CENTRE FOR DISTANCE AND ONLINE EDUCATION

Class: BBA-Part-III   Semester: V

Paper: 501 (Business Research Methods)   Unit: I

Medium: English

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Department website: www.pbidde.org

BBA-501: BUSINESS RESEARCH METHODS

Time Allowed: 3Hrs

Max. Marks : 100
Theory   : 60
Internal Assessment : 40

Note : The question paper covering the entire course shall be divided into three sections as follows :

SECTION-A

It will consist of 10 very short answer questions with answers to each question up to five lines in length. All questions shall be compulsory. Each question shall carry two marks; total weightage of the section shall be 20 marks.

SECTION-B

It will consist of essay type questions with answers to each question up to 7 pages in length. Four questions shall be set by the examiner from Part-I of the syllabus and the candidate shall be required to attempt two. Each question shall carry ten marks; total weightage of the section shall be 20 marks.

SECTION-C

It will consist of essay type questions with answers to each question up to 7 pages in length. Four questions shall be set by the examiner from Part-II of the syllabus and the candidate shall be required to attempt two. Each question shall carry ten marks : total weightage of the section shall be 20 marks.

Course Input :

PART-I

Research Methodology: Meaning, Objectives and Process of Research, Research Methods in Social Sciences, Exploratory, Descriptive and Experimental Research; their Applications and Limitations. Sampling Design : Concepts, Types and their Applicability.

PART-II

Techniques for Data Collection; Primary and Secondary Sources, Primary Sources-Consumers and Trade Survey, Including Consumer Panels and Retail Auditing. Qualitative Techniques of Data-Collection; Application. Questionnaire Designing and Protesting. The Measurement Process: Measurement in Marketing. difficulties in Measurement and Concepts of Validity and Reliability; Attitude Measurement General Methods; Scaling Techniques: Thurston, Likert, and Semantic Differentials. Report Writing and Presentation.

INTRODUCTION OF RESEARCH METHODOLOGY

Lesson Structure :

1.1.0 Objectives

1.1.1 Introduction

1.1.2 Meaning and Definition

1.1.3 Characteristics and objectives of Research

1.1.4 Some Key Concepts used in Research

1.1.5 Types of Research

1.1.6 Significance of Research

1.1.7 The Process of Theory Building

1.1.8 Research method v/s Methodology

1.1.9 Research and Scientific Methods

1.1.10 Criteria of Good Research

1.1.11 Self Check Exercise

1.1.12 Summary

1.1.13 Glossary

1.1.14 Exercise

1.1.15 Suggested Readings

1.1.0 Objectives

After reading this lesson you should be able to understand :

(i)   Describe what research is and how is it defined.

(ii)   Characteristics of research.

(iii)   Types of research.

(iv)   Distinguish between applied and basic research.

(v)   Significance of research.

1.1.1 Introduction

Research is derived from the Latin word researcher which means to look for something which is hidden. It is composed of two words Re + search, Re means fact and search means to find.

Conducting research is essential to make suitable and right decisions about specific problems. The best course of action is always dependent on a good amount of research. Organisation may take decision regarding price of a product on the basis of market research conducted by a marketing agency but a house wife may decide about the price of the product on the basis of her experience in purchasing commodities. Research is the solution provides to various problems e.g. if the problem is that why India is an under-developed economy. Through research various features of under development will be highlighted like more dependence on agriculture, less developed industrial sector, poor infrastructure etc. and the real course of under development will be highlighted and steps will be taken on the basis of the findings of research to get rid of under development. The questions which are generally tend to answer are what, why how where and who Rudyard (Kipling, a noted English poet wrote a piece of poetry which explains the insight) of research beautifully. He wrote :

I put six honest learning men,

They thought me all knew,

Their names are what and why and when, and how and where and who,

Def: Redman & Moxy "Research in systematized effort to gain new knowledge."

1.1.2 Meaning and Definition

*   The word research is composed of two words, re and search. The dictionary defines the former as a preface meanings again, a new or over again and the later as a verb, meaning to examine closely and carefully, to test and try, or to prove. Together they form a noun describing a careful, systematic, patient study and investigation in some field of knowledge, undertaken or establish facts or principles.

*   The word research is a structured inquiry that utilizes acceptable scientific methodology to solve problems and creates new knowledge that is generally acceptable.

*   Research can be defined as any scholarly investigation in search for truths, for facts, for certainties.

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*   Research is an original contribution to the existing stock of

knowledge making for its advancement. It is the persuit of truth with the help of study, observation, comparison and experiment.

*   Research is directed towards the solution of a problem. It may attempt to answer a question or to determine the relation between two or more variables.

1.1.3 Characteristics and Objectives of Research

Characteristics of Research : Following are the main characteristics of research :

1.   Research is directed towards the solution of a problem. The ultimate aim is to discover cause and effect relationships between variables.

2.   Research emphasizes upon the development of generalizations, principles or theories that will be helpful in predicting future occurrence.

3.   Research is based upon observed experience or empirical evidence.

4.   Research demands accurate observations.

5.   Research involves gathering of new data from primary or secondary sources or using existing data for a new purpose.

6.   Research is more often characterised by carefully designed procedures that apply strict and impartial analysis of data.

7.   Research requires expertise.

8.   Research strives to objective and logical, applying every possible test to validate the procedures employed, the data collected and conclusions reached. The researcher attempts to eliminate personal biasness.

9.   Research involves the quest for answers to unsolved problems.

10.   Research is characterized by patient and unhurried activity.

11.   Research is carefully recorded and reported.

12.   Research sometimes requires courage.

Objectives of Research :

The objectives of any good business research should be how to better perform your business in an economically sound manner and to increase the net profit, exposure and ensure its continuity.

Though each research study has it own specific purpose, we may think
of research objectives as falling under following main groups. The
objectives of research are :

1. To gain familiarity with a phenomenon or to achieve new insights
    into it, for example, studies are exploratory or formulative research.

2. To portray accurately the characteristics of a particular individual,
    situation or a group, e.g. descriptive research.

3. To determine the frequency with which something occurs or
    associates with something else, e.g. diagnostic research.

4. To test a hypothesis of a casual relationship between variables, e.g.
    hypothesis testing.

1.1.4   Some Key Concepts used in Research

One can understand the process of research methodology and the
techniques involved in it lastly of some basic concepts are known to us.
The following concepts are the most important :

(1)   Theory :

The word 'Theory' has also been used in different ways in the different
contexts. For our purpose a theory is coherent body of general
propositions used as principles or explanation of the relationships of
certain observed-phenomena. A key element in the above definition is
the term, proposition. So let us see what is a proposition. A proposition
is a statement concerned with the relationships among concepts. It has
to be based on logic. A proposition states that every want either has
a certain property or stands in a certain relationship to other events.

(2)   Concept :

A concept is a generalized idea about some occurrences or processes.
It is based on empirical events. Concepts are expressed in words that
refer to various events or objects. For example, research concepts of
'asset' is an abstract term that may in the concrete world of reality
refer to a specific machine. Concepts may be framed at different levels
of action. It may be based on propositions or empirical observations.
Researcher generally try to explore those concepts which are based
upon empirical observations and the theorists translate the
conceptualising of reality into abstract ideas. Only when we explain how
concepts are related to other concepts then we begin to construct

theories. Thus, the difference between a theory and a concept is that concept it is a single phenomenon whereas a theory is an assimilation of many concepts.

(3)   Hypothesis means tentative or assumed statements :

A hypothesis is a proposition that is empirically testable. Every research starts with framing of a hypothesis which is nothing but a tentative conclusion. We try to test it with the help of statistical tools and if, it is tested successfully, we accept the hypothesis.

1.1.5   Types of Research

There are two broad classification of Research :

1.   Research in physical or a natural sciences.

2.   Research in social or human sciences.

Physical science deals with things, which can be put to laboratory tests under guided conditions. These researches deal with physical phenomena upon which man complete control.

Researches in social sciences are based on human behavior, which is influenced by so many factors such as physical, social, temperamental, psychological and economic. We can never hope to put such beings to laboratory tests. Even, if it is done, their responses would not be natural but subject to the awareness of the artificial conditions.

Descriptive vs Analytical research – Descriptive research is principally concerned with survey studies of different forms. It relates to fact finding. It is used to determine the characteristics of phenomena being considered. It aims at depicting the present state of affairs as it exists. The researcher attempts to determine the causes of a particular phenomenon, though he holds no control over variables. Descriptive research doesn't provide any detail about why particular event has occurred. It is not a causal relationship research. Finding the eating habits of a particular community is a type of descriptive research.

In analytical research, researcher uses already available information. The main aim of researchers in this type of research is to critically evaluate the information available. Analytical research describes the cause effect relationship. To know why shares prices of a particular company are down, is an example of analytical research.

Applied vs Basic Research

Research can either be applied research or basic research. Applied

research aims at finding a solution for an immediate problem facing a society or an industrial/business organisation, whereas basic research is mainly concerned with generalizations and the formulation of a theory.

Gathering knowledge for knowledge's sake is termed pure or basic research'. Research concerning some natural phenomena or relating to pure mathematics are examples of fundamental or basic research.

The central aim of applied research is to discover a solution for some pressing practical problems, whereas basic research is directed towards finding information that has a broad base of applications and thus, adds to the already existing organized body of scientific knowledge.

Quantitative vs Qualitative

Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. Quantitative research, on the other hand, is concerned with qualitative phenomena i.e. phenomena relating to quality or kind. Qualitative research is specifically important in the behavioral sciences where the aim is to discover the underlying motives of human behavior.

Conceptual or Empirical Research

Conceptual research is related to some abstract or theory whereas empirical research relies on experience or observation alone, often without due regard for system and theory.

1.1.6 Significance of Research

All progress is born of enquiry. Doubt is often better than over confidence, 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 of. Increased amounts of research make progress possible.

Research inculcates scientific and inductive thinking which 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. Research, as an aid to economic policy, has gained added importance, both for government and business.

Research provides the basis for nearly all government policies in our economic system. For instance, government and budget rest in part on

an analysis of the needs and desires of the people and on the
availability of revenues to meet there needs. Research has its special
significance in solving various operational and planning problems.

Research is equally important for social scientists in studying various
social relationships and in seeking answer to various social problems.

Besides the above points, the significance of research can also be
understood keeping in view the following points :

(i)   To those students, who are to write a Master/Ph.D. thesis,
         research may mean a careerism or a way to attain a high position
         in the social structure.

(ii)   To professionals in research methodology, research may mean a
         source of livelihood.

(iii)   To philosophers and thinkers, research may mean to Duplet for
         new ideas and insights.

(iv)   To analysis and intellectuals, research may mean to
         generalizations of new theories.

1.1.7   The Process of Theory Building

Many times a question is asked about the generation of theories.
Although this is not an easy question to answer but still we can look
at the generation of theories through abstract conceptual and imperical
level exploration. At the abstract level a theory may be developed with
detective reasoning by going from a general statement to a specific
assertion. Detective reasoning is a logical process of deriving a
conclusion from something known to be true. For example, we know
that all managers are human beings if we know that Mr. X is a
manager then we can deduce that Mr. X is a human being also.

The empirical level of theory may be developed with inductive reasoning
which is a logical process of establishing a general proposition on the
basis of observation of particular facts. For example, if a stock broker
with 20 years experience of trading in a stock exchange repeatedly
notices that the price of gold rises whenever there is some disturbance
in the country, the stock broker may project this empirical observation
in a generalized way and build a theory that price of gold is related
with the political stability in the country. It has been generally found
that a theory based on either empirical observation or deductive logic
may not be a perfect theory especially in the field of social sciences.
These sciences deal with human beings and their behaviour is bound

to have variations of human nature. In pure sciences, the relationships
are fixed, so theory building is more accurate and scientific. For
example, two units of oxygen and one unit of hydrogen shall always
make water but a good perfect training in management may not create
a manager in the real sense. So in social sciences, theory construction
is often the result of a combination of deductive and inductive
reasoning. We draw conclusions on the basis of our experience and
then verify these conclusions is known, as Research Methodology.

1.1.8   Research method v/s Methodology

It seems appropriate at this stage to explain the difference between
research methods and research methodology.

Research methods may be understood, as all those methods that are
used for conduction of research. Research methods or techniques, thus
refer to the methods the researchers use in performing research
techniques, thus, refer to the methods the researchers use in
performing research operations. Since the object of research,
particularly the applied research is to arrive at a solution for a given
problem, the available data and the unknown aspects of the problem
have to be related to each other to make a solution possible, keeping
this on view, research methods can be put into the following three
groups :

(i)   In the first group we include those methods which are concerned
        with the collection of data. These methods will be used where the
        data already available are not just sufficient to arrive at the
        required solution.

(ii)   The second group consists of those statistical techniques which
        are used for establishing relationships between the data and the
        unknown.

(iii)   The third group consists of those methods which are used to
        evaluate the accuracy of the results obtained.

Research methods falling in the above stated the groups which are
generally taken as the analytical tools of research.

Research methodology is a way to systematically solve the research
problem. In it we study the various steps that are generally adopted by
a research in studying his research problem along with the logic behind
them. It is necessary for the researcher to know not only research

methods/techniques but also the methodology. Researchers not only need to know how to develops certain indices or tests, how to calculate the mean, mode, the median or the standard deviation or chi-square, how to apply particular researcher techniques.

From above points stated above, we can say that research methodology has may dimensions and research methods do constitute a part of the research methodology.

1.1.9 Research and Scientific Methods

For a clear perception of the term research, one should know the meaning of scientific method. The two terms, research and the scientific method, are closely related. Research is termed as an inquiry into the nature of the reasons for and the consequences of any particular set of circumstances, whether these circumstances are exfirmentally controlled and recorded just as they occur. Further, research implies the researcher is interested in more than particular results, he is interested in the relatability of the results and in their extremism to more conflicted and general conditions. On the other hand, the philosophy common to all research methods and techniques, although they may vary considerably from one science to another is usually given the name of scientific method. Scientific method is the pursuit of truth as determined by logical considerations. The ideal of science is to achieve a systematic interrelation of facts. Scientific methods attempts to achieve this ideal by experimentation observation, logical arguments from the accepted postulates and a combination of these three in varying proportions. In scientific method, logic aids in formulating propositions explicitly and accurately so that their possible alternatives become clear.

1.1.10   Criteria 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.

2.   Good Research is Logical : This implies that research is guided by the rules of logical reasoing and the logical process of introduction and deduction are of great value in carrying out the research. Induction is the process of reasoning from a part to the whole whereas deduction is the process of reasoning from a premise to a conclusion which follows from that very premise.

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.

4.   **Good Research is Replicable** : This characteristic allows research results   to be verified by replicating the study and there by building a sound basis   for decisions.

1.1.11   Self Check Exercises

Q1: What do you mean by hypothesis?

Q2: What do you mean by basic research?

1.1.12   Summary

Research is effectively used in economics, commerce and management. Henry Ford, the master of famous Ford Motor Company once said, "Research is fundamental to everything we do, so much so that we hardly make any significant decision without the benefit of some kind of market research. The most important managerial value of business research is that it reduces the uncertainly and risk by providing information that improves the number of ways. First it may be used to define problems or to identify opportunities to enrich management efforts. A second reason for using business research is to explain why something went wrong. Detailed information about specific mistakes or failures is frequently sought. The basic objective of seeking answers to such questions is to identify the problems areas for the business.

1.1.13   Glossary

1.   Empirical - Research based on first hand information.

2.   Hypothesis -   An assumption taken

3.   Frequency -   Number of times of occurring something

1.1.14   Exercise

(A)   Short Questions

Q1.   Define Research.

Q2.   Distinguish between Quantitative and Qualitative Research.

Q3.   What do you mean by Hypothesis.

(B)   Long Questions

Q1.   What is the meaning of research? Discuss the various characteristics of research.

Q2.   Discuss the objectives and significance of Research.

Q3.   Write a detailed note on types of research.

1.1.15   Suggested Readings

1.   C.R.   Kothari   :   Research   Methodology
2.   S.C. Sinha & A.K. Dhiman :   Research   Methodology

Research Process

Structure of the Lesson :

1.2.0 **Objective**

The main objective of this chapter are as follows:

1. To understand the research process in a detailed manner
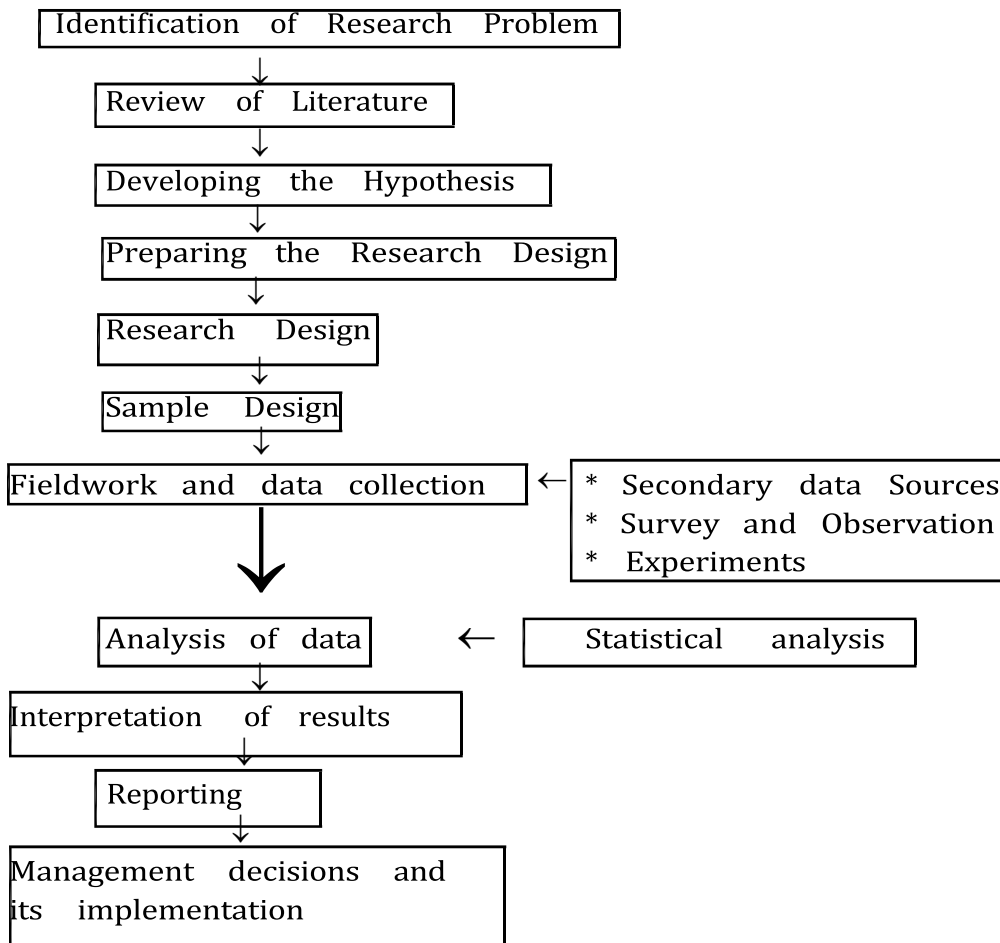2. To understand the concept and characteristics of Hypothesis.

1.2.1   Introduction

Research methodology is a way to systematically solve the research problem. It is necessary for the researcher to know not only the research methods/ techniques but also the methodology. They not only need to know how to develop certain indices or tests such as calculation of mean, mode etc. or

how to apply research techniques in particular, they also need to know which of these methods are relevant and which are not, what would they mean and indicate and why. So research methodology has many dimensions and research methods do constitute a part of research methodology.

1.2.2 Research Process

Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. These steps are not mutually exclusive, nor they are separate and distinct. They do not follow each other in a specific order. However the following sequence provides a useful procedural guidelines regarding the process :

Identification of Research Problem
↓
Review of Literature
↓
Developing the Hypothesis
↓
Preparing the Research Design
↓
Research Design
↓
Sample Design
↓
Fieldwork and data collection ← * Secondary data Sources
* Survey and Observation
* Experiments
⇓
Analysis of data ← Statistical analysis
↓
Interpretation of results
↓
Reporting
↓
Management decisions and its implementation

(Research Process)

1.2.2.1 Identification of the Research Problem :- At the first
glance, it would seem fairly easy to see and pose a problem for study.

But the experience of researchers is summed up in the ad-age "It is
often more difficult to find and frame the problem, rather than to solve
it. Problem means what the researcher a wants to solve. It is the main
concentration of whole of the research work." The problem is of two
types:

(i) Which relate to state of nature?

(ii) Which relate to relationship between variables?

So whole of the study research is conducted after setting the problem.
The problem once set is not rigid in nature, but problem can change
also. So initially the problem is set in a broad way or in a general way
after defining/redefining the problem it can be formulated in a specific
way.

Essentially two steps are involved in framing the problem:

(i) Understanding the problem thoroughly

(ii) Refreshing the same into meaningful terms from analytical point
of view.

There are number of sources of selecting the problem :-

(a) Existing trouble

(b) Literature study

(c) Discussions

(d) Expert advice

(c) Studies already made

1.2.2.2   Extensive Literature Survey :-   It means a broad/wide survey of literature on the selected problem. So whatever the material on such specific topic or on other related fields is available are to be surveyed by the researcher. So for this abstracting and indexing journals bibliographies are the first place to go. Academic journals, conference proceedings, government reports, books must be tapped depending on the nature of problem. It should be remembered that in survey of literature one source will lead to other. So a good library is of immense use at this stage of surveying of literature.

Developing the Hypothesis :- Hypothesis is derived from two words hypo + thesis. Hypo means tentative or assumed, thesis means statements. So hypothesis is a set of declarative statements or sentence which is to be proved or disapproved. So after setting the problem in hypothesis framing answers to such problems are decided in advance. Hypotheses are answered to such problems. After conducting an extensive, literature survey, the researcher should able to state in clear terms the working hypothesis. These are the assumptions made in order to draw out and test its logical consequences. Every hypothesis framed should possess the following features-clarity, simplicity, declarative sentence form, capable of testing etc. The role of hypothesis is to guide the researcher by determining the area of research and to keep him on the right track. It sharpens the thinking and focuses attention on the more important fact of the problem. It also indicates the requirement of type of data. The hypothesis can be developed by :-

(i)   Discussing it with colleagues and experts about the problem, its origin and the objective in seeking the problem.

(ii)   Examination   of data   and   records,   if available   concerning   the problem for possible trend, peculiarities and other clues.

(iii)   Review of similar studies or related studies.

(iv)   Personal, investigation like interviews, surveys etc.

Thus hypothesis arise as a result of prior thinking about the subject, examination of 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.

There are two types of hypothesis framed by researcher: (i) Null hypothesis (ii)   Alternative hypothesis.

Null hypothesis is that hypothesis which researcher wants to disapprove and alternative hypothesis is one which the researcher wants to prove.

Another important concept in testing hypothesis is level of significance. It is always certain %age chosen with great care. It means the chances of or willingness to take the risk by accepting null hypothesis e.g. if level of significance is 5% it means that there are 5% chances of accepting wrong hypothesis and 95% level of confidence i.e. accepting a true hypothesis.

There are various steps to test hypothesis :-

(i)   Making a formal statement :- null hypothesis (H_o) or alternative hypothesis (Ha).

(ii)   To select a level of significance.

(iii)   To select the appropriate sampling distribution.

(iv)   To select the random sample and compute appropriate value from sample data.

(v)   To calculate probability and compare probabilities with the relevant table values. Statisticians have developed several tests of hypotheses. Parametric and Non-parametric tests so by using these tests one can test hypothesis to be true/false.

1.2.2.3 Preparing the Research Design :- Research design is
preparing the blue print for action i.e. how the research will be
conducted or to state the conceptual structure within which research
will be conducted. The preparation of such a design facilities research
to be as efficient as possible yielding maximum 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 depend on research purpose.
Research purpose may be grouped into four categories :-

-        Exploration

-        Descriptive

-        Diagnosis

-        Experimental

So research design differs in all respects. A flexible design which
provides opportunity for considering many different aspects of problem
is considered appropriate if the purpose is that of exploration. But when
purpose happens to be accurate description of a situation or of an
association between variables, the suitable design will be one that
minimizes bias and maximizes the reliability of data collected and
analysed. There are several designs, such as experimental and non-
experimental hypothesis testing.

The preparation of research design, appropriate for a particular
research problem, involves to considering action of following :-

(i)   The means of obtaining the information.

(ii)   The availability and skills of the researcher and his staff.

(iii)   Explanation of the way in which selected means of obtaining
         information will be organised and the reasoning leading to the
         action.

(iv)   The time available for research.

(v)   The cost factor relating to the research

Types of Research Design

(i)   Research design in case of exploratory research studies

(ii)   Research design in case of descriptive and diagnostic research studies

(iii)   Research design in case of hypothesis - testing research studies

(ii)   Research design in case of experimental studies

          -      Completely randomized design

          -      Randomized block design

          -      Latin Square design

          -      Factorial designs

Research Design	Exploratory	Descriptive
Overall design	Flexible	Rigid
Sampling design	Non-probability	Probability
Statistical design	No preplanned	Planned
Observational design	Unstructured	Structured
Operational design	No fixed decision	Advanced decisions

1.2.2.4   Determining the Sample Design :- A sample design is a definite plan for obtaining a sample from a given population. It refers to techniques or procedure or way the researcher will select units. As whole of the units or census method is impossible. Due to many constraints, it is almost impossible to conduct a census study for a research purpose. So in such case a representative sample of the complete population needs to be taken. Sample design greatly affects the outcome of the study. If the sample design is not appropriate one, it will lead to misleading results. There are various ways to take a sample from a population; these will be discussed in subsequent chapters.

2.2.6.   Collection of data :- Having formulated a research problems, developed a study design, constructed a research instrument and selected a sample, you then collect the data from which you will draw inferences and conclusions for your study.

Many methods are there to gather the desired information. As a part

of the research design, you decided upon the procedure you wanted to
adopt to collect your data. At this stage, you actually collect the data.
For   example,   depending   upon   your   plans,   you   might   commence
interviews, mail out a questionnaire, conduct nominal/focused group
discussions or make observations.

1.2.2.7   Execution of the project :- This is a very important step
in the research process. It 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. A careful watch should be kept for unanticipated factors in
order to keep the survey as much realistic as possible. The steps should
be taken to ensure that the survey is under statistical control so that
the collected information is in accordance with predefined standard of
accuracy.

1.2.2.8   Analysis of data :- The analysis of data requires a number
of operations such as establishment of categories, the application of
these   categories   to   raw   data   through   coding,   tabulation   and   then
drawing statistical inferences. The unwiedly data should be condensed
into a few manageable groups and tables for further analysis.

1.2.2.9   Hypothesis   testing   :-   After   analysing   the   data,   the
researcher is in a positions to test the hypothesis, if any, he had
formulated earlier. Do the facts support the hypothesis or they happen
to be contrary? This is the usual question which should be answered
while   testing   hypothesis   various   tests   such   as
chi-square test, t-test, F-test have been developed for the purpose.

1.2.2.10   Generalizations or Interpretation :- If a hypothesis is
tested and upheld several times, it may be possible for the researcher
to arrive at generalization i.e. to build a theory. As a matter of fact,
the real value of research lies in its ability to arrive at certain
generalizations. 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.

1.2.2.11   Preparation of the Report :- Finally, the researcher has
to prepare the report of what has been done by him. Writing of report
must be done with great care. The layout of the report should be as

follows :

(i)   Preliminary   pages

(ii)   The   main   text

(iii)   The   end   matter

1.2.2.12   Management decisions

The findings are conveyed to decision maker after consultation with the
research programme. Decision maker analyses the findings and takes
appropriate decision in the light of statistical findings presented by the
researcher. This is not a formal part of research process.

1.2.3 concept of Hypothesis

Hypothesis is a formal statement which is basically a prediction that
can be tested. It is used in an experiment to define the relationship
between two variables. A researcher must take   utmost care   while
framing hypothesis statement. It should not be vague. Hypothesis is
considered as the main tool in research. Its main function is to suggest
new   experiments   and   observations.   Hypothesis   is   defined   as   a
proposition or set of propositions set forth as an explanation for the
occurrence   of   some   specified   group   of   phenomena   either   asserted
merely as a provisional conjecture to guide some investigation or
accepted as highly probable in the light of established facts. Hypothesis
is a predictive statement, capable of being tested by scientific methods.
There are two types of Hypothesis:

        (1) Null Hypothesis

        (2) Alternate   Hypothesis

        Null Hypothesis is one which the researcher wishes to disprove
and althernate Hypothesis is one which the researcher wishes to prove.

1.2.4 Characteristics of HYpothesis

1.   Hypothesis should be clear and precise.

2.   Hypothesis should be capable of being tested.

3.   Hypothesis should state relationship between variables.

2.   Hypothesis should be limited in scope and must be specific.

5.   Hypothesis should be consistent with most known facts.

6.   Hypothesis should be accepted in simple terms so that it is easily
        understandable by all the concerned people.

1.2.5 Self Check Exercise :

Q1.   Discuss   the   characteristics   of   Hypothesis.

Statistics   have   developed   various   tests   for   Hypothesis.   These   are   classified   as:

      a.   Parametric   Test

      b.   Non-Parametric   Test

Parametric   Tests   usually   assume   certain   properties   of   the   population   from   which   we   draw   samples   assumptions,   like   observations   come   from   normal   population,   sample   size   is   large   etc.   These   assumptions   must   hold   good   before   parametric   tests   are   used.   But   sometimes   researcher   cannot   make   such   assumptions   in   such   situations   then   non-parametric   tests   are   used.

1.2.6 Summary

This   lesson   has   provided   an   overview   of   the   research   process,   which   has   been   broken   into   various   steps,   the   details   of   these   steps   will   follow   in   the   next   lessons.   The   light   steps   cover   the   total   spectrum   of   a   research   endeavor,   starting   from   problem   formulation   through   to   writing   a   research   report.   The   steps   are   operational   in   nature,   following   a   logical   sequence,   and   detailing   the   various   methods   and   procedures   in   a   simple   step   manner.

1.2.7   Glossary

    1. Null Hypothesis: This is the one which the researcher wishes to disprove.

    2. Alternate Hypothesis: This is one which the researcher wishes to prove.

1.2.8   Answers to Self Check Exercise

    1. (a) See Para 2.4

1.2.9   Exercise

(A)   Short Questions

    1.   Define   "research   problem".

    2.   What do you mean by analysis of data   ?

    3.   Determine   sample   design.

(B)   Long Questions

1.   Briefly   describe   various   steps   involved   in   research   process.

2.   Write   note   on   the   Hypothesis   testing

3.   Explain   the   steps   involved   in   report   writing.

1.2.10 Suggested Readings

  ⓪   Research Methodology by M.N. Borse

  ⓪   Research Methodology and Statistical Techniques by Santosh Gupta

  ⓪   Research Methodology - Methods and Techniques by C.R. Kothari

Research Methods and Techniques

Structure of the Lesson :

1.3.7 Other Research Methods

      1.3.7.1   Field Investigation Method

      1.3.7.2   Evaluation Research Method

      1.3.7.3   Action Research Method

      1.3.7.4   Ex-post Facto Research Method

      1.3.7.5   Historical Method

1.3.8 Problems Encountered by Researchers in India

1.3.9 Summary

1.3.10 Self-check questions

1.3.11 Glossary

1.3.12 Exercise

1.3.13 Suggested Readings

1.1.3.0   Objective

The main objective of this lesson is to explain the students basic terms and application of main research methods and techniques of research process. In the light of main objective, in this lesson, we shall discuss various

1.   techniques   of   research   (i.e.   Exploratory,   survey   and experimentally   research);

1.3.   methods under above mentioned types techniques of research; and

1.3.   their importance and applications in the research process.

1.1.3.1   Introduction

The two terms, 'research' and 'scientific method', are closely related. To clear the perception of term research one should know the meaning of scientific Research. 'Research' can be termed as an inquiry into the nature of reasons for and the consequences of any particular set of circumstances   whether   these   circumstances   are   experimentally controlled or recorded just as they occur.

In scientific method, logic aids in formulating propositions explicitly and accurately so that their possible alternative become clear. The scientific method is based on certain basic postulates which can be stated as under :

〇   It relies on empirical evidence.

〇   It utilizes relevant concepts.

(iii)   It is committed to only objective considerations.

(iv)   It results into probabilistic predictions.

(v)   It aims at formulating most general axioms or what can be termed as scientific theories.

The scientific method encourages a rigorous, impersonal mode of procedure dictated by the demands of logic and objective procedures.

1.3.2   Research Methods

Any research process can be completed through a number of alternative methods. The research process is just like a road map, some roads are better than others, some are difficult to travel and some are more interesting than others. It is important to note that all roads may lead to one destination but the road one takes depends upon many other factors. All states in the research process have to be kept in mind while deciding about the   method or research to be adopted. In other sense the Research methods may be understood as all those methods/ techniques that are used for conduction of research. Research method, thus, refer to the methods the researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods, since the object of research is to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible keeping this in view, research methods can be put into the following three groups ;

1.   In the first group we include those methods which are concerned with the collection of data. These methods can be used where the data already available are not sufficient to arrive at the required solution.

2.   The second group consists of those statistical techniques which are used for establishing relationships between the data and unknown.

3.   The third group consists of those methods which are used to evaluate the accuracy of the results obtained.

Research methods falling in the above stated last-groups are generally taken as the analytical tools of research.

The Method of research may be classified from many points of view :

*   The field to which applied : Social science, Education,

Philosophy.

*   Purpose : Description,   prediction,   determination   of causes, determination   of   status.

*   Place where it is conducted : In the field or laboratory.

*   Application : Pure research or applied research, data gathering derives employed, Tests, questionnaires,   rating scales etc.

*   Character of data applied : Objective, Subjective, quantitative, qualitative   etc.

1.3.3   Types of Researches

Mainly the following types of researches are undertaken :

(1)   Exploratory   research

(2)   Survey   research

(3)   Experimental   research

The details of these types of researches is discussed in the next part of this lesson.

1.3.3.1   Exploratory research :

This is the most important types of research as it draws out the inner most feeling of the respondents. Exploratory research is also useful when a researcher does not have full knowledge about the research problem, importance of exploratory research can be understood by the experience of a diamond company which conducted quantitative exploratory research and found that the decisions regarding the purchase of diamond jewellery are taken by men rather than women. It was found that women played semi-passive role before the purchase of diamonds. Through this research, the diamond firm came to know about this new phenomena.

Exploratory research is generally quantitative in nature. It provides an understanding of a concept or crystalizes a problem. In such a research, rigorous measurement or quantification or mathematical analysis is not performed. In a nut shell it is quantitative in nature.

Exploratory research is a series of informal studies to provide background information. A researcher must be creative in the choice of information sources to be investigated. He must be flexible though to investigate all sources that may provide information about the systematic, while designing exploratory research.

Purpose of Exploratory Research

This type of research is generally conducted for the following purposes :

(a) **Diagnosing a situation** :- Exploratory research helps in clarifying or analysing the nature of a problem. It helps in setting priorities for research. It also provides an orientation for business firms by gathering information on a topic with which the company has a little experience. This type of research is generally done before planning a formal research project.

(b) **Screening alternative** :- Exploratory research may also be used to determine the best alternative out of several opportunities. This exercise is generally done for concept testing in advertising research.

(c) **Discovering new ideas** :- Exploratory research also used to generate new ideas. Sometimes, people have new and different ideas for increasing production, reducing cost of improving products. These ideas can be known and identified by such exploratory research.

1.3.3.2   Survey Research :

Survey research is based upon the collection of primary data and its interpretation to reach some tangible conclusions. A survey means asking certain questions to the succeed respondents for gathering information. Questions may be asked either verbally or in a written form. Questions may be asked through the mail, on the telephone or by direct conversation.

The type of information gathered in surveys varies considerable depending upon a survey's objectives. Typically, survey investigations attempt to describe what is happening or to learn the reasons for a particular happening. Mostly survey research is descriptive in nature.

Most surveys have multiple objectives. Few surveys gather only a single type of information, for example, an organisations researcher might conduct a descriptive survey to determine worker's feelings about four days week. But the same survey may also inform use the views of younger generation as compared to the older employees. Although, the surveys are conducted to quantify certain factual information, still certain aspects of a survey may be qualitative in nature. Similarly, most of the surveys are descriptive but some of

them may also provide cause relationships.

Surveys provide a quick, inexpensive, efficient and accurate means of accessing information about the population. These surveys are quite flexible and if properly conducted they are external useful also. Over the past few decades, survey research techniques have become quite scientific and accurate.

These surveys have many errors also. These errors cop up either because of erratic sampling or non-adoption of systematic methods described for such sample surveys.

1.3.3.3   Experimental Research :

We generally associate the word experiment with physical sciences where laboratory experiments are conducted in a controlled situation. The concept of experimentation these days is being widely used in business and social science research also. The purpose of experimental research is to allow the researcher to control the research situation so that causal relationships among variables may be studied. The researcher manipulates a single variable and keeps the other variable constants. The objectives of experimental research are :

(i)   To explain the relation under pure and uncontaminated conditions.

(ii)   To test the predictions derived from theory and other researches.

(iii)   To define theories and hypotheses which can be used to formulate hypotheses related to other experimental/non-experimental tested hypotheses and to assist in building theoretical statements.

Limitations :

This method has its own limitations as given under :

1.   The main argument against this method is whether the results obtained through this method are applicable in practical situations or whether they are purely hypothetical.

2.   The unit of study in this method is so short and the approach is so short segmental that chances of its application are very few.

3.   The degree of manipulation of independent variable pre supposes that the unit of study must be small and experiment must be confined to a short period.

1.3.4 Methods of Exploratory Research

Any research starts with gathering information. A researcher may choose anyone of the following methods of exploratory research :

1.3.4.1   Experience Surveys : The researchers may discuss issues and ideas with top executives and knowledgeable persons having personal experience in the field. Experience surveys may be quite informal discussions and conversations which are intended only to get ideas about the problems. Such surveys are not expected to be conclusive but they initiate the process for further research. The only care that should be taken in conducting such surveys is that knowledgeable people should be selected because they are more articulated individuals. The purpose in such a research is to help to formulate the problem and clarify concepts rather than develop conclusive   evidence.

1.3.4.2   Secondary data Analysis : Another quick and cheaper source of exploratory research is published material. Mostly research has been conducted almost on all problems by some agencies or individuals. Their findings are recorded and published in the form of secondary data. In commerce and business management the most authentic secondary data is the accounting record, trade and industry associations' data.

Once a situational analysis is using experience surveys a secondary data analysis is complex, we become clear about the issues which warrant further investigation on the basis of this background information. It is at this point that a research specialist is required.

1.3.4.3   Pilot Studies : Pilot study is a feasibility study as it tests the research design in reality. A Pilot study is conducted to check the possible problems in research design. A small part of the total sample is selected to conduct a pilot survey. Sometimes researchers only focus in conducting a pilot survey is to check the statements of research instrument. A pilot study is informal exploratory investigation that is carried out to serve as a guide for a larger study planned for a larger survey. This focus group generally discuss the quantitative aspects of the questions which becomes a basis for a formal quantitative research project.

1.3.4.4   Focus Group Interview: Focus group interview are so popular these days that many researchers consider it to be the only

exploratory research tool. A focus group interview is an unstructured free flowing interview with a small group of people. It is not rigidly constructed question and answer session but a flexible format that encourages discussion on different issues. The group consists of the interviewer or moderator and a few participants (normally 8-12) who discuss a single topic. The moderator introduces the topic and encourages the group to discuss the subject amongst themselves.

The primary advantages of focus group interviews are that they are relatively brief, easy to execute, quickly analysed and inexpensive. The only limitation of focus group interviews is that a small discussion group is not representative sample. So focus group interviews cannot take the place of quantitative studies. But at the same time, the advantage of such interview is its flexibility.

The focus group interview method should be used with the following considerations:

(1) The composition of a group should be as homogeneous as possible.

(2) The place for such discussions should provide a conducive and natural environment.

(3) The moderator should have the capability of focusing on the issue, generating fresh ideas and changing the flow of discussion when required.

1.3.4.5   Case Study Method : The purpose of the case study method is to obtain information from situations which are similar to the problem situation being investigated by the researcher. In this method, we simulate a situation or look at an original situation created in the past and try to analyse it. Like all exploratory research the results from case analysis are also conceptual because the situations are only simulated or imaginative.

1.3.4.6   Projective Techniques : In the case of exploring personal liking or disliking there is no sense in asking direct questions. Individuals attitudes, motivation, reactions and characteristics can best be judged by projective techniques. Under laying assumption of this method is that a man does not behave like himself when he talks in his own person. But when he is given a mask, he tells the truth. In other words, projective techniques assume that when a person is directly questioned, his true feelings

are not expressed because he may be feeling embarrassed about the answers that reflect poorly on his self-concept. However, if the respondents are presented with unstructured and ambiguous situations, their true feelings will be expressed.

A projective technique is an indirect means of questioning that enable the respondent to project feeling on to third party. Respondents are encouraged to describe a situation in their own words. Individuals are expected to interpret the situation within the context of their own experiences, attitudes and personality. The most common projective techniques in business research are (1) word association, (2) sentence completion, and (3) third person techniques or thematic appreciation tests. In words association, a list of words is given to the respondent and then he is asked to respond with the first word that comes into his mind. In the case of sentence completion, the respondents are required to complete a number of incomplete sentences with the first word or phrase comes to mind. Another important projective technique is Thematic Appreciation Text (TAT). TAT is picture interpretation technique. In TAT a series of pictures is shown to the respondent and he/she is asked to tell a story on about it. He/she is asked about what characters in the cards or pictures are thinking. It is believed that what thought or emotions the respondent tells about the character in the picture are his own thoughts and emotions.

1.3.4.7   In-depth Interview : In this case, detailed interviews are conducted and many questions are asked for elaboration of the concept. Unlike the projective techniques, in this case, interviews are supplementary questions to explore everything regarding the issue. The limitations of such in-depth interviews are that very few people cooperate in such interviews. Sometimes, they are not capable or articulating their views.

Limitations of Exploratory Research :

Exploratory research can never take the place of quantitative research. Our experience tells that exploratory research has mostly led to incorrect decisions. The most important thing to remember about exploratory research techniques is that they have limitations. Most of them are qualitative and the interpretation of the findings in only a judgement. For example, the findings from projection

technique can be vague. They sometimes produce interesting and surprising hypothesis. Conclusions based on exploratory research are also not fulfilled the need of the researcher. Similarly, findings from focus group interviews are also ambiguous. You do not come to know whether the respondents have understood the problem or not. The size of the sample used for such researches is very small which may not be representative. Case studies have the disadvantage of being either extremely good or bad examples or a situation rather than average situations.

1.3.5 Methods of Survey Research

Survey methods can be classified according to different criteria. They may be classified according to the method of communication, the degree of structure and design of a questionnaire and the time frame in which the data are collected.

1.3.5.1   Personal   Interviews   :   Gathering   information   through face to face contact with individuals popularly known as personal interviews has a long history. Periodic interviews were used as a basis for fixing tax rates in the ancient empires of Egypt and Rome. Personal interviews are direct communications where interviewers in face to face situations ask questions to the respondents. There is a two way conversation between the interviewer and the respondent. Personal   interviews   may   take   place   anywhere.   An   important characteristic of personal interviews is the opportunity to probe of a respondents answer in brief or of unclear, the researcher may probe for   a   clearer   or   more   comprehensive   explanation.   Although interviewers are expected to ask question exactly as they appear on the questionnaire, probing allows the interviewers to get a clearer or more   comprehensive   explanation.   Complex   questions   that   cannot easily be asked on telephone or through mail can be handled very skillfully   through   personal   interviews.

In the case of personal interviews, a few considerations should be kept   in   mind   to   make   personal   interviews   more   effective   and productive.   These   considerations   are   the   following:

(a)   The questionnaire should be scientifically designed and there should be a logical sequence between the questions.

(b)   The interview should not be very long. Limitations of time should be kept in mind.

(c)   The questions asked during the interviews may be supported by visual aids and themetics.

(d)   As far as possible a feedback should also be sought to clarify the questions.

(e)   No personal or embarrassing questions should be asked.

(f)   An assurance should be given to the respondent regarding the confidentiality   of   the   interview.

1.3.5.2   Questionnaire Method : In some research surveys, the total population or sample is so large widespread or distributed that personal interviews are not possible. In such cases, the information is sought with the help of questionnaires. These questionnaires are mailed to the respondents and the response received is analysed to arrive at conclusions. A questionnaire is different than a schedule. Since the knowledge about these concepts are important, we will denote a full lesson on these topics.

Questionnaire method is used according to its suitability for the type of information required. It is not feasible to obtain extensive data with the help of questionnaire because in such cases an in-depth interview is required. Questionnaire method is effective only when the respondent is willing to express his reactions clearly. Some research problems are such where the questionnaire will not be responded at all. For example, you can gather some information about the income of a family only through interview or observation, nobody will fill up the questionnaire in this case. Moreover, a questionnaire can be a successful source of collecting information. Questionnaire method has the following advantages:

(a)   In this method, survey staff is not required.

(b)   Questionnaire method is unbiased as the surveyor is not present on the scene.

(c)   We can cover a very large area or a large number of respondents through this method.

(d)   A fair amount of uniformity is ensured through this method.

(e)   A fair amount of queries can be maintained through this method.

(f)   This method provides sufficient time to the respondents to think and send his replies.

(9)   The information collected through this method is more reliable and dependent.

Questionnaire method has the following disadvantages :-

(1)   This method cannot be applicable where the informants are illiterate.

(2)   This method involves some uncertainty about the response.

(3)   The information collected by this method may not be correct.

1.3.5.3   Scheduled Method : Scheduled method is another form of research. It is quite similar to the questionnaire method with some unique characteristics. In this case a schedule of questions is used by the researcher or the surveyor during personal interview with the respondent. The characteristics of good schedule are the same as that of a questionnaire.

1.3.5.4   Observation Method : Observation method is a technique under which data from the field is collected with the help of observation by the observer. It is an eye phenomenon. The basis of observation is curiosity and therefore, the researcher should be curious to observe the object or situation. Many discoveries in the world and many social reforms were made as a results of observation. All observers, while going to the field may have a hypotheses in the mind and observation can be just be chance. In a planned research, observer has to be pre-planned with a definite aim and a hypothesis. Observations can be simple and noncontrolled in which the observation is made in natural course without any outside influence. It can also be a controlled observation in which we plan it according to our objectives. It is generally carried on as an experiment in which certain devices may also be used.

1.3.5.5   Case Study Method : Case study method is another method which is used extremely in social research. It is a fairly exhaustive method of studying a person or a group of persons. The method was introduced in the 19th century for studying family budget in France.

Basically, this method deals with analysing the behaviour pattern of a unit or a group or people and its relationship with its environment. This case under the study may be one human individual only or only an episode in the life of a group of persons.

In case study method, there are certain underlying assumptions. The first basic assumption is that there present an identity of human nature which means that all human beings have a basic identity and basic characteristics of human beings even if the particular time characteristics change. Another assumption is that most person's follow an underlying natural reaction system. Still another assumption is that it is believed that the reactions to certain situations by all human beings are the same. One would expect that the responses of love, hatred, affection or repulsions are almost uniform although there may be slight variation.

Advantages :

*   This method fills in a gap of making the research possible and also meaningful on the problems that would have remained unexplored.

*   Not repeatable under any circumstances and therefore, historical method serves a ready hand method to the researchers whose problems depend on historical observations.

*   This method provides very useful information that goes a long way towards the solution of a research problem.

Limitations :

This method is not free from limitations. The main drawbacks are :

*   Non-matching   situations

*   Over   generalizations

*   Subjective   interpretations

*   Necessary   conditions   for Historical   Research

*   Selection of a topic for Research

*   Social   insight

*   Historical   orientation

*   Knowledge   of related   social   sciences

*   Wide   educational   back ground

*   Familiarity with the topic and its objectives

*   Dispassionate   study

*   Imaginative   capacity

*   Selection   and rejection   of the material

1.3.6   Methods of Experimental Research

The   methods based   on experiments conducted in a laboratory are defined   as   Experimental   Methods.   Hence,   it   is   also   known   as laboratory   research.   Generally   laboratory   research   is   done   in   the fields of physics, chemistry, biology etc. But it is highly useful, though a fit difficult, even in social sciences also. The   only   problem is to set up   a   social   research   laboratory,   and   to   create   environmental conditions.   Then   it   will   produce   required/   excellent   results.

1.3.6.1   Experimental   Method   : An experimental method is the proof of a hypothesis which seeks to look up into two factors in a casual relationship through the study of contracting situations been controlled on all factors except the one of interest the later being either the hypothetical case or the hypothetical effect.

Experimental method implies a controlled observation of a succession of events, its aim is to search for casual connection.

1.3.6.2   Application of Experimental Method : Experimental method is very useful in economic research. Following techniques are generally adopted as experimental method in economic search.

* Model building
* Input-output method
* Cost benefit analysis method
* Linear programming method

The   purpose   of an experimental design   is to   obtain   maximum information with the minimum cost and labour. For this purpose, two groups are chosen in such a manner they do not differ from each other in significant respects except by chance, one of these groups is called as the experimental group and the other as the controlled group. The two groups are then compared in terms of the assumed effect.

Main advantages of this method are :

The approach is more rigorous. It has the advantages of scientific and vigor and mathematical logic in so far as the entire piece of research

work is based on a well founded model.

* In comparison to other methods, this approach permits the determination of cause and effect relationship more precisely and clearly.

* The method is also advantageous in so far as, under identified conditions, a lot of it depends on the behaviour of the respondents.

Sometimes this method is criticized on the ground that it does not make any solid contribution to knowledge but merely helps in consolidating the facts that have already been existing.

In practice, the use of experimental method in social research is much more complicated.

However despite of many difficulties, this method is now playing an important part in research in psychology, sociology, anthropology and other social sciences.

1.3.6.3   Problems of social experiments : The application of the experimental method to human problems has not so successful because as can't investigate it in the similar manner as we explore external values in social science.

In case of experimental method setting has to be created and it is not always possible in social research. Many difficulties arose in setting the experiment.

For successful it is necessary that all other causative factors except the one under study must be strictly unchanged and the particular variable may be varied gradually.

It is not possible in practical life to measure values of the variables used for the estimation of regression models without error. All variables in social research are oftenly subject to errors of observation and measurement.

1.3.7   Other Research Methods

Following are the other types of research methods which are not covered under the earlier discussed methods of research :

1.3.7.1   Field Investigation Method : A field experiment is a research study in a realistic situation in which one or more independent variables are manipulated by the experimenter under as controlled conditions as the situation will permit.

A field experiment is generally credited with a few virtues are supposed to be unique in this category of a research. These virtues may be listed as (i) the variables in a field experiment (ii) field experiments have the advantages of investigation more fruitfully the dynamics of inter-relationships of small group of variable (ii) Field experiment studies are also ideal to testing the theory and to the solution of the real world problems.

1.3.7.2   Evaluation Research Method : Evaluation research is a recent addition to the types of research. This category of research is called as a product of developmental programming which has been adopted on a very large scale in the recent years. The evaluation is carried out with respect to the broader changes and major objectives of a program.

It is of three type, mainly :

(i)   Concurrent   evaluation

(ii)   Periodic   evaluation

(iii)   Terminal   evaluation

*   Concurrent evaluation is a continuing process of an inspection of the project that has been launched.

*   Periodic evaluation takes place at different phases or stages of performance of the project.

*   Terminal evaluation is the evaluation of the final phase of the project. Once the project has been completed, an overall assessment is made to see to how best a project has served the objectives for which it was launched.

1.3.7.3   Action Research Method : This is a recent addition to the research methods. This type of research is conducted through direct action. The actual study may consist of a number of phases, say, base line survey, systematic of action, periodical assessment, etc. A good example action research is a study of test marketing. A base-line survey is initially conducted and the informants are identified, and this is followed by the distribution of the product under study, and then an assessment of survey.

1.3.7.4   Ex-post Facto Research Method : This is an empirical research and the researcher does not have any control over independent variables, because they have already been manifested.

Ex-post factor research is systematic empirical inquiry in which the scientist does not have direct control of independent variables because their manifestation have already occurred or because they are heavenly not manipulated. In ex-post facto research, the researcher's control on the behaviour of the independent variables is very weak and in many cases no control is possible.

1.3.7.5   Historical Method : Any research which makes use of observations based on past events is known as research in Historical approach. Its main aim is to apply the method of reflective thinking to social and economic problems still unsolved by means of discovery of past trends of events; facts and attitudes. The historical research should for conduct critical evaluation and interpretation of historical documents and records in such a manner that general laws, trends or hypothesis can be framed.

*   Historical research is the systematic and synthesis objective location, evaluation synthesis of evidence in order to establish facts and draw conclusions concerning past events.

*   Historical method may be defined as a system in which present day events are studied with reference to the events that took place in the past.

1.3.8   Problems Encountered by Researchers in India :

1.   The lack of a scientific training in the methodology of research is a big problem for researchers.

3.   There is insufficient interaction University research departments and business establishments.

3.   Most of the business units don't have the confidence that the material supplied by them to researchers will not be misused.

4.   Research studies overfalling one another are undertaken quite often for want of adequate information.

5.   There does not exist a code of conduct for researchers and inter-university and inter-departmental rivalries are quite common.

6.   Many researcher also face the difficulty of adequate and timely assistance from Government.

7.   Library facilities are not up to the mark for conducting quality research.

8.   There is also difficulty of timely availability of published data from various recognized agencies.

1.3.9   Summary

In this lesson we have discussed various types of researches and their research methods, their characteristics, usefulness and limitations. Mainly Exploratory research, survey research and Experimental research based methods are explained in this lesson. These research processes can be completed through a number of alternative methods like survey methods, secondary data analysis, Projective techniques, pilot studies, Focus group Interviews, Questionnaire method, Schedule method, Case study method, Observation method, Experimental method, Evaluation research method, Action research method, Ex-post facto research and Historical methods.

1.3.10 Self Check Questions

Ques 1.   What do you mean by Survey Research ?

Ques 2.   List various methods of Exploratory Research.

1.3.11 Glossary

1.	Survey Research	:	Research process based on survey.
3.	Exploratory Research	:	It is a series of informal studies to provide background information.
3.	Laboratory Research	:	Research techniques where laboratory experiments are conducted in a controlled situation.

1.3.12   Exercise

(A)   Short Question :

Ques 1.   Define the term Research.

Ques 3.   What do you mean by Exploratory research ?

Ques 3.   Can Experimental/Laboratory   research is possible to conduct in Social Sciences.

(B)   Long Questions :

Ques 1.   Discuss the various methods of survey research.

Ques 2.   Define 'Experimental research'. Explain its techniques, advantages and limitations.

Ques 3.   Explain the main methods of Exploratory research and their usefulness   to the researcher.

1.3.13   Suggested Readings

1.   Research   Methodology

        By :   C.R. Kothari

SAMPLING DESIGN

Structure

1.4.0 Objective

1.4.1 Introduction

Self-Check Exercise

1.4.2 Some Basic Concepts

1.4.3 Census and Sample   Methods

1.4.3.1   Census   Method

1.4.3.2   Sampling Methods

1.4.3.3.   Importance of Sampling Methods

1.4.3.4   Merits and Demerits of Sampling Method

1.4.3.5   Difference Between Census and Sample Methods

Self-Check Exercise

1.4.4 Sampling Methods

1.4.4.1   Probability sampling methods

Self-Check Exercise

1.4.4.2 Non-probability   sampling methods

Self-Check Exercise

1.4.5 Sampling and non-sampling errors

1.4.6 Summary

1.4.7 Glossary

1.4.8 Exercise

1.4.9 Suggested   Readings

1.4.0 Objective

The main objective of this chapter are as follows:

1. To understand the basic concepts related to population and sample.

2. To understand the various techniques of sampling methods such as probability sampling methods and non-probability sampling methods.

3. To understand the sampling and non-sampling errors.

1.4.1 INTRODUCTION

Sampling is defined as the process of learning about population on the basis of sample drawn from it. In it, a part of universe is studied who represent the whole population because it includes all the characteristics of whole universe. There are various probability and non-probability sampling methods which are used to collect the data from sample of items selected from population and conclusions are drawn from them. These are known as sampling techniques. For example, if some-one wants to purchase a cotton or apples, he will examine only one or two from the whole lot and on that basis he will examine only one or two from the whole lot and on that basis he will decide whether to purchase the carton or not. We use sampling because of following reasons :

1.   Economy or Reduced Cost

The sampling method is economical. In the sampling techniques, there is less cost of data collection, administration, transport, training and man hours spent. Collecting data from 2000 or 3000 farmers costs less as compared to 10 lakh farmers covering the entire universe.

2.   Large Scope

For collecting information highly technically trained personnel with scientific equipment are required. That is why we can say that it has larger scope.

3.   Scientific Approach

The sampling technique is scientific in approach as it is based on random sampling. This technique is based on the theory of probability and on certain laws. (a) law of statistical Regularity (b) law of Inertia of large numbers (c) law of Persistence (d) law of Optimisation (e) law of validity. Sampling can also   ascertain the extent of sampling error and degree fo reliability and thus this technique has scientific approach.

4.   Greater Accuracy

The sampling often permits a higher level of accuracy due to following reasons (a) detailed information can be obtained from a small group (b) Qualified person can be appointed and trained (c) relatively less data can be handled easily.

5.   Detailed Enquiry

In Sampling, the number of units and the area of study are small. Therefore, it is possible to take a detailed and intensive study as is done in case of social, economic and business studies.

6.   Reliability

In case of sampling results are more reliable because in this it is possible to determine the extent of sampling errors and the degree of reliability on the basis of probability.

7.   Less Time

In sampling only representative units are approached and thus it saves time and man hours. Moreover the processing, editing and analysing the data also consumes less time.

8.   Administrative Convenience

Sampling requires small administrative set up involving less personnel

including trained investigators. They can be conveniently managed and thus it leads to administrative convenience.

3.   Indispensability

The sampling technique of collecting information is indispensable in type of universes. Infinite universe, hypothetical universe and universe liable to be destroyed through testing are the examples where are other method cannot be applied so we left with choice of only using sampling techniques.

Self Check Exercise :

Q. 1. What is sampling ? Why do we use it ?

1.4.2   Some Basic Concepts

(1)   Universe or Population

In statistics, universe of population means an aggregate of items about which we obtain information. A universe or population means the entire field under Investigation about which knowledge is sought. For example, if we want to collect information about the average monthly expenditure of all the 3,000 students of a college, then the entire aggregate of 3,000 students will be termed as Universe or Population. A population can be of two kinds (i) Finite and (ii) Infinite. In a finite population, number of items is definite such as, number of students or teachers in a college. On the other hand, an infinite number of items e.g. number of stars in the sky, number of water drops in an ocean, number of leaves on a tree or number of hairs on the head.

(2)   Sample

A part of population is called sample. In other words, selected or sorted units from the population is known as a sample. In fact, a sample is that part of the population which we select for the purpose of Investigation. For example, if an investigator selects 200 students of a college who represent all of them, then these 200 students will be termed as a sample. Thus, sample means some units selected out of it population which represent it.

1.4.3 Census and Sample Methods

There are two methods of collect statistical data :

(1)   Census Method

(2)   Sampling Methods

1.4.3.1.   Census Method

Census method is that method in which information or data is collected

from each and every unit of the population relating to the problem under investigation and conclusions are drawn on their basis. This method is also called as Complete Enumeration Method. For example, suppose some information (like Monthly Expenditure. Average Height. Average Weight etc.) is to be collected regarding 3000 students of a college, For that purpose if we collect data by inquiring each and every student of the college then this method will be called as Census method. In this example, the whole college i.e. all 3000 students will be considered as a population and every student as an individual will be considered as a population and every student as an individual will be called the unit of the population. Population census in India is conducted after ten years by using census method.

Merits and Demerits of Census Method Merits

Merits

(i)   Reliable and Accurate Data : Data obtained by census method have more reliability and accuracy because in this method data are collected by contacting each and every unit of the universe.

(ii)   Extensive Information : This method gives detailed information about each unit of the universe. For example, Indian population census does not only provide the knowledge about the number of persons but also information about their age, occupation, income, education, marital status etc.

(iii)   Suitability : This method is more suitable for the populations with limited scope and diverse characteristic. Use of this method is also appropriate where intensive study s desired.

Demerits

(i)   More Expensive : Census method is an expensive one. More money is needed for it as information is collected from each unit of the population. This is why this method is used by Government mostly for very important issues like Census etc.

(ii)   More Time : This method involves mush time for data collection because data are collected from each and every unit of the population. This results in delay is making statistical inferences.

(iii)   More Labour : This method of data collection also involves very much labour. For this the enumerators in a large number are required.

(iv)   Not suitable for Specific Problems : This method is not suitable relating to certain specific problems and infinite population. For example

if the population is infinite or items of the population are perishable or very complex type, then the census method is not suitable.

1.4.3.2   Sampling Methods

Sampling method is that method in which data is collected from the sample of items selected from population and conclusions are drawn from them. For example if a study is to be made regarding to the monthly expenditure of 3000 students of a college, then instead of collecting information from each student of the college, if we collect information by selecting some students like 100, then this will be called Sampling method. On the basis of sampling method, it is possible to study the monthly expenditure of all the students of the college. Sampling method has three main stages (i) to select a sample (ii) to collect information from it and (iii) to make inference regarding the population.

1.4.3.3   Importance of Sampling Methods

In present times sampling method is an important and popular method of statistical inquiry. Beside economic and business world, this method is widely used in daily life. For example, a housewife comes to know of the cooking of the whole lot of rice by observing two-three grains only A doctor tests the blood of a patient by examining one or two drops of blood only. In the same way, we learn about the quality of a commodity while buying the items of daily use like wheat, rice pulses. etc. by observing the sample or specimen. In factories, statistical quality controller inspects the quality of items by examining a few units produced teacher gets the knowledge about the efficacy or his teaching by putting questions to a few students. In reality there is scarcely any area left where sampling method is not used.

1.4.3.4   Merits and Demerits of Sampling Method

Merits :

(i)   Saving of Money : Sampling method is less expensive. It saves more and about because only a few units of the population are studied.

(ii)   Saving of Time : In sampling method, data can be collected more quickly as these are obtained from some items, of the universe. Thus much time is saved.

(iii)   Intensive Study : As number of items is less in sampling method, they can a intensively studied.

(iv)   Organisational Convenience : In this method, research work can be organized and executed more conveniently. More skilled and

competent investigator can be appointed.

(v)   **More Reliable Results :** If sample is selected in such a manner as it represent totally the universe, then the results derived from it will be more accurate and reliable.

(vi)   **More Scientific :** Sampling method is more scientific because data can be inquired with other samples.

(vii)   **Only Method :** In some fields where inquiry by census method is impossible then in such situation, sampling method alone is more appropriate. If the population is infinite or too widespread or of perishable nature, then sampling method s used in such cases.

Demerits :

(i)   **Less Accurate :** Sampling method has less accuracy because rather than making inquiry about each unit of the universe, partial inquiry or inquiry relating to some selected units only is made.

(ii)   **Wrong Conclusions :** If method of selecting a sample is not unbiased or proper cautions has not been taken, then results are definitely misleading.

(iii)   **Less Reliable :** Compared to census method, there is more likelihood of the bias of the investigator, which makes the results less reliable.

(iv)   **Need of Specified Knowledge :** This is a complex method as specialized knowledge is required to select a sample.

(v)   **Not Suitable :** If all units of a population are different from one another, then sampling method will not prove to be much useful.

4.3.5 Difference between Census and Sample Method

The main difference between the census method and the sampling method are as follows :

(i)   **Scope :** In census method, all items relating to a universe are investigated whereas in sampling method only a few items are inquired.

(ii)   **Cost :** Census method is expensive from the point of view of time, money and labour whereas Sampling method economize on them.

(iii)   **Field of Investigation :** Census method is used in investigations with limited field whereas sampling method is used for investigation with large field.

(iv)   **Homogeneity :** Census method is useful where unit of the population

are heterogeneous whereas sampling method proves more useful where population units are homogenous.

(v)   Type of Universe : In such fields where study of each and every unit of the universe is necessary, census method is more appropriate. On the contrary, when population is infinite or vast or liable to be destroyed as a result of complete enumeration, then sampling method is considered to be more appropriate.

Self Practice :

Q. 2   Explain Difference between census and sample method.

1.4.4 Sampling Methods

The method of selecting a sample out of a given population is called sampling. In other words, sampling denotes the selection of a part of the aggregate statistical material with a view to obtaining information about the whole. Now a days, there are various methods of selecting a sample from a population in accordance with various needs.

1.   Probability Sampling Methods :

    (1)   Simple Random Sampling

    (2)   Stratified Random Sampling

    (3)   Systematic Random Sampling

    (4)   Multistage Random Sampling

    (5)   Cluster Sampling

2.   Non-Probability Sampling Methods :

    (1)   Judgement Sampling

    (2)   Quota Sampling

    (3)   Convenience Sampling

    (4)   Extensive Sampling

1.4.4.1   Probability Sampling Methods

Probability sampling methods are such methods of selecting a sample from the population in which all units of the universe are given equal chances of being included in the sample. There are various variants of probability sampling methods, which are given below :

(1)   Simple Random Sampling :

Simple random sampling is that method in which each item of the universe has an equal chance of being selected in   the sample. Which item will

included in the sample and which not, such decision is not made by an
investigator on his will but selection of the units is left on chance. According
to random sampling, there are two methods of selecting a random sample :

(i)   Lottery Method : In this method, each unit of the population is
named or numbered which is marked on separate piece of paper. Such
chits are folded and put into some urn or bag. Thereafter as many chits
are made selected by some person as many units are to be included in a
sample.

(ii)   Tables of Random Numbers : Some experts have constructed
random number tables. These tables help in selection of a sample. Of all
such various tables, Tippett's Tables are most famous and are in use.
Tippett has constructed a four-digit table of 10,400 numbers by using
numbers as many as 41,600. In this method, first of all, all the items of a
population are written serially. There after by making use of Tippett's tables,
in accordance with the size of the sample, numbers are selected. The
selection of a sample with the help of Tippett's table can be made clear by
an example :

<div align="center">An Extract of Tippett's Table</div>

2952	6641	3992	9792	7979	5911
3170	5524	4167	9525	1545	1396
7203	4356	1300	2693	2370	7483
3408	2762	3563	6107	6913	7691
0560	5246	1112	9025	6008	8127

For example, 12 units are to be chosen out of 5000 units, With Tippett's
table, to decide such units, firstly 5000 units will be serially ordered from
1 to 5000 and then from Tippett's table, 12 numbers will be chosen from
the beginning which are less than 5000. These 12 numbers are follows :

2952	3992	3170
4356	1300	2693
2370	3408	2762
4167	1545	1396

The items of such serial numbers will be included in the sample. If units
of the population are less than 100, then 4 digit random numbers will be
made compact into two digit numbers, and then such two digit numbers
will be selected. Like as to select 6 units out of 60 units, the units with

serial numbers 29, 39, 31, 41, 15 and 13 will be included in the sample.

Merits

(i)   There is no possibility of personal prejudice in this method. In other words, this method is free from personal bias.

(ii)   Under this method, every unit of the universe gets the equal chance of being selected.

(iii)   The use of this method saves time, money and labour.

Demerits

(i)   If sample size is small, then sample is not adequately represented.

(ii)   If universe is very small, then this method is not suitable.

(iii)   If some items of the universe are so important that their inclusion in the sample is very essential, then this method will not be appropriate.

(iv)   This method will not be appropriate when population has units with diverse characteristic.

(2)   Stratified Random Sampling :

This method is used when units of the universe are heterogeneous rather than homogenous. Under this method, first of all units of the population are divided into different strata in accordance with their characteristics. Thereafter by using random sampling, sample items are selected from each stratum. For example, if 150 students will be divided into three groups on the basis of Arts, Commerce and Science. Suppose there are 500, 700, 300 students respectively in three faculties and 10% sample is to be taken then on the basis of random sampling 50, 70 and 30 students respectively will be selected by using random sampling. Thus this method assumes equal representation to each class or group and all the units of the universe get equal chance of being selected in the sample.

2(a)   Issues in Stratified Random Samples :

As a general rule, a reasonable approach is to create strata on the basis of a variable known to be corrected with the variable of interest and for which information on each universe element is know. Strata should be constructed in a way which will minimize difference among sampling units within strata, and maximize difference among strata.

How many Strata should be constructed ?

Common sense supports as many strata are possible to be used so that

each stratum will be homogender as possible. If estimates are wanted for particular universe subgroups, then it will be necessary to set up as separate stratum for each. Each stratum means can them be estimated with high precision. In turn, the overall population mean will be estimated with high precision.

How many observations should be taken in each Stratum :

Once strata composition and number have been decided, the next question is how many sampling units should be drawn from each stratum ? When deciding this question, researchers can user either a proportional allocation or disproportional allocation.

Proportional Allocation :

The most obvious way is to use proportional allocation. Here one sample each in proportion. Here one sample each in proportion to its relative weight in the universe as whole.

Disproportional Allocation :

There are circumstances where some form of disproportional allocation should be considered. These arise most commonly when sampling institutional universes rather than human universes. As a funeral principle, when the variability among the observations writhing a stratum is high, one sample that stratum at a higher rate than for strata with less interval variation.

Merits :

◍ There is more likelihood or representation of units in this method.

◍ Comparative study on the basis of facts at different strata is possible under this method.

◍ This method has more accuracy.

Demerits :

◍ This method has limited scope because this method can be adopted only when the population and its different strata are known.

◍ There can be the possibility of prejudice if the population is not properly stratified.

◍ If the population is too small in size, it is difficult to stratify it.

(3) Systematic Random Sampling :

In this method, all the items of the universe are systematically arranged and numbered and then sample units are selected at equal intervals. For

example, if 5 out of 50 students are to be selected for a sample then 50 students would be numbered and systematically arranged. One item of the first 10 would be selected at random. Subsequently, every 10th item from the selected number will be selected to frame a sample. If the first selected number is 5th item, then the subsequent numbers would be 15th, 25th 35th and 45th.

(a)   Selecting a Systematic Sample :

1.   The first step is to determine the total number of items in the universe. Divide this figure by desired sample size. The result is called the sampling interval.

$$\text{Sampling Interval} = \frac{\text{Number of universe items}}{\text{Desired sample size}}$$

2.   Select a random number between 1 and the sampling interval figure. This identifies the first element on the universe list to be included in the sample.

3.   Add a sampling interval to the random number selected in step 2. The total represents the second element on the universe list to be included in the sample.

4.   Continue adding the sampling interval to each total to create a new total. Each new total represents another element on the universe list to be included in the sample.

Merits :

(i)   It is a simple method. Samples can be easily obtained by it.

(ii)   This method involves very little time in sample selection and results are almost accurate.

Demerits :

(i)   In this method each unit does not stand the equal chances of being selected because only the first unit is selected on random sampling basis.

(ii)   If all the units are different in characteristic, then results will not be appropriate.

(4)   Multi-stage Random Sampling

When sampling procedure passes through many stages, then it is known as multi-stage sampling. In this method, firstly the entire universe or population is divided into stages or sub-stages. From the each stage some units are selected on random sampling basis. Therefore, these units are

subdivided and on the basis of random sampling again some sub-units are selected. Thus, this goes on with sub-division further and selection on. For example, for the purpose of a study regarding Adult Education in Punjab State, first some districts will be selected on random basis. Thereafter out of the selected districts, some tehsils and out of tehsils, some villages or town my be thus selected, further out of the villages or towns, some neighborhood, or wards and out of the wards, some households will be selected from whom the inquiry will be made concerning the problem at hand.

Merits

◍   This is the best method of studying a universe or population on regional basis.

◍   This method in suitable for those problems where decisions on the basis of sample alone can not be taken.

Demerits

◍   This method requires many tests to correctly estimate the level of accuracy which involves a lot of time and labour.

◍   In this method, level of estimated accuracy level is predecided which does not seem logical.

(5)   Cluster Sampling :

In this method, simply the universe is divided into many groups called cluster and out of which a few clusters are selected on random basis and then the clusters are complete enumerated. This method is usually applied in industries like as in pharmaceutical industry, a machine produces medicines tables in the batches of hundred each then for quality inspection, a few randomly selected batches are examined.

(6)   Area Sampling :

Cluster sampling is known as Area Sampling when cluster happens to be some geographical sub-division.

Self Practice :

Q. 3. List the methods of probability Sampling.

1.4.4.2   Non-Probability Sampling Methods

Non-probability methods are those methods in which selection of units is made on the basis of convenience or judgement of the investigator rather than on the basis of probability or chance. In such methods, selection of

units is made in accordance with the specific objectives and convenience of the investigator.

(1)   Judgement Sampling :

Under this method, the selection of the sample items depends exclusively on the judgement of the investigator. In other words, the investigator exercises his judgement in the choice and includes those items in the sample which he thinks are most typical of the universe with regard to the characteristic under study. For example, if a sample of 20 students is to be selected from a class of 80 students for analyzing the spending habits of the 10 students, the investigator would select 20 students, who in his opinion are representative of the class.

Merits

(i)   This method is less expensive.

(ii)   This method is very simple and easy.

(iii)   This method is useful in those fields where almost similar units exists or some units are too important to be left out of the sample.

Demerits

(i)   There is greater chance of the investigator's own prejudice in this method.

(ii)   This method is not very accurate and reliable.

(2)   Quota Sampling :

In this method, the investigators are assigned definite quotas according to some criteria. They are instructed to obtain the required number to fill in each quota. The investigators select the individuals (i.e. sample items) to collect information on their personal judgements which the quotas. When all or a part of the whole quota is not available or approachable, the quota is completed by supplementing new respondents. Quota sampling is a type of judgement sampling.

Merits

(i)   In this method, there is greater chance of important unit being included.

(ii)   Statistical inquiry is more organised in this method on account of the units of quotas fixed.

Demerits

(i)   Possibility of prejudice will exist.

ⓞ   Here is greater likelihood of sampling error in this method.

(3)   **Convenience Sampling :**

In this type of non-probability sampling, the choice of the sample is left completely to the convenience of the investigator. The investigator obtain a sample according to his convenience. For example, a book publisher selects some teachers conveniently on the basis of the list of the teachers from the college prospectus and gets feedback from them regarding his publication. This method is less expensive and more simple but is unscientific and unreliable. This method results in more dependence on the enumerators. This method is appropriate for sample selection where the universe or population is not clearly defined or list of the units is not available or sample units are not clear in themselves.

(4)   **Extensive Sampling :**

In this method, sample size is taken almost as big as the population itself like 90% the section of the population. Only those units and left out for which data collection is very difficult or almost impossible. Due to very large sample size, the method has   greater level of accuracy. Intensive study of the problem becomes possible but this method involves heavy resources disposal.

Self Practice :

Q. 4 Mention the methods non-probability sampling.

1.4.5   Sampling and Non-Sampling Errors

The choice of a sample though may be made with utmost care, involves certain errors which may be classified into two types : (1) Sampling Errors, and (2) Non Sampling Errors. These errors may occur in the collection, processing and analysis of data.

(1)   **Sampling Errors**

Sampling errors are those which arise due to the method of sampling.

Sampling errors arise primarily due to the following reasons :

(1)   Faulty selection of the sampling method.

(2)   Substituting one sample for the other sample due to the difficulties in collecting the sample.

(3)   Faulty demarcation of sampling units.

(4)   Variability of the population which has different characteristics.

(2)   Non-Sampling Errors

Non-sampling errors are those which creeps in due to human factors which always varies from one investigator to another. These errors arise due to any of the following factors.

(1)   Faulty planning.

(2)   Faulty selection of the sample units.

(3)   Lack of trained and experienced staff which collect the data.

(4)   Negligence and non-response on the part of the respondent.

(5)   Errors in compilation.

(6)   Errors due to wrong statistical measures.

(7)   Framing of a wrong questionnaire.

(8)   Incomplete investigation of the sample survey.

Characteristics of a good sample design :

1.   Representative sample

2.   Economically   viable

3.   Having smaller sampling error

4.   Marginal systematic bias

1.4.6   Summary

This chapter explains the meaning of population which means an aggregate of items about which we obtain information and a part of population is called sample. The method of selecting a sample from a given population is called sampling. There are two types of sampling methods, one is probability sampling method which gives the equal chance to all units to be included in sample. Other one is non probability sampling method which means selection of units is made on the basis of convenience or judgement rather than on the basis of chance.

1.4.7   Glossary

1.   Universe: An aggregate of items about which we obtain information.

2.   Sampling: The method of selecting a sample out of a given population is called sampling.

3.   Sampling errors: These are those which arises due to method of sampling.

1.4.8   Exercise

(A) Short Questions :

1.   What is cluster Sampling ?

2.   Define Judgement Sampling ?

3.   What do you mean by Universe or Population ?

(B) Long Questions :

1.   Define sample. What are requirements of Good Sample ?

2.   Distinguish between random sampling and deliberate sampling.

3.   Discuss the Multi-stage Random Sampling Methods.

1.4.9 Suggested Readings

1.   Statistical Methods by S. P. Gupta.

2.   Mathematical Statistics by S. C. Gupta.

3.   Mathematical Statistics by Kapoor and Saxena.

4.   Statistical Analysis by T. L. Kaushal.

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