RESEARCH METHODOLOGY

V SEMESTER

CORE COURSE

BA POLITICAL SCIENCE

(2011 Admission)

UNIVERSITY OF CALICUT

SCHOOL OF DISTANCE EDUCATION

Calicut university P.O, Malappuram Kerala, India 673 635.

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SCHOOL OF DISTANCE EDUCATION

STUDY MATERIAL

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RESEARCH METHODOLOGY

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Contents   *Page No.*

MODULE – I

RESEARCH METHODOLOGY

Nature & Meaning of Research

In the modern complex world every society today is faced with serious social, economic & political problems. These problems need systematic, intelligent and Practical solutions. Problem solving is technical process. It requires the accumulation of new knowledge. Research provides the means for accumulating knowledge & wisdom. In other words, research is a systematic effort of gathering analysis & interpretation of problems confronted by humanity. It is a thinking process and scientific method of studying a problem and finding solution. It is an indepth analysis based on reflective thinking.

Definitions

Research in common parlance refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic. Research is an academic activity and the term should be used in a technical sense.

a) –William Emory defines Research as "any organised enquiry designed and carried out to provide information for solving a problem"

b) The new Oxford English Dictionary defines research is "the scientific investigation into and study of material, sources etc inorder to establish facts and the reach new new conclusions".

c) Redman and Mory defines, research as "a systematised effort to gain new knowledge''.

d) "A careful investigation or inquiry specially through search for new facts in any branch of knowledge" Advanced Leaner's Dictionary.

Characteristics of Research

The above definitions reveal the following characteristics of Research

1. Research is a systematic and critical investigation into a phenomenon.
2. It is not mere compilation of facts.
3. It adopts scientific method.
4. It is objective & Logical
5. It is based on empirical evidence.
6. Research is directed towards finding answers to questions & solutions to problems.
7. It emphasis the generalisation theories and principles.

Objectives of Research

The objectives of Research can be grouped under the following heads

1. To gain familiarity with a phenomenon or to achieve new insights to it.
2. To portray accurately the characteristics of a particular individual situation or a group.
3. To determine the frequency with which something occures or with which it is associated with something else.
4. To test a hypothesis of a casual relationship between variables.

Motivations in Research

What makes people to undertake research?

The answer is as follows.

1. Desire to get a research degree along with its benefits.
2. Desire to face the challenge in the solving the unsolved Problem.
3. Desire to get intellectual joy of doing some creative work.
4. Desire to be of service to Society.
5. Desire to get respectability.

Importance of Research

"All progress is born of enquiry. Doubt is often betten than overconfidence, for it leads to enquiry & enquiry leads to investigation". Research has an important role to guiding social plan. Knowledge of the society & the cultural behaviour of the people require proper planning for their well development. Because knowledge & cultural behaviour of human being are interdependent. A reliable knowledge is needed for planning & this is possible only through research.

Knowledge is a kind of power with which one can face the implication of a particular Phenomenon.

Research provides the basis for all govt policies in our economic system.

Research help us in making predictions. Eg. Chernobil Neuclear, newclear plant disastrour, Bhopal gas disastrour.

Research is equally important in seeking answer to various social problems

In addition to this, the significance of research can be understood with the following points.

1. To the students who are to write a PHD; it is a careerism.
2. To Professionals in research methodology, research means a source of livelihood.
3. To Philosophers & thinkers research may mean the outlet for new ideas and insights.
4. To literary man research means the development of new styles & creative work.
5. To the intellectuals research mean the generalisation of new theories.

Research Method & Research Methodology

It is necessary to explain the differences between research methods & research methodology. Research methods may be understood as all those methods & techniques that are used for conducting research. Research methods, thus refer to the methods the researcher use in performing the research operations. In other words all those methods which are used by the researcher during the course of his research problem are termed as as research methods.

Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. Abraham Kaplan defines research methodology in this way. Research methodology is "the description, explanation & Justification of various methods of conducting research".

Research Methodology has many dimensions and research methods do constitute a part of Research Methodology. The scope of Research Methodology is wider than that of research methods. "Thus, when we talk of research methodology we not only talk of the research methods but also considered the logic behind the methods we use in the context of our particular method or technique & why we are not using others. So that research results are capable of being evaluated either by the researcher himself or by others" Why a research study has been undertaken how the research problem has been defined in what way & why the hypothesis has been formulated, what data have been adopted etc ate usually answered when we talk of Research Methodology.

Scientific Method

Research is a scientific endeavor

"The Scientific Method is a systematic step-by-step procedure following the logical process of reasoning". (Clover Vernon.T) Scientific Method is a means for gaining knowledge of the universe. It is an objective logical & Systematic Method of analysis of a phenomenon, devise permit the accumulation of relable knowledge. It is a systematized form of analysis. It is characterized by intellectual attitude. The Scientific Method is based on certain articles of faith they are;

a) Reliance on evidence

Truth is established on the basis of evident conclusion is admitted only when it is based on evidence. The answer to a question is not decided by imagination or guess.

b) Commitment to Objectivity

Objectivity is the hall mark of Scientific method. Objectivity is the willingness & ability to accept truth with our bias.

c) Ethical Neutrality

Science does not pass normal judgment on facts. It does not say that they are good or bad. Science never imposes anything. Science aims at nothing but making true & adequate statements about the object.

d) Verifiability

The conclusions arrived by a scientist should be verifiable. He must make known to others how he reached at his conclusion. Such verifications help in further research.

e) Logical Reasoning Process

The Scientific Method involves the logical process of reasoning. The reasoning process is used for drawing inference from the finding of a study or for arriving at a conclusion.

The Research Process
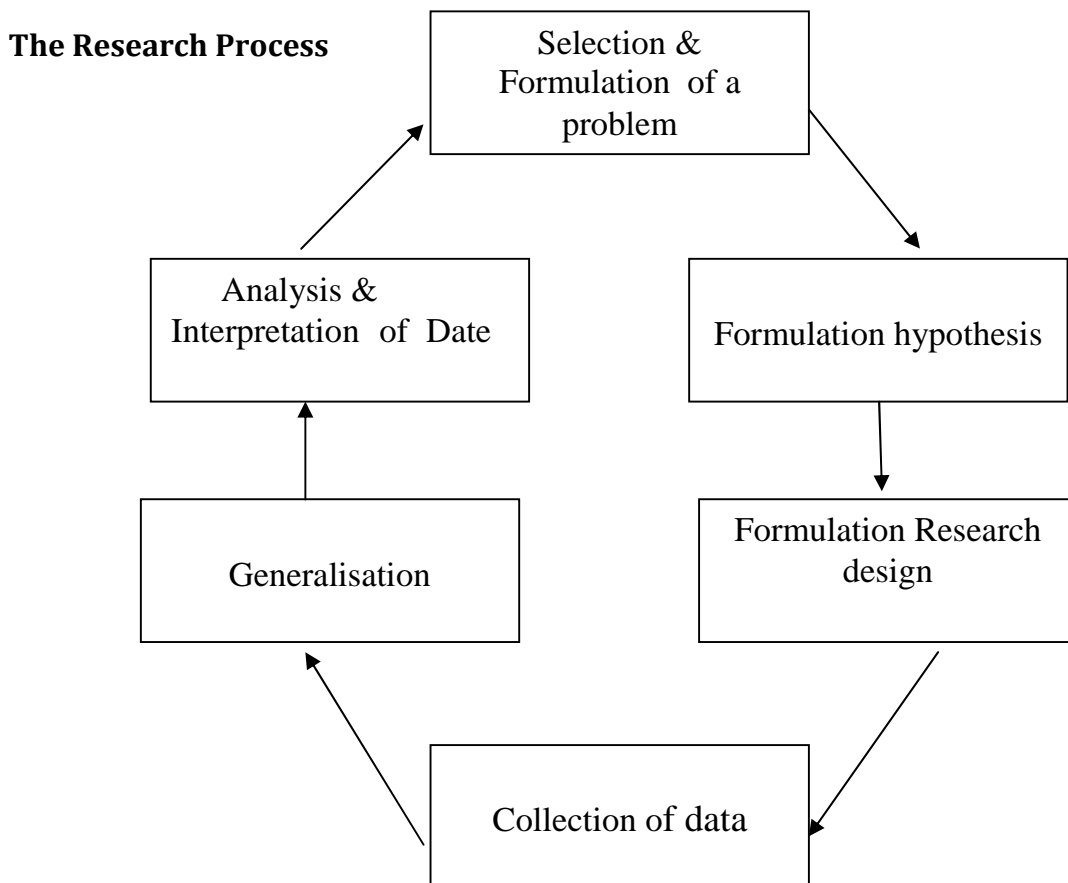
The Research Process is the Paradigm of research project. In a research project there are various scientific activities. The research process is a system of Interrelated activities. Usually research begins with the selection of a problem. The various stages in the research process are explained in the above diagram. Research is a cyclical process. If the Data do not support the hypothesis, research is repeated again.

C.R. Kothari in his book, "Research Methodology: Methods & Techniques" presents a brief overview of a research process. He has given the following order concerning the Research Process.

1. Formulation the Research problem
2. Extensive Literature survey
3. Developing the hypothesis
4. Preparing the research design
5. Determining sample design
6. Collection of Data
7. Execution of the Project
8. Analysis of Data
9. Hypothesis testing
10. Generalisation & Interpretation
11. Preparation of the report.

Qualities of Good Research Worker

The success of any Research to a great extent depends on the qualities of the Researcher. The qualities are two fold.

1. General Qualities
2. Particular Qualties
1. General Qualties

a) Scientific attitude

The 1ˢᵗ essential quality of a successful research worker is that be must possess a scientific frame of mind. Human beings have certain prejudices but a researcher should not be guided by this. He must develop a spirit of science in his mind.

b) Imagination & insight

The researcher must possess a high degree of imagination. He should be able to go deeper & deeper into the area of social phenomena & visualise the intangible aspects of society.

c) Perseverance

The work of scientific Research requires unlimited patience. He should not get easily discouraged. He may often face serious difficulties. But he must develop courage to face, the difficulties & work patiently.

d) Quick Grasping Power

The Researcher should possess the power to grasp the significance of things quickly.

e) Clarity of thinking

A good Researcher should have clear idea about terminology that he is going to use.

Specific Qualities

a) Knowledge of the Subject

The researcher should be an expert in the study of the subject which he is going to research. Hence he should read all texts on the matter & form of clear-cut idea bout the subject under study.

b) Knowledge of the Research Technique

The Research worker should also possess an ultimated knowledge of the techniques he applies in solving the problem.

c) Personal Taste

A Personal taste in the study will inspire him & keep his morale high in times of difficulties.

d) Unbiased Attitude

The Researcher should have no pre conception about the subject under study. He should maintain an open mind.

Factors Which Hinder Research

1. Tradition in the community is a powerful retarding influence

2. Lack of time, energy & resources.

3. Research is considered to the business of a few armchair academicians.

Problems faced by Researchers in India

Researchers in India particularly those engaged in research in Social Science face the following problems.

1. The lack of scientific training in the methodology of research.
2. There is insufficient interaction between the University Research Department and business establishments & govt. departments.
3. In the fear of misuse govt. is not willing to supply basic documents.
4. There does not exist a code of conduct for researchers.
5. Another difficulty is insufficient secretarial assistance
6. Library management is not satisfactory in many places.
7. Lack of time and money

Social Science Research

Sciences are broadly divided into physical sciences & social sciences. Social sciences include various disciplines dealing with human nature, human life, human behaviour, social groups & Social institutions. Example Artropology, Commerce, Economics, Geography, History, Law, Political science, Phychology, Sociology etc. All these branches are separate but are interdependent.

Social Science Research is a systematic method of exploring analysing & conceptualizing human life inorder to extent, correct or verify the knowledge of human behaviour & social life. Social Research, "Seeks to find explanations to unexplained social phenomena, to clarify the doubtful & correct the misconceived facts social life"- Pauline. V. Young.

Objectives of Social Science Research

a)   The aim of Social Science Research is to discover new facts or verify and test old facts.
b)   It tris to understand the human behaviour & its interaction with the environment & Social institutions.
c)   It tris to find out causal connection between human activities and natural laws governing them.
d)   Another purpose of Social Science Research is to develop new tools and techniques in social science.

Functions of Social Science Research

1.   Discovery of facts & their interpretations - Research provides answer to questions of what, where, when & how of man, social life and institutions. There are half truths pseudotruths and superstitions. Discovery of facts enlights us.
2.   Diagnosis of problems- The developing countries face so many problems such as poverty unemployment, Social tensions, law productivity etc. Social Science Research helps to discover solution to this problems.
3.   Systematization of knowledge- The facts discovered through research are past & parcel of the body of knowledge.

4. Prediction- Social Science Research aims at predicting social events.

5. Planning – Panning is needed for socio-economic development & Social Science Research provides sufficient data for planning.

6. Social Welfare- Social Science Research unfold & identify the causes of social evils & problems.

Good Research

I. James Harold Fox in "criteria of good research" says that scientific research should satisfy the following conditions.

1. The purpose of Research should be clearly defined and common concepts should be used

2. The Research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has been attained.

3. The design of the Research should be carefully planned to yield results that are as objective as possible.

4. The Research report should be complete and should be frank and without any flows.

5. Collection and analysis of data should be adequate and the reliability should be checked carefully.

6. Conclusions should be justified by data

7. Researches must be an experienced person with goal reputation.

II.

1. Good Research is systematic
2. Good Research is logical
3. Good Research is empirical
4. Good Research is replicable (Denny N Bellenger and Burnet A Green Berg)

B. HYPOTHESIS

When a researcher observes known facts and takes up a problem for analysis, he first has to start somewhere and this point of starting is Hypothesis. In other words, one has to proceed to formulate tentative solution. This purposed solutions constitute the Hypothesis. The collection of facts (data) will be fruitful if they are either for or against this proposed solution. The tentative explanation or solutions are the very basis for research process.

When to make a Hypothesis?

Hypotheses are not given to us readymade. This is so specially in social sciences. Because there is not a system of highly developed theoretical order in many social sciences. As a result in many social science researchers a considerable portion of research is developed for hypothesis making. So it should be remembered that research can begin only with a well-formulated Hypothesis.

Definition

1. In the words of George A. Lund Burg " a hypothesis is a tentative generalization the validity of which remains to be tested……. In its most elementary stage the hypothesis may be very bunch, guess, imaginative data, which becomes the basis for action or investigation".

2. Goode and Hatt defined it as " a proposition which can be put to test to determined validity".

3. Rummel " a hypothesis is a statement capable of being tested and there by varified or rejected".

Need (importance) of Hypothesis

In all analytical and experimental studies hypothesis should be set up in order to give a proper direction to them. Hypothesis are useful and the guide Research Process in proper directions. In addition to put in the theory to test, a hypothesis has to performe certain other functions.

In many ways it is a guiding print to research. Young says "Formulation of hypothesis gives definite the point of enquiry aids in establishing direction in which to proceed and help to delimit the field of enquiry".

The use of hypothesis prevents a blind search and indiscriminate gathering of data which may later prove irrelevant to the problem under study.

In the data collection hypothesis serves as the forerunner.

A Researcher based on hypothesis can save a lot of time and keep the researcher from considerable amount of confusion.

Hypothesis is helpful in directing the researcher to find out order among facts.

Hypothesis have also certain practical values to society besides serving as a means for seeking solution to various problems, they help in understanding the social phenomena in the proper perspective.

Sources of Hypothesis

Hypothesis can be derived from various sources.

1. Theory

   This is one of the main sources of hypothesis. It gives direction to research by stating what is known. Logical deduction from theory leads to new hypothesis.

2. Observation

   Hypothesis can be derived from observation. For example, from observation of price behaviour in a market the relationship b/w price and demand of an article can be hypothesised.

3. Analogies

   Analogies are another sources of hypothesis. Julian Hexley has pointed out that causal observation in nature or in the framework of another science may be a fertile source of Hypothesis.

4. Intution and personal experiences

   Intution and personal experiences may also contribute to the formulation of hypothesis. Personal life and experience of person determine their perception and conception these may, in term direct a person to certain hypothesis more quickly. The story Newton and falling apple, the flash of wisdom to Sree Buddha under Banyan tree Illustrate this accidental process

5. Findings and Studies

   Hypothesis may be developed out of the findings of other studies in order to repeat the test.

6. Culture

   Another source of hypothesis is the culture in which the researcher is nurtured. For example sociology as an academic discipline originated from western culture. Over the past decade a large part of the hypothesis on American society examined by researchers were connected with violence. Indian society is caste-ridden. It is riddled with inequalities and privileges.

Characteristics of a Good hypothesis

What is a good hypothesis? What are the criteria of for judging it. An acceptable hypothesis should fulfill certain conditions.

1. Conceptual Clarity

    A hypothesis should be conceptually clear. It should consist of clearly defined and understandable concepts

2. Specificity

    A hypothesis should be specific and explain the expected relation b/w variables and the conditions under which these relations will hold.

3. Testability

    A hypothesis should be testable and should not be a moral judgement. It should be possible to collect empirical evidences to test techniques.

4. Availability of techniques

    Hypothesis should be related to available techniques. Otherwise they will not be researchable therefore the research must make sure that methods are available for testing his proposed hypothesis.

5. Consistency

    Hypothesis should be logically consistent. The propositions derived should not be contradictory

6. Objectivity

    Scientific hypothesis should be free from value judgment. The researcher system of values has n o placing Research.

7. Simplicity

    A hypothesis should be as simple as possible. Simplicity demands insight. The more insight the researcher has into a problem, the simpler will be his hypothesis.

    Types of Hypothesis

1. Descriptive Hypothesis

    These are propositions, they described the characteristics of a variable. The variable may be an object, person, organisation, situation or event. For ex. "The rate of unemployment among arts graduates is higher than that of commerce graduates".

2. Relational Hypothesis

    These are propositions which describe the relationship b/w two variables. The relation suggested many be positive or negative for ex. 'Families with higher income spent more for recreation'. 'Upper class people have more children than lower class people'.

3. Causal Hypothesis

    Causal Hypothesis states that the existence of, or a change in, one variable causes for leads to an effect on other variable. The 1st variables is called independent variable later the dependent variable.

4. Common Sense Hypothesis

    These represent the commonsense ideas. They state the existence of empirical uniformities received through day to day observations.

5. Analytical Hypothesis

    These are concerned with the relationship of analytic variables. These hypothesis occurs and the higher level of abstraction.

6. Null Hypothesis

    Null means 'Zero' When a hypothesis is stated negatively. It is called Null Hypothesis. The object of this hypothesis is to avoid the personal bias of the investigator. In the matter of collection of data. A null hypothesis is used to collect additional support for the known hypothesis.

7. False Hypothesis

    A hypothesis which is bound to be unsatisfactory when verified is called a false hypothesis.

8. Barren Hypothesis

    A hypothesis from which no consequences can be deducted is called a Barren Hypothesis. It is a hypothesis which cannot to test. Ex. The child fell ill because a wicked women's eye felt upon it. This is a baseless hypothesis because it cannot be verify.

    Testing of Hypothesis

    Science does not admit anything as valid knowledge until satisfactory test confirm the validity. A hypothesis should be subjected to regrets test and. Type I and Type II errors should be eliminated.

C. CONCEPTS

Concepts are basic elements of scientific method but by and large all concepts are abstractions and represent only certain aspects of reality. In the words of P.V.Young "Each new class of data, isolated from other classes on the other basis of definite characteristics, is given name, a label in short hand concept. A concept is in reality a definition in short hand of a class or group of facts".

Categories of Concept

Concepts are divided into two categories i.e. Concepts by postulation and concept by intuition. The concepts following in the first category have meaning except from the specific theory; When these concepts are used in two different theories these communicate two different meanings, sometimes even different and opposite from each other on the other hand concept by intuition devotes something which is immediately apprehended. The meaning of these concepts is constant whoever use it. Both the categories of concepts have equal importance and significance in social science research.

Features of Good Concept

a)   The concepts should be clear, definite and precise.

b)   The concept should be comprehensive and clear in formation and understanding.

c)   The concept should avoid multiple meaning and as far as possible should convey exactly what was intended when the concept was coined.

Types of Concepts

a)   Concrete concepts:- Symbolize material objects which can be seen, touched and fret. eg. book , table

b)   Abstract concepts refer to properties or characteristics of objects. eg. weight, height

Characteristics of concepts

1)   Concepts are symbols which we attach to the bundle of meanings we hold.

2)   Concepts represent only one part of reality.

3)   Different people hold different concepts of the same thing.

4)   Concepts also represent various degree of abstraction.

(A concept is thus an abstract symbol representing an object, a property of object, or a certain phenomena.

Variable

The concrete observable events which represent the abstract concepts or constructs are called variables.

MODULE II
TYPES OF RESEARCH

Research is classified into different forms on the basis of intent & methods.

The following are the different types of research.

1. Descriptive Vs Analytical

    Descriptive research includes Surveys or fact-finding enquiries of different kinds. The major purpose of descriptive research description of the state of affairs as it exist at present. The main characteristics of this method is that the researcher has no control over the variables; He can only report what has happened or what is happening.

    In Analytical research, on the other hand the researcher has to use facts or information already available & analyse this to make a critical evaluation, of the material.

2. Applied Vs Fundamental

    Research can either be applied (or action) research fundamental (or pure) research Applied Research aims at finding a solution for an immediate problem facing a society or an organisation whereas Fundamental Research is mainly concerned with Generalisation and with the formulation of a theory. 'Gathering knowledge for knowledge' is termed pure research. Research studies concerning natural phenomenon, human behaviour etc are examples of Fundamental Research. But Research aims at certain conclusion facing a concrete social problems is an example of applied Research.

3. Qualitative Vs Quantitative

    Quantitative Research is based on the measurement of quantity or amount. It is applicable to a phenomenon that is phenomenon relating to or involving quality or kind. Qualitative Research is specially important in the behavioural sciences were the aim is to discover the underlying motives of human behaviour.

4. Conceptual Vs Empirical

    Conceptual Research is that related to some abstract ideas for theory. It is generally used by philosophers and thinkers to develop the new concepts or to interpret existing ones.

On the other hand Empirical Researches relie on experiments or observation alone, often without due regard for system of theory. It is data based research coming up with conclusions which are capable of been variable of observation and experiment.

5. One Time Research or Longitudinal Research

In the formal case the research is confined to a single time period, whereas the later case the research is carried on over several time periods.

6. Laboratory Research and Field setting Research

This classification is based on the environment in which research is carried out.

7. Historical Research

Historical Research is that which utilities historical sources like documents remains etc to study events ideas of the past including the philosophy of persons and groups at any remote point of time

SURVEY RESEARCH

Survey is a fact finding study. It is a method of research involving collection of data directly from a population or sample thereof at particular time. It must not be confused with mere clerical routine of gathering and tabulating figures. It requires expert and imaginative planning carefull analysis and rational interpretation of the findings.

Definitions

1. Mark Abraham defines survey as "a social survey is a process by which Quantitative facts are collected about the social aspects of a community composition and activities".

2. Herman N Morse defines It as "a method of analysis on scientific and orderly form for defined purpose of given social situations and activities."

The Characteristics of Survey

1. It is a field study; It is always conducted in a natural setting.
2. It seeks responses directly from the respondents.
3. It can cover a very large population.
4. A survey involves an extensive and intensive study.
5. A survey covers a definite geographical area, city, a district or a state

Steps involved in a Survey

The sequences of the task involved in carried out a survey from the 1st stage of planning to the Final stage of preparing the report is presented below.

a) Selection of problem and its formulation

b) Preparation of the research design.

c) Operationalisation of concepts and construction of measuring indexes and states.

d) Sampling

e) Construction of tools for collection of data and there pre-test.

f) Field work and collection of data

g) Processing of data and tabulation

h) Analysis of data

i) Reporting

The Purpose of the Survey

1. The purpose of survey is to provide information's do government or planners or business enterprises.

2. Many enquiries aim to explain phenomenon

3. Surveys may be designed to make comparison of demographic groups.

4. Surveys are useful for making predictions

Types of Survey

1. General or Specific survey

    When a survey is conducted for collecting general information about population institution or phenomenon without any particular object or hypothesis it is known as general survey.

    Specific survey are conducted for specific problems or for testing the validity of some theory or hypothesis.

2. Regular and Adhoc Survey

    Some surveys are regular in nature and must be repeated after regular intervals. Such a survey is called Regular Survey.

    Adhoc survey is are undertaken ones for all.

3.   Preliminary And Final Survey

A Preliminary survey is generally known as 'Pilot study' and it is a fore run of the Final Survey. Final survey is made after the pilot study has completed.

4.   Senses and Sample Survey

A survey make our all the units of a given universe then it is called a sense survey. If the survey covers only a fraction of the universe, then it is called sample survey.

Advantages of Survey

The major advantages of the survey method are

1.   The versatility of the survey method is its greatest strength. It is the only practical way to collect many types of informations from individuals, socio-economic data, attitudes, opinions, experience and expectations.

2.   The survey method facilitates drawing generalisations about large populations on the basis of studies of representative sample.

3.   The survey method is flexible to permit the use of various methods of collection of data.

4.   The survey help the researches to face unanticipated problems.

5.   Survey is useful in verifying theories

Limitations of Survey

1.   Survey method is primarily meant for collection of data from primary sources. So its success depends upon the willingness and co-operations of the respondents.

2.   The survey method depends primarily on verbal behaviour. The respondent can give misleading answers.

3.   A sample survey is subject to sampling error.

4.   There is a limit of the number of items of information that can be collected in a single survey. There is an optimal length of time for an interview.

5.   A survey is very expensive in terms of time and cost.

MODULE III

RESEARCH DESIGN

Meaning

"A Research Design is the logical and systematic planning in directing the research. The design research from translating a general scientific model into varied research problem. But in practices in most of the basis it is just a plan of study. The research design can either be formal or informal.

Definition

1. "It constitutes the blue print for the collection, measurement and analysis of data" - Philips Bernard S

2. It "provides a systematic plan of procedure for the researcher to follow" -Best John N

3. "The design research from controlling general scientific model into varied research procedure"- P.V. Young

4. "A research design is "the programme that guides the investigator in the process of collecting, analysis and interpreting observations". – David and Shava

A research design addressers itself to certain key issues such as:

a) What is the problem uncles study?

b) What is the major research question?

c) What is the area of the study?

d) How many people will be study?

e) How this people will be selected?

f) What methods and techniques will be used to collect data from them?

Features of Research Design

a) It is a plan that specifies the objectives of study and the hypothesis to be tested.

b) It is an outline that specifies the sources and types of information relevent to the research question.

c) It is a blueprint specifying the methods to be adopted for gathering and analysis of data.

d) It is a scheme defining the procedure involved in a research process.

Features of a good Design

A good design has the following features.

1. Flexibility
2. Efficiency
3. Appropriate
4. Economical
5. Minimum error
6. Maximum reliability
7. Smallest experimental error
8. Maximum information

Why a Research Design?

1. Research Design is needed because it helps in the smooth sailing of Research operations.

   A Research without a pre-drawn plan is like an ocean voyage without mariners compus.

2. The Research Design helps in providing direction our study.

3. It prevents welter in a study.

4. The use of Research Design prevents blind search.

5. A Research Design fixes clear cut boundaries to a research.

6. It makes the research systematic

7. It help us to meet unexpected events.

Contents of a Research Design

Usually a Research Design consist of the following details

1. What is the study about?
2. Why is the study being made?
3. Where will the study be carried out?
4. What type of data is required?
5. Where can the required data be found?
6. What period of time will the studied include?
7. What will be the sample design?
8. What technique of data collection will be used?
9. How will the data we analyse?
10. In what style the report will be prepared?

By way of conclusion it can be said that research design must contain at least:

a) Statement of a problem
b) Procedure and techniques
c) Sampling frame
d) Processing and analysis of data

Types of Research Design

1. Exploratory Research Design (Formulative Research)

   Exploratory Research studies are also termed as formulative research studies. Exploratory Research is preliminary study of an in familiar problem about which the researcher has little or no knowledge. It is similar to a doctor initial investigation of patient suffering from an in familiar malady for getting some clues for identifying.

2. Descriptive Research Design

   Descriptive study is fact finding investigation with adequate interpretation. It is the sample type of research. It is more specific than the exploratory study. As it has focus on particular aspects or dimensions of the problem studied. It is design to gather descriptive informations and provides information for formulating more sophisticated studies. Data are collected by using of appropriate methods.

3. Action Research

   Action Research is a type of evaluation study. It is a concurrent evaluation study of an action programme launched for solving a problem. Action research is otherwise called Apply Research.

   The following are the different phases in action research.
   1. A base lane survey of the pre-action situation.
   2. A feasibility study of the proposed action programme
   3. Planning and launching the programme.
   4. Concurrent evaluation of the programme
   5. Making modifications and changes in the programme and its methods of implementations in the light of research finding.
   6. Final Evaluation

   (The Researcher can design his research depends upon the nature of the research being conducted.)

MODULE IV

SAMPLING

Need of sampling

Sometimes it is not feasible to study a whole group or an extremely large group. For example social work researcher may be interested in learning about the mentally challenged children, mentally ill, prison inmates, street children or some other large group of people.

It would be difficult or rather impossible to study all members of the groups. Here comes the process called sampling, which allows to study a manageable number of people from the large group to device inferences that are likely to be applicable to all the people of the large group.

Another reason why we would study a sample is that the results of obtained from the sample are more precise and correct than the results obtained from the study of the whole group.

Cost involved in studying all units of a large group is yet another factor which suggest to study a small group of people.

Associated with cost there are certain other factors such as time available for the study.

Above all, the point to be kept in mind is if we can get almost same result by studying a carefully selected small group of people, why should we study the large group at all.

Some Technical terms

1) Population or Universe
Population or universe is the aggregate of all units possessing certain specified characteristics on which the sample seeks to draw inferences.

2) Frame :- The frame describes the population interms of sampling units .It may be a geographical area. In essence a frame lists or maps elements of the universe.

3) Census :- Census denotes a total enumeration of individuals elements for units in defined population.

4) Sample : A Sample is composed of some fractions or part of the total number of elements or units in a defined population.

5) Design: The Designing means the method by which sample to chosen.

6) Random: A mathematical term 'Random' means that every element of the total population has a equally change of probability on being chosen for the sampling.

7) Unit: any population or universe should contain some specifications in terms of content units, extent and time for Eg: "A farmers household in a district in Punjab in 1975" There is a unit determination in a household and time destination of the population .

8) Parameter : Parameter is the value of a variable calculation from the population which is being studied.

9) Precision : Precision of is a sample is designated by the computation of slandered error.

10) Stratification: It makes which the segmentation of a sample. It is a number of data. Characteristics of Good sample

a) Representativeness: A sample must be representative of the population. In measurement terms as well as in quality.

b) Accuracy: Accuracy is defined as the degree to which has to absent which sample.

c) Precision: The sample must yield précised estimate. Standard error should be minimized.

d) Size: A good sample must be adequate in size. It should not too small or too big.

Advantages of sampling

1. Sampling reduces time and cost of research studies.
2. Sampling saves labour
3. The quality of study is often better with sampling.
4. Sampling provides much quicker results.

Limitations

1. In the absence of a thorough knowledge, sampling methods the result option may be incorrect or misleading.
2. A complicated sampling may require may labour than a complete coverage.
3. A pure representation is impossible in most cases

Sampling Methods

Sampling methods may be classified into two types.

a) Probability or Random sampling
b) Non Probability or Non- Random sampling

Probability sampling is the following types:

a)   Simple Random sampling
b)   Stratified Random
c)   Systematic Random
d)   Random Sampling with probability proportional to size.
e)   Cluster sampling
f)   Area sampling

Non Probability sampling may be classified into:

a)   Convenient sampling
b)   Purposive sampling
c)   Quota sampling
d)   Snow-Ball sampling

Probability sampling Methods

A)   Simple Random Sampling
1.   Lottery Method: This is the simplest and most familiar procedure of random sampling. If a simple of ten students is to be taken out of a list of 50 students take 50 equals size in a global container and thoroughly shuffle them. Take to steps from the container one after another each time before drawing a stip shuffle the container. Thus we can take the decide sample from a population using Random methods.
2.   Use of table of Random numbers

10	06	96	43	27	15
37	73	44	36	91	60
08	54	72	90	74	22
09	25	88	94	65	04
12	11	66	99	49	17

This method is developed by Fisher, Yates and Tippest (Tippet table) to select a Random sample out of a given frame. One should simply start to read number from the table of Random Number.

We can select from the second column from the row we get sample 77,47,44,01 and 80 one thus the decide number of sample can be taken from a table of Random number shown as below.

3.   Use of Computer

If the population is very large and if computer facilities are available, a computer may be used for drawing a Random sample. The computer can be programmed to printout a series of Random member as the research decides.

B)   Stratified Sample

This is an improved type of random probability sampling. In this method the population is subdivided into homogenous groups or strata and from each strata from random sample is drawn. For eg. University students may be divided on the basis of discipline and each discipline group may again be divided into junior and seniors; The employees of a business firm may be divided into managers and non managers and each of this group may be subdivided into salary, grade wise strata.

C)   Systematic sampling (Fixed Interview Method)

This method of sampling is an alternative to random selection. It consists of every nth item in the population after a random start with an item from 1 to N. Suppose it is decided to select a sample of 20 students from a list of 300 students, divide the population total of 300/20. The quotation is 50 (Fraction in the division is not taken) select a number at a random b/w 1 and 15 by using lottery method. Suppose the selected number is '9' then the student numbered '9', '24' (9+15), 39 (24+15), 54 (39+15) etc. are selected as sample.

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

D)   Proportionate Stratified Sampling

This sampling involves drawing a sample from each strain in proportion to their share in the total population. For example the final year MBA students of the management faculty of a university consist of the following specialization group.

Specialisation	No. of Students	Proportion
Production	40	.4
Finance	20	.2
Marketing	30	.3
Rural Development	10	1
	100	1

The Researcher wants to draw an overall sample of 30. Then the strata sample size would be

Strata	Sample
Production	30x.4=12
Finance	30x.2=6
Marketing	30x.3=9
Rural Development	30x.1 =3
Total	30

Thus proportionate sampling gives proper representation to each stratum and its statistical efficiency is very high. Therefore this is very popular.

Non Probability Sampling Methods

a) Convenience Accidental Sampling

This is a non probability sampling. It means selecting sample units in a just 'Hit and Miss' fashion. Example interviewing people whom will happen to meet. For example, a teacher may select ten students in his class. This method is also known as accidental sampling because the respondents whom the researcher meets accidently are included in the sampling. It has some advantages.

a) It is the cheapest and simplest method of data.
b) It does not require a list of population
c) It does not require any statistical experience. It has some limitations also
a) It may not yield the desirable
b) It is not a reliable sample method
1. Purposive or Judgment Sampling

This method is deliberate selection of sampling units. It is also known as Judgment sampling. Here the chance depends upon the judgment of the researcher.

It has some merits

1. It is less costly and more convenient. It has demerit. It does not mensure proper representation.
2. It requires prior information about people.
2.   Quota Sampling

This a form a convenience sampling involving selection of Quota groups such as ; sex, age, social class. Here each investigators may be given an assignment Quota requires and sample is selected from Quota assigned to be.

3. Snow ball Sampling
4. This is a colourful name for a technique of building up a list or a sample of a special population by using an initial set of the members as informants.

REPORT WRITING

Report writing is the last activity of the research process. The Research report is a means for communicating our research experiences to others and adding them to pond of knowledge.

Meaning and purpose of a research report: A research report is a formal statement of the research process and its results it narrates the problem studied methods used for studying it and findings and conclusion of the study. It is a technical activity which requires considerable thought, effort, skill and penetration and overall approach to the problem data analysis as well as firm control over language and greater objectivity.

Functions of Research Reports

1. It serves as means for presenting the problem studied, methods and techniques used for collecting and analysing data the findings, conclusions and recommendation.
2. It serves as a basic reference material for future use
3. A report serves as a means for judging the quality of the completed research book.
4. It is a means for evaluating the researchers ability and competence to the research.
5. It provides systematic knowledge on problems and issues analysed.

Types of Report

1. Technical Report (Thesis)

   This is a comprehensive full report of the research process and its outcome. It is primarily meant for academic community. It is a formal long report covering all the aspects of research process. It is also comprehensive and complete that the study can be duplicated by others.

2. Popular Report

   This type of Report is designed for an audience of executives and other non technical users. The format of this report is different from that of a technical report. The style may be more journalistic.

3.   Interim Report

When there is a long time lag b/w data collection and presentation of a result. In case of sponsored project, the sponsor may be asked to present an Interim report. It contains what has been done so far.

4.   Summary Report

A summary Report is a report of two or three pages.

5.   Research abstract

This a short summary of the research report.

6.   Research Article :- It is designed for publication in a professional Journal.

Format of Research Report

A) Preliminary Section
a) Title Page
b) Certificate
c) Declaration
d) Acknowledgement
e) Preface and forward
f) Table of contents
g) List of tables (if any)
h) List of figures (if any)

B)   Main body of the Report

a) Introduction
1. Statement of the problem
2. Significance of the study
3. Purpose
4. Definition of important terms
5. Objectives
6. Hypothesis
7. Methodology
8. Period of the study
9. The study area
10. The data
11. Chapterisation

b)   Review of literature
1. Critical analysis of the previous research
2. Brief statement of the present study

c) Design of the study
1. Procedure used
2. Methods of gathering data
3. Description of data

d) Presentation and Analysis of data
1. Text
2. Tables
3. Figures

e) Summary and conclusion
1. Brief re-statement of the study
2. Description of the procedure used
3. Main findings and conclusions
4. Recommendation for further research

f) Reference Section
1. Bibliography
2. Appendix
3. Index

MODULE V

DATA COLLECTION, DATA PROCESSING AND DATA ANALYSIS

Definition

" Data are facts, figures and other relevant materials past and present serving as bases for study and analysis".

Meaning of Data

The search for answers to research questions calls collection of Data. "Data are facts, figures and other relevant materials, past and present, serving as bases for study and analysis".

Types of Data

The Data needed for social science Research may be broadly classified into:

a) Data pertaining to human beings

b) Data relating to Organisations

c) Data pertaining to territorial area.

A) Personal Data (relating to Human beings) are of two types.

a) Demographic and socio-economic characteristics of individuals. Like name, sex, race, social class, relation, education, occupation, income etc.

b) Behavioural Variables: Attitudes, opinion knowledge, practice, intensions etc.

B) Organistion Data:- Consist of data relating to an organizations, origin ownership, function, performance etc.

C) Territorial Data :- are related to geo-physical characteristic, population, infrastructure etc of divisions like villages, cities, taluks, distinct, state etc.

Importance of Data

The data serve as the bases or raw materials for analysis without Data no specific inferences can be drawn on our study. The reliability of data determines the quality of research. Data form the basis of testing hypothesis data provides the facts and figures for constructing measuring scale. The scientific process of research can be carried out only through accurate data.

Sources of Data

The sources of Data may be classified into a) primary sources b) Secondary sources.

a)   Primary Sources.

Primary sources are original sources from which the researcher directly collects data that have not been previously collected. Primary Data are first –hand information collected through various methods such as observation, interview etc.

b)   Secondary Sources

These are sources containing data which have been collected and compiled for another purpose. The secondary sources consist of readily available and compiled statistical statements and reports.   Secondary sources   consist of not only published but also unpublished records. They consist of Data over which a researcher has no original control.

Collection of Primary Data

The important methods of Primary data are:
1.   Observation
2.   Interviewing
3.   Schedules
4.   Questionnaire

I.   Observation

Observation means viewing or seeing.   We observe things while we are awake. Observation is classical method of scientific enquiry

Definition

Observation may be defined as "a systematic viewing of a specific phenomenon in its proper setting for the specific purpose of gathering data for a particular study". Observation as a method includes both seeing and hearing"

Characteristics of Observation

1.   It is both physical and mental activity. The observing eyes catches many things which are sighted but attention is focused on that data are pertinent to a given study.
2.   Observation is selective a researches does not observe anything and everything but select the range of things to be observed on the basis of the nature, scope and objectives of his study.
3.   Observation is purposive and not casual. It is made for the specific purpose of not in things relevant to the study.
4.   Observation captures to the study. Social context in which a persons behaviour occurs.
5.   Observation is based on standarised tools.

Types of Observation

With reference to the investigators role observation is classified into:

a)   Participants observation
b)   Non-Participates Observation

In terms of mode of observation. Observation is classified into

a)   Direct Observation
b)   Indirect Observation

With reference to the system adopted observation is classified into

Controlled observation and uncontrolled observation

a)   Participant Observation
In this observation, the observer is a part of the phenomena on group which is observed and he as both a observer and participants.

It has certain advantages

1.   The Observer can understand the emotional reactions of the observed group.
2.   The observer will be able to record the context which gives meaning to the observed behaviour

The main Disadvantages are:

1.   The Participant observer narrows his range of observation.
2.   In this type of observation , The objectivity is lost.
3.   The clear demand makes in accuracy in recording.

Non Participant observation

        In this method the observer stands apart and does not participate in the phenomenon observed. Naturally there is no emotional involvement on the part of the observer. This method calls for skill in recording observation in an unnoticed manner.

D)   Direct Observation

This means observation of an event personally by the observer when it takes place. This is a flexible method.

 Indirect Observation

This does not involve the physical presence of the observer and the recording is done by mechanical autographic or electronic devices.

E) Controlled Observations – Maximum control over extrinsic and intrinsic variable

F) Uncontrolled Observations – No control over extrinsic and intrinsic variable.

Planning of Observation

The use of observation method requires proper planning; first, the researcher should carefully examine the relevance of observational method.

Second, he must identify the specific investigative questions.

Third, he must decide the observation content .

Four, observer should be selected and trained

Tools of observation

Systematic observation requires certain devices. They are:

Schedules, diary, Cards, Cameras, tape recorder, video tape, tape, Barometers, screen and mirrors, closed circuit television, pocket calculators etc.

Advantages of observations

Observation has certain advantages

1.   The main advantage is that it makes it possible to study behaviour as it occurs.
2.   Data collected by observation may describe the observed phenomena as they occur in their natural setting
3.   Observation is more suitable for studying subjects who are unable to articulate eg. Children, animals, birds etc.
4.   Observation makes it possible to capture the whole events.
5.   It is easier to make disguised observation
6.   Observation for mechanical devices it can be recorded correctly.

Limitations

1.   Observation is of no use in studying past events.
2.   It is unable to study opinion and attitudes.
3.   The researcher has to wait for the events
4.   Observation is very expensive.
II.   Interviewing

Interview is one of the major methods of data collection. It is often superior to other data collection methods. People are usually more willing to talk than to write.

Definition

"It may be defined as a two way systematic conversation b/w an investigator and an informant initiated for obtaining information relevant to a specific study"

Types of Interview

a) Structured or directive Interview

This is an Interview made with a detailed standard schedule. The same questions are put to all the respondents and the same order. Each question is asked in the same way in each interview. This type of Interview is used for large scale formulated surveys.

It has certain advantages

1. Data from one Interview to the next can be easily compared

2. Recording and coding of data do not cause any problem.

It has some limitations

1. It tends to loss spontaneity of conversation

2. The respondants view is minimized.

b) Unstructured or Non-directive Interviews

Respondent to talk freely about a given topic and a pre-planned schedule is not used.

It has some advantages

1. It is similar to natural conversation

2. It provides great opportunity to explore a problem.

It has some limitations

1. The data is not comparable

2. Time is wasted for unproductive conversation

c) Focused Interview

This is a semi- structural interview the investigator attempts to focus the discussion on the actual effect of a given experience to which the respondents opinion, emotions or conditions on the basis of an interview guide. This required training and skilled.

Interview Processing

The Interviewing process consist of the following stages

1. Preparation
2. Introduction
3. Developing rapport
4. Carrying the interview forward
5. Recording the Interview
6. Closing the Interview

Interview problems

In a personal Interview there are certain problems

I.   Response Problem
There are different types of response problem

a)   Non-Response

   Non-response refers to failure to obtain response from respondents here respondent remains silent or refuse to answer

b)   Partial response

In partial response the respondent give an incomplete answer

c)   Irrelevant response

In irrelevant response respondent gives totally irrelevant answers.

II.   Interviewers bias

   The Interviewer may resort to cheat by taking up data without actually interviewing he may use manipulations by rephrasing the question etc.

III.   Non availability

   Another major problem of Interviews is the non-availability of respondent. A respondent may be a too busy or out of stations.

Features of Interview

1.   Interview is not a casual conversation but a conversation with a specific purpose.
2.   The participant, the Interviewer and the respondent both are strangers.
3.   Interview is a mode of obtaining verbal answers to verbal questions.
4.   Interview is an interaction process.
5.   Interview is not a chemical examination.

TELEPHONE INTERVIEW

   Telephone Interview is a non-personal method of data collection. It may be used as a major method or supplementary method of data collection. This method is used when the universe is very large and the survey is will completed to a limited period of time and the universe is widely scatted. It has some advantages.

1. It is a low cost method
2. Large No. of respondents can be covered within a small time and it does not require field work.

It has some limitations:-

1. There is a time limit to the telephone conversation.

GROUP INTERVIEW

A Group Interview may be defined as a method of collecting primary data in which a No. of individuals with a common interest interact with each other a group may consist of six to eight individuals. The interviewer acts as the discussion leader. Information is obtained self administered questions. It is a popular method and has the following advantages.

1. The respondents comment freely and detailed.
2. This method is highly flexible.
3. They didn't have watch the interview as observed.

It has some limitations also

5. It is difficult to representative samples.
      There is the possibility of one individual dominating others.
IV.   Schedules and Questionnaire

Schedules and Questionnaires are the most common instruments of data collection. These two types of tools have much in common. Both of them contain a set of questions logically related to a problem under study; Both aim at collecting responses from the respondents. But both are different. A schedule is used as a tool for interviewing, a questionnaire is used for mailing. The schedule is filled by the interviewer in a face-to-face interview; whereas a questionnaire is filled by the respondent himself.

V.   QUESTIONNAIRE

This method of data collection is quite popular particularly in case of big enquiries. It is being adopted by private individuals, research workers and even by governments. In this method a questionnaire is sent (usually by post) to the persons concerned with a request to answer the questions and return the questionnaire.

A Questionnaire contains a number of questions printed or typed in a definite order. Then it is mailed to the respondents who are expected to read and answer to questions and return by writing down the answer. The respondents have to answer the questions on their own. It has the following merits.

1. There is a low cost even when the universe is large and it is widely spread geographically

2. It is free from the bias of the interviewer answers are in respondents own words.

3. The respondents have enough time to read and answer the questions.

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

5. Large samples can be used; so the method is dependable and reliable.

Limitations

The main limitations of this system are;

1.   Low rate of return of duly filled questionnaire

2.   It is possible only in case of educated respondents.

3.   The control over the questions is lost once it is sent.

4.   There is inflexibility of questions.

5.   There is possibility of unclear answers.

6.   This method is a slowest one.

SCHEDULES

This method of data collection is very much like the collection of data through questionnaire with little difference which likes in the fact that schedules are being filled in by enumerators who are specially appointed for this purpose. These enumerators along with schedules go to respondents, put to them the questions from the performer in the order questions are listed and record the replay in the space meant for the same Performa. This method requires the selection and training of enumerators to fill up the schedules and they should be carefully selected. Enumerators should be intelligent and must be able to find out the truth. The enumerators should be honest sincere and hard working. This method is very useful because it yield good results. Population censes all over the world is conducted through this method.

Differences between Schedule and Questionnaire

1.   The Questionnaire is generally sent through mail to informants. The schedule is generally filled by the research worker.

2.   To collect data through questionnaire is relatively cheap. To collect data through schedule is relatively more expensive.

3.   Non- response is high in case of questionnaire whereas in schedule response is very high.

4.   In Questionnaire there is no personal conducts. But in a schedule there is a face-to-face contact.

5.   The questionnaire method is used only when respondents are literate.

6.   Along with schedules observation methods can be also used.

Types of Questions

a)   Structural Question

Questions which allow only a few alternative ways of answering are structural questions. The simplest example of a structural question "What is your age"? there can be only one answer to this question.

b)   Dichotomous Questions (two choice questions)

Dichotomous Questions result in Yes or No answers. For eg..Are you a member of lions club?

c)   Multiple choice questions

Here the answer is selected from among several alternatives

d)   Ranking questions

Here different alternative answers are given for question and the respondent is asked to rank them or show his preference by number income 1,2,3, etc.

   Questions not to be asked

1.   Vague questions should be avoided
2.   Leading questions should be avoided.
3.   Presuming questions should not be included.
4.   Hypothetical questions should not be included.

DATA PROCESSING AND DATA ANALYSIS

Data Processing

       Data processing is an intermediately stage of work b/w data collection and data analysis. The complete Instruments of data collection that is Interview schedule Questionnaire, data sheet etc contain a west mess of data. They cannot straight way provide answers to research question. They are like raw materials and they need processing. The following are the major steps in data processing.

1.   Editing

     The 1st step in processing of data is editing of data. Editing is a process of checking to detect and correct errors and concessions. Editing is done at 2 stages.

a)   Field Editing

       During the time of Interviewing. The interviewer cannot always record response completely and legibly. Therefore after each Interview is over the researcher should review the schedule to complete abbreviated responses, rewrite eligible response and correct omissions.

b)   Office Editing

All completed schedules and questionnaire should be thoroughly checked in the office for completeness accuracy and uniformity.

2.   Classification and Coding

a)   Classification

The edited data are classified and coded. The responses are classified into meaningful category, so as to bring out there essential pattern. By this method several ended responses are reduced into 5 or 6 appropriate categories containing critical information needed for analysis. Suppose the responses to a question an occupation in a survey consist of items as business executive, share broker, electricians, Driver, farm labourer, lawyer, college teacher, medical practitioner barber, carpenter, accountant and gold smith.

This data are not amenable for analysis. So they can be classified as

1.   Professional and managerial Business executive, college teacher, lawyer, medical practitioner.

2.   Clerical: Accountant, Assistant

3.   Skilled labours: Share broker, electricians, carpenter, barber, Gold smith

4.   Unskilled labourer: Farm labourer

b)   Coding

Coding means assigning numerals or other symbols to the category of responses for each question. A coding scheme is designed on the basis of the concerned category. The coding schemes with the assigned symbols together with specific coding instructions may be assembled in a book. The codebook will identity a specific items of variable or observation and code number assigned to each category of that item.

Occupation		**Religion**	
Salaried	- 1	Hindu	- 1
Profssional	- 2	Christian	- 2
Business	- 3	Muslim	- 3
Retired	- 4	Budhist	- 4
House Wife	- 5	Jainsist	- 5

3.   Transcription

When only a few schedules are processed and hand tabulated, Tabulation can directly we made from the schedules. On the other hand direct tabulation from the edited schedule or questionnaire is difficult if the number of schedules and the number of responses in them are large.

Suppose an Interview schedule contain 180 responses requiry tabulation and 210 simple and cross tables are to be constructed, each schedule has to be handled at least 210 for tabulation. This will result in mutilation of the schedule. In order to avoid this draw able data contained in schedule or questionnaire are transferred to another material for tabulation. This intermediately process is called transcription. There are two methods of transcription Manual or mechanical

4.   Tabulation

After the transcription of data is over data are summarised and arranged in a compact form for further analysis. Thus tabulation is the process of summonsing raw-data and discipline them of compact statistical tables. Tabulation can be done by hand or by mechanical or electronic devices.

5.   Graphic Representation

In presenting the data of frequency distinction and statistical computation, It is often desirable to use appropriate to forms of graphic representation. In addition to tabular forms. Graphic representation involves the use of graphic charts and other pictorial devices reduced large masses of statistical data to a form that can be quickly understood at a glance. The devise of graphic representation are useful for non-technical people or general public. Graphic representation must be planned with almost care. Graphic forms used must be simple clear and accurate. The most commonly used graphical forms are
a)   Line graph or charts
b)   Bar charts
c)   Segmental representations
d)   Pictograph

THE ROLE OF COMPUTER IN RESEARCH

Introduction

Problem solving is an age old activity. The development of electronic devices specially the computer has given added impetus to this activity. Problems which could not be solved earlier due to sheer amount of computations involved can now be tackled with the aid of computer accurately and rapidly. Today people use computer in all walks of life. To the researcher the use of computer to analyse complex data had made complicated research design practical. Electronic computers became an indispensible part of research students in physical and behavioural sciences as well as in humanities.

A computer as the name indicates is nothing but a device that computes. In this sense any device, however, sophisticated, but enables one to carryout mathematical manipulation becomes a computer. Today we mean computer as electronically operating machine which is used to carry out computations.

Important Characteristics of Computers

1. Speed :-Computers can perform calculations in just a few seconds that human beings would need weeks to do by hand. This has led to many scientific projects which were previously impossible.

2. Diligence:- Being a machine, a computer does not suffer from the human traits of tiredness and lack of concentration. If two million calculations have to be performed, it will perform the two million calculations with exactly the same accuracy and speed as the first.

3. Accuracy:- The computer's accuracy is consistently high. Errors may occur very rarely but it can detected very easily. The errors are due to the imprecise thinking by the programmer or due to in accurate poorly designed systems.

4. Automation:- Once a programme is in computers memory all that is needed is the individual institution to it which are transferred one after the other, to the control unit of execution. The CPU follows these instructions until it meets a last instruction which says " stop programme execution".

5. Binary Digits:- Computers use only the binary number system (a system in which all numbers are represented by a combination of two digits- one and zero) and thus operates to the base of two compared to the ordinary decimal arithmetic which operates on a base of ten.

6. Storage:- Although the storage capacity of the present day computer is much more than its earlier counterpart but even then the internal memory of the CPU is only large enough to retain a certain amount of information just as the human brain selects and retains what it feels to be important and regulates unimportant deatails to the back of the mind or just forgets them. Hence it is impossible to store all types of information inside the computer records. If need be all unimportant information/data can be stored in auxiliary storage devices and the same may be brought into the main internal memory of the computer as and when required for processing.

Computers and Researchers

Performing calculations almost at the speed of light, the computer has become one of the most useful research tools in modern times. Computers are ideally suited for data analysis concerning large research projects. Researchers are essentially concerned with huge storage of data, their faster retrieval when required and processing of data with the aid of various techniques. In all these operations, computers are of great help. Their use, apart expediting the research work, has reduced human drudgery and added to the quality of research activity.

Techniques involving trial and error process are quite frequently employed in research methodology. This involves lot of calculations and work of repetitive nature. Computer is best suited for such techniques, thus reducing the drudgery of researchers on the one hand and producing the final result rapidly on the other. Thus, different scenarios are made available to researchers by computers is no time which otherwise might have taken days or even months.

The storage facility which the computers provide is of immense help to a researcher for he can make use of stored up data whenever he requires to do so.

Thus, computers do facilitate the research work. Innumerable data can be processed and analysed with greater ease and speed. Moreover, the results obtained are generally correct and reliable. Not only this, even the design, pictorical graphing and report are being developed with the help of computers. Hence, researchers should be given computer education and be trained in the line so that they can use computers for their research work.

In spite of all this sophistication we should not forget that basically computers are machines that only compute, they do not think. The human brain remains supreme and will continue to be so for all times. As such, researchers should be fully aware about the following limitations of computer-based analysis:

1. Computerized analysis requires setting up of an elaborate system of monitoring, collection and feeding of data. All these require time, effort and money. Hence, computer based analysis may not prove economical in case of small projects.

2. Various items of detail which are not being specifically fed to computer may get lost sight of.

3. The computer does not think; it can only execute the instructions of a thinking person. If poor data of faulty programs are introduced into the computer, the data analysis would not be worthwhile. The expression "garbage in, garbage out" describes this limitations very well.

MODULE VI

PROBLEM FORMULATION

In Research process, the 1st and foremost step is that of selecting properly and defining a research problem. The researchers must find the problem and formulate it so that it becomes susceptible research like a doctor a researches must examine all the symptoms concerning a problem before he can diagnosis correctly.

"A problem well put is half solved. This saying highlights the importance of proper formulation of the selected problem. The primary task of Research is the collection of relevant data and the analysis of data or finding answers to research questions.

The proper performance of this task depends upon the identification of correct data and information required for the study. Once the problem is formulated he can execute the other steps without any vaste of time and energy. Thus formulation is a direction and specific focus to research effort. It helps to delimit the field of enquiry and prevent blind research and indiscriminate gathering of data. A proper formulation help to solve all major tasks for research like sampling, collection of data, construction of tools, plan of analysis etc.

What is a Research Problem?

A Research problem in general refers to some difficulty the researches experiences in the context of a theoretical or practical situation and wants to obtain a solution for the same.

"The term problem means a question or issue to be examined"

The term problem originate from the Greek word 'Probellim' – meaning anything that thrown forwards, a question proposed for solution, a matter stated for examination.

What is formulation?

Formulation means "translating and transforming the selected Research problem in to a scientifically researchable question".

An illustration

Let us suppose that a Research problem in general way as follows "Why is productivity in Japan so much higher than India.

In this form of question has a number of ambiguities such as: what sort of productivity is being refered to? With industries the same is related? With what period of time the

productivity is being talked about? In view of all such ambiguities the given statements or the question is too much general to be amenable to analysis, Rethinking and discussion about the problem may resulting narrowing down the question to "what factors were responsible for the higher labour productivity of Japan's manufacturing Industries during the decade 1971 to 1980 relative to India's manufacturing Industries"?

This version of the problem is definitely an improvement over its earlier versions for the various ambiguities have been removed to the extend possible. Further rethinking and rephrasing of the problem will become in this form.

"To what extent did labour productivity in 1971 to 1980 in Japan exceed that of India in respect of 15 selected manufacturing Industries? What factors were responsible for the productivity differentiates between the two countries by Industries?

With this sort of formulation, the various terms involves such as 'labour productivity', 'productivity differentials etc are explained clearly. The time period, the need of data etc are considered in this type of formulation.

Selection of a Problem

The Research problem undertaken for study must be carefully selected the task is a difficult one, although it may not appear to this. So in this connection researcher can seek the help of a guide. However the research problem cannot be borrowed. A problem must spring from the mind of researcher like a plant spring from its seed. A research guide can only help a researcher to choose the subject. The following paints may be observed by the researcher in selecting a research problem.

1. Subject which is overdone should not be chosen.
2. Controversial subjects should not be taken.
3. Too narrow or too wide problems should be avoided.
4. The subject selected for research should be familiar and feasible.
5. The subject should be within our time limit.
6. The subject should be within our affordable budget.

Sources of Problem

The sources from which one may be able to identity research problems are:

1. **Reading**
   When we critically study books and articles relating to subject of our interest, pertinent questions may arise in our mind. Similarly areas of research may strike to our mind when we read research reports.

2. **Academic Experiences**

Classroom lectures, class discussions seminar discussions and out –of-class exchanges of ideas with fellow students and professors will suggest many stimulating problems to be studied.

3. **Daily Experience**

Life is dynamic. We learn new things and undergo new experiences every day. It we are all inquisitive and sensitive to like situation we may bit upon questions worth of investigation. The story about Newton testifies to this. Apples have fallen on the beads of people before Newton.   But it was sensitive Newton alone raised the question regarding fall of apple which led to the discovery of Law of gravitation.

4. **Consultation**

Discussion with experts, researchers etc. will help to identify meaningful problems of research.

5. **Field situation**

Field visits, training and extension work provide exposure to problems which call for study.

6. **Brain storming**

Intensified discussion within a group of interested person may often be a means of identifying pertinent questions and of developing new ideas about a problem.

7. **Intuition**

Sometimes new ideas may strike to one's mind like a flash reflective mind is spring of knowledge. Eg. Sri Buddha.

Techniques of formulating Research Problem

How to define a Research Problem is undoubtedly a herculian task. However it is a task that must be talked intelligently. The usual approach is that the Researcher should himself pose a question and set techniques and procedure for throwing tight non the problem.

Defining a Research Problem properly and clearly is a crucial part of Research study and must in no case should accomplished hurriedlly. However in practice this is frequently overlooked. The techniques involved in defining and formulating a Research problem are as follows.

1. Statement of the problem in a general way
2. Understanding the nature of the problem
3. Surveying the available literature
4. Developing ideas through discussion
5. Rephrasing the Research Problem.

1. **Statement of the problem in a General way**

First of all the problem should be stated in broad general way keeping in view either some practical concern or some scientific or intellectual interests. For the purpose the researcher must immerse himself thoroughly in the subject matter concerning which he wishes to pose a problem. In Research, some preliminary survey or Piolot Survey is desirable. Then he can himself states the problem or be can seek the help of a guide. Ofter the guide puts forth the problem in general terms, and then it is upto the Researcher to narrow it down and phrase the problem in operational term. The stated problem may have various ambiguities that must be resolved by cool thinking and thinking at the same time the feasibility of particular solutions has to be consider and the same should be kept in view wild stating the problem.

2. **Understanding the nature of the problem.**

The next step in defining the problem is to understand its orgin and nature clearly. The best way of understand the problem is to discuss it with those who 1st raised it in order to find out how the problem originally came out and with what objectives in view. If the researcher has stated the problem himself, he should consider once again all those points that induced him to make a general statement concerning the problem. For a better understanding of the nature of the problem involved, he can enter into discussion with those who have a good knowledge of the problem concerned or similar other problems. The researcher should also keeping you the environment within which the problem is to be studied or understood.

3. **Surveying the available literature**

All the available literature concerning the problem at hand must necessarily be surveyed and examined before a definition of research problem is given. He must be conversant with relevant theories in the field, report and the records as also of all other relevant literature. He must devote sufficient time in reviewing of research already undertaken on related problems. This is done to findout what data and other materials, if any, are available for operational purposes. This would also help the researcher to know if there are certain gaps in the theories or whether the existing theory applicable to the problem study are in consistent with each other, or whether the findings of different studies donot follow pattern consistent with the theoretical expedition and so on. All these enable a research to take new strides in the field of Furtherance of knowledge that he can move to starting from the existing premise studies on related problems are useful for indicating the type of difficulties that may be encountered in the present study as also the possible analytical short coming. At times such studies also suggest useful and even new lines of approach to the present problem.

4.   Developing ideas through discussion

Discussion concerning a problem often produces useful information. Various new ideas can be developed through such an exercise, hence, a researcher must discuss him problems with his colleagues and others who have enough of experience in the same area or in working on similar problems. This is known as experience survey. People with rich experience are in a position to enlightened the researcher firm

5.   Rephrasing the Research Problem

Finally the researcher must patiently sit to rephrase the research problem into a working proposition- Once the nature of the problem has been clearly understood, the environment (with in which the problem has to be studied) has been defined, discussion over the problem have taken place and the available literature has been surveyed and examined rephrasing the problem into analytical or operational terms is not a difficult task. Through rephrasing the researcher puts the research problem in as specific terms as possible so that it may become operationable and may help in the development of working hypothesis.

While defining a Research Problem the following points also may be noted.
a) Technical terms should be clearly defined
b) Basic Assumptions should be clearly defined
c) A straight forward approach should be provided
d) The suitability of time period and the source of data must be considered.
e) The scope of investigation and the limit of investigation should also we defined.

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