.	Control group

18	The group that receives the experimental treatment condition is the	Experimental group	Control group	Participant group	Independent group	Experimental group
19	control techniques available to the researcher controls for both known and unknown variables?	Building the extraneous variable into the design	Matching	Random assignment	Analysis of covariance	Random assignment
20	A cell is a combination of two or morein a factorial design.	Research designs	Research measurements	Dependent variables	Independent variables	Independent variables
21	In, the researcher attempts to control and/ or manipulate the variables in the study.	Experiment	Hypothesis	Theoretical framework	Research design	Experiment
22	refers to the influence of a single independent variable.	Interaction effect	Reactive effect	Main effect	Proactive effect	Main effect
23	A measure is reliable if it provides consistent	Hypothesis	Results	Procedure	Sensitivity	Results
24	This type of design is one where all participants participate in all experimental treatment conditions.	Factorial design	Repeated measures design	Replicated design	Pretest-posttest control-group design	Repeated measures design
25	In an experimental research study, the primary goal is to isolate and identify the effect produced by the	Dependent variable	Extraneous variable	Independent variable	Confounding variable	Independent variable
26	Experimental design is the only appropriate design where relationship can be established.	Strong	Linear	Weak	Cause and Effect	Cause and Effect
27	Which of the following statement is wrong about the data of the Descriptive Research?	It may be qualitative, in verbal symbols	quantitative, in mathematical symbols.	It may be qualitative and quantitative both	It is only qualitative, never quantitative.	It is only qualitative, never quantitative.
28	Exploratory research addresses which of the following types of question?	If	How	Why	What	What

29	Stability means -	Accurate	Broad	Consistency	Depth	Consistency
		Involves testing an	Allows theory to	Allows for	Uses qualitative	Involves testing an
	A deductive theory is one that:	explicitly defined	emerge out of the	findings to feed	methods whenever	explicitly defined
30		hypothesis	data	back into the	possible	hypothesis
	In sampling, units in the population					
	has unequal or zero chances for being					
31	selected as a sample unit.	Probability	Non-Probability	Area	Judgement	Non-Probability
	is often called the root means square			Non-Sampling		
32	error	Sampling error	Total error	error	Bias	Total error
	The errors which arise because of					
	studying only a part of the total					
33	population are called errors	Non-Sampling	Sampling	Bias	Total	Sampling
	Qualitative observation is usually done					
	for exploratory purposes; it is also called	Structured	Naturalistic	Complete	Probed	Naturalistic
34	observation.					
	may arise if some sections of the					
	population are not available / refuse to			Non-Sampling		
35	cooperate	Bias	Sampling error	error	Non-Sampling bias	Bias
	errors which arise from sources other					
36	than sampling	Sampling	Non-Sampling	Sampling Bias	Non-Sampling bias	Sampling
	Errors of observation, Errors of					
	measurement and Errors of responses			Non-Sampling		Non-Sampling
37	leads to	Bias	Sampling error	error	Non-Sampling bias	error
	is a result biases of observation and					
	non-observation, response biases and		Non-Sampling			Non-Sampling
38	process biases	Non-Sampling error	Bias	Sampling Error	Sampling Bias	Bias
	Collecting data by reference through		Snowball	Convenient	Judgement	Snowball
39	reference is known as	Quota Sampling	Sampling	Sampling	Sampling	Sampling

	involving selection of quota groups of					
	accessible sampling units by traits such	Judgement		Snowball	Multistage	
40	as sex, age, social class etc.,	Sampling	Quota Sampling	Sampling	Sampling	Quota Sampling
	method means deliberate selection of					
	sample units that conform to some pre-	Judgement		Snowball	Multistage	Judgement
41	determined criteria	Sampling	Quota Sampling	Sampling	Sampling	Sampling
	method means deliberate selection of					
	sample units that conform to some pre-			Snowball	Multistage	Purposive
42	determined criteria	Purposive Sampling	Quota Sampling	Sampling	Sampling	Sampling
		r urposite sumpring	Quota Samping	Sumpring	Sumpring	Sumpring
	maana salasting sample units in a just		Snowball	Convenient	Judgement	Convenient
40		Quete Sempling	Showball	Convenient	Samelina	
43	nit an miss Tasmon	Quota Sampling	Sampling	Sampling	Sampling	Sampling
	Insampling, sampling is carried out					
44	in two or more stages	Multi-stage	Cluster	Proportionate	Random	Multi-stage
	sampling is an important form of					
45	cluster sampling	Area	Multi-stage	Proportionate	Systematic	Area
	Grouping of population based on some					
	common chorectoristics is known as					
46	commission characteristics is known as	Cluster	A #20	Multi stage	Dandom	Cluster
46	sampning	Cluster	Alea	winn-stage	Kalluolli	Cluster
	method is also known as fixed	Systematic		Snowball	Disproportionate	Systematic
47	interval method	Sampling	Cluster Sampling	Sampling	Sampling	Sampling
		Sumpring		Sampling	Sumpring	Diamanantianata
	involves giving over representation to			Sampling	Disman antianata	Disproportionate
	some strata and under representation to		Sampling with			Stratified
48	others	Stratified Sampling	Replcaement	Replacement	Stratified Sampling	Sampling
	sampling involves drawing a sample					
	from each stratum in proportion to the			Sampling with	Sampling without	
49	latter's share in the total population	Proportionate	Disproportionate	Replcaement	Replacement	Proportionate
	divided into homogenous groups or		Stratified			
	strata, and from each stratum, random		Random	Multi-stage	Purposive	Stratified Random
50	sample is drawn	Random Sampling	Sampling	Sampling	Sampling Method	Sampling

	Lottery method is an example of		Stratified			
51	method of sampling	Simple Random	Random	Systematic	Cluster	Simple Random
			It is free from		widely dispersed	widely dispersed
	What is the advantage of random	It is free of errors in	bias and	It is simple to	the selection of	the selection of
52	sample?	classification	prejudice	use	sample becomes	sample becomes
	-				-	
	When we try to explain the relationships		Longitudinal		Cross sectional	
53	among variables, the study is called	Exploratory study	study	Causal study	study	Causal study
						, , , , , , , , , , , , , , , , , , ,
	Which of the following does not	Nature of	Type of sampling	The degree of	Knowledge of	Knowledge of
54	determine the size of a sample?	population	design	precision	sampling	sampling
		It should be	6	I I I I I I		
	What is not essential about a research	amenable to	It should be	It should lead to	It should lead to	It should lead to
55	problem?	research	significant	new knowledge	theory building	theory building
					uneory summing	
	Deliberate sampling is also known as		Convenience	Simple random		Purposive
56		Purposive sampling.	sampling.	sampling.	Quota sampling.	sampling.
	Simple random sampling is also known	Probability		Convenience	Purposive	Probability
57	as	sampling.	Quota sampling.	sampling.	sampling.	sampling.
	has practical application in					
58	research.	Analytical work.	Chemical work.	Physical work.	Applied work	Applied work
	A random sample is collected from the					
	population and its statistics is			Matched-pair		
59	design.	Two-group.	One-group.	data analysis .	Multiple-group.	One-group.
	Sampling in qualitative research is					
	similar to which type of sampling in	Simple random	Systematic			Purposive
60	quantitative research?	sampling	sampling	Quota sampling	Purposive sampling	sampling