

Unit 1- INTRODUCTION TO RESEARCH METHODOLOGY

1.1 MEANING OF 'RESEARCH'

(Q: Define research.)

- Research is a scientific and systematic search for appropriate information on a specific topic.
- It is an original contribution to the existing stock of knowledge resulting in its advancement.
- Research an art of scientific investigation and refers to the systematic method consisting of defining the problem, formulating a hypothesis, collecting, organising and analyzing data, making deductions and reaching conclusions and finally, testing the conclusions to determine whether they fit the hypothesis.

1.2 OBJECTIVES OF RESEARCH

(Q: What are the objectives of research?)

The main aim of research is to find out the hidden truth which has not been discovered yet.

Other research objectives are:

1. To become familiar with or get new insights into a phenomenon (exploratory or formulative research studies);
2. To portray the characteristics of a particular individual, group or a situation (descriptive research studies);
3. To determine the frequency with which something occurs (diagnostic research studies);
4. To test a hypothesis of a causal relationship between variables (hypothesis-testing research studies).

1.3 MOTIVATION IN RESEARCH

*(Q: Discuss the role of motivation in scientific research. or
What are the key factors that drive researchers to pursue their studies?)*

The motives for doing research are:

1. Desire to get a research degree along with its benefits;
2. Desire to face the challenge and concern in solving the practical problems;
3. Desire to get intellectual joy of doing some creative work;
4. Desire to do service to society;
5. Desire to get respectability.

Other factors are directives of government, employment conditions, curiosity about new things, desire to understand causal relationships, social thinking and awakening.

1.4 TYPES OF RESEARCH

*(Q: Describe the different types of research, clearly pointing out the difference between an experiment and a survey. **Note:** Find a part of the answer to this question in 'collecting the data' section in page 8.)*

The basic types of research:

(i) Descriptive vs. Analytical:

Descriptive research (Ex post facto research): The purpose is to describe the state of affairs as it exists at present. The researcher has no control over the variables; he can only report what has happened or what is happening. Ex: frequency of shopping, preferences of people etc. It uses survey methods, fact-finding enquiries of all kinds, including comparative and correlational methods.

Analytical research: The researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

(ii) Fundamental vs. Applied Research:

Fundamental (basic or pure) research: It is mainly concerned with generalisations and with the formulation of a theory, that has a broad base of applications and adds to the already existing scientific knowledge. Ex: Research concerning natural phenomenon, relating to pure mathematics, concerning human behaviour.

Applied (or action) research: It aims at finding a solution for a concrete practical problem of a society or a business organization. Ex: Marketing research, evaluation research, research to identify social, economic or political trends that affect an institution etc.

(iii) Quantitative vs. Qualitative:

Quantitative research: It is based on the measurement of quantity or amount and applicable to phenomena that can be expressed in terms of quantity.

Qualitative research: It is concerned with qualitative phenomenon, i.e. phenomena relating to quality or kind. Ex: behavioural sciences research to discover the underlying motives of human behavior, attitude or opinion research. It uses in depth interviews, sentence completion tests, story completion tests.

(iv) Conceptual vs. Empirical:

Conceptual research: It is related to some abstract ideas or theory. It is used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

Empirical research (experimental research): It is data-based research, coming up with conclusions which are verified by observation or experiment. The researcher first provides a working hypothesis, then sets up experimental designs to manipulate the materials concerned so as to prove or disprove his hypothesis. The experimenter has control over the variables under study and evidence gathered through experiments are considered to be the most powerful support for a given hypothesis.

(v) Other Types of Research: Other types of research are variations of above approaches, based on the purpose of research, or the time required to accomplish research, or the research environment etc. Based on time, research may be (i) **one-time research:** research is confined to a single time-period, (ii) **longitudinal research:** The research is carried out over several time-periods. Based on research environment research can be field-setting research or laboratory research or simulation research. Clinical or diagnostic research follow case-study methods or in-depth approaches to reach the basic causal relations and use very small samples and very deep probing data gathering devices. The research may be (i) **exploratory research:** objective is the development of hypotheses rather than their testing, (ii) **formalized research:** that with substantial structure and with specific hypotheses to be tested. Historical research: utilizes historical sources like documents, remains, etc. to study events or ideas of the past, including the philosophy of persons and groups. Research can be (i) **conclusion-oriented:** In this research, a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes, (ii) **decision-oriented research** is for the need of a decision maker and the researcher in this case is not free to undertake research according to his own inclination. Ex: Operations

research, where it is a scientific method of providing a quantitative basis for decisions regarding operations under control.

1.4.1 Research Approaches

(Q: Discuss various research approaches. Or Differentiate between quantitative vs qualitative research approaches)

Two basic approaches to research: **(1) Quantitative approach:** It involves the generation of data in quantitative form which can be subjected to rigorous quantitative analysis. This approach is sub-classified into:

(i) Inferential: This is used in survey-based research where a sample of population is studied (questioned or observed) to determine its characteristics, and it is then inferred that the population has the same characteristics.

(ii) Experimental approach: It is characterized by much greater control over the research environment and in this case some variables are manipulated to observe their effect on other variables.

(iii) Simulation approach: It involves the construction of an artificial environment, giving initial conditions, parameters and exogenous variables, running a simulation under controlled conditions, generating relevant information and data and building models for understanding behaviour of the process in future.

(2) Qualitative approach: The research is concerned with subjective assessment of attitudes, opinions and behaviour and generates results in non-quantitative form. This research is a function of researcher's insights and impressions. The techniques of focus group interviews, projective techniques and depth interviews are used.

1.4.2 Significance of Research

(Q: Explain the significance of research in modern times)

Thus, research is the fountain of knowledge for the sake of knowledge and an important source of providing guidelines for solving different business, governmental and social problems.

- Progress is possible through increased amounts of research. Research **inculcates the logical habits** of scientific thinking and organisation.
- Research provides the basis for all government policies in economic system and for investigating the consequences of each of these policies. Ex: government's budgets rest on an analysis of the needs and desires of the people and on the availability of revenues to meet these needs. The plight of cultivators, the problems of big and small business / industry, working conditions, trade union activities, the problems of distribution, the size and nature of defence services are matters requiring research. **In the context of government, research as a tool to economic policy** has three distinct phases of operation, viz., **(i) investigation of economic structure** through compilation of facts; **(ii) diagnosis of events** that are taking place and the analysis of the forces underlying them; and **(iii) the prognosis**, i.e., the prediction of future developments.
- Research solves various **operational and planning problems of business** and industry. The results of Operations research and market research, along with motivational research, assist in taking business decisions. **Market research** is the investigation of the structure and development of a market for the purpose of formulating efficient policies for purchasing, production and sales. **Operations**

research refers to the application of mathematical, logical and analytical techniques to the solution of business problems of cost minimisation or of profit maximization (optimization problems). **Motivational research** is concerned with the determination of motivations underlying the consumer (market) behaviour.

- Research with regard to demand and market factors has great utility in business. Given knowledge of future demand, industry adjusts its supply schedule within the limits of its projected capacity. Business budgeting, which ultimately results in a projected profit and loss account, is based mainly on sales estimates which in turn depends on **business research**. Research, thus, replaces intuitive business decisions by more logical and scientific decisions.
- Research is important for **social scientists** to predict human interactions and in solving immediate problems of human relations.

The following points support the significance of research:

- (a) For master's students or Ph.D. scholars, research is a careerism, a way to attain a high position in the social structure;
- (b) To research methodology professionals, research is a source of livelihood;
- (c) To philosophers and thinkers, research is the outlet for new ideas and insights;
- (d) To literary people, research is the development of new styles and creative work;
- (e) To analysts and intellectuals, research is the generalisations of new theories.

1.4.3 Research Methods versus Research Methodology

(Q: Distinguish between Research methods and Research methodology. Or Evaluate the statement with example: research methodology has many dimensions and research methods do constitute a part of the research methodology)

Research methods: These refer to all those methods/techniques that are used for conduction of research. They are used by the researchers during the course of studying research problem.

(Note: 'Method's vs 'Technique's: 'Method's are more general. It is the method that generate 'technique's. However, in practice, the two terms are taken as interchangeable. For more information visit the chart in page 7.)

Research methods can be put into the three groups:

- 1. Group One:** These methods are concerned with the collection of data and will be used where the data already available are not sufficient to arrive at the required solution;
 - 2. Group Two:** These include statistical techniques which are used for establishing relationships between the data and the unknowns;
 - 3. Group three:** These methods are used to evaluate the accuracy of the results obtained.
- Research methods falling in the last two groups are taken as the analytical tools of research.

Research methodology (RM): It is a science of studying how research is done scientifically. The scope of RM is wider than that of research methods. RM along with the research methods, also explains, why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analysing data has been used etc.

Ex: Along with how to develop tests, calculate the mean, standard deviation, apply particular research techniques, researchers should also need to know which of these methods, are relevant and which are not, and what would they mean and indicate and why.

1.4.4 Research and Scientific Method

(Q: Differentiate between research and scientific method)

Research and scientific method, are closely related.

Research: It refers to 'an inquiry into the nature of, the reasons for, and the consequences of any particular set of circumstances, whether these circumstances are experimentally controlled or recorded just as they occur.' Experimentation is done by the researcher to test hypotheses and to discover new relationships among variables. But the conclusions drawn on the basis of experimental data are criticized for faulty assumptions, poorly designed experiments, badly executed experiments or faulty interpretations. As such the researcher must pay all possible attention while developing the experimental design and must state only probable inferences.

The scientific method: It is, based on following basic postulates:

1. It relies on empirical evidence;
2. It utilizes relevant concepts;
3. It is committed to only objective considerations;
4. Ethical neutrality: it aims at making only adequate and correct statements about population objects;
5. It results into probabilistic predictions;
6. Its methodology is made known to all concerned for critical scrutiny and for use in testing the conclusions through replication;
7. It aims at formulating general scientific theories.

Scientific method is a logical and systematic method. It is a method free from personal bias or prejudice, that ascertains demonstrable qualities of a phenomenon capable of being verified, wherein the researcher is guided by the rules of logical reasoning, the investigation proceeds in an orderly manner and includes internal consistency.

1.4.5 Importance of Knowing Research Methodology

(Q: Why is it important for researchers to have a strong understanding of research methodology? Discuss or What is the importance of knowing how to do the research.)

The study of RM gives the training in gathering material and arranging them, participating in the field work, training in appropriate data collection techniques, in the use of statistics, questionnaires and controlled experimentation and in recording evidence, sorting it out and interpreting it.

- i) For one who is preparing himself for a career of carrying out research, must develop the skill of using research techniques and must thoroughly understand the logic behind them to do better research.
- ii) RM Knowledge will inculcate the ability to evaluate and use research results with reasonable confidence.
- iii) RM knowledge enables to make intelligent decisions concerning problems evolving in practical life.
- iv) The RM knowledge helps the consumer of research results to evaluate them and enables him to take rational decisions.

1.5 RESEARCH PROCESS

(Q: Briefly describe the different steps involved in a research process. or Outline the research process)

Research process consists of series of steps necessary to effectively carry out research as shown in figure 1.1. They do not follow each other in any specific order and the researcher has to decide in the research process the requirements of the subsequent steps.

1. Formulating (Defining) the research problem: Two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view. The researcher must first decide the general area of interest to carry out the research. To understand the problem, the researcher must discuss it with subject experts and take the help from a guide who is experienced and has several research problems. The researcher must examine two types of literature—the conceptual literature concerning the concepts and theories, and the empirical literature consisting of similar studies made earlier. After this the researcher rephrases the problem into operational terms making it more specific after verifying the objectivity and validity of the background facts.

There are two types of research problems, (i) those which relate to states of nature and (ii) those which relate to relationships between variables.

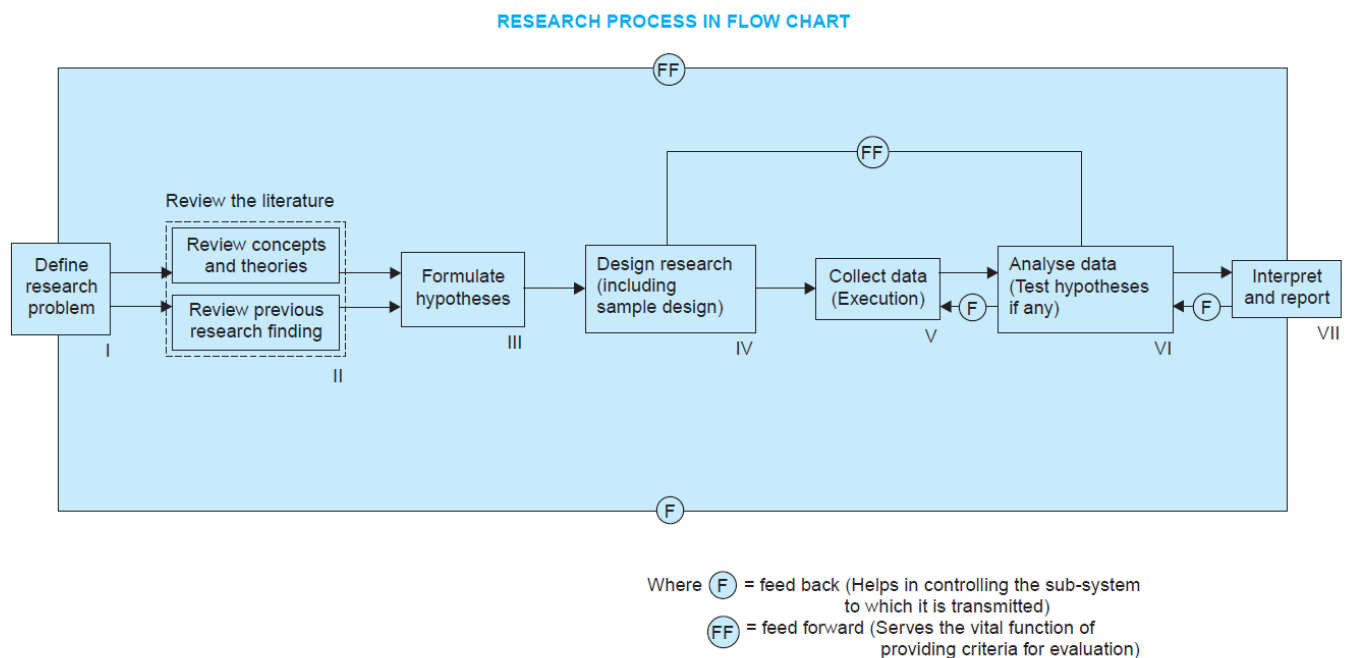


Fig. 1.1: Flow Chart showing Research Process

2. Extensive literature survey: Once the problem is formulated, the researcher should undertake extensive literature survey connected with the problem. For this purpose, earlier studies, which are similar to the study in hand should be carefully studied in indexed journals and published / unpublished bibliographies, academic journals, conference proceedings, government reports, books etc., must be tapped depending on the nature of the problem.

3. Development of working hypotheses:

(Q: Define Hypothesis. What are characteristic features of Hypothesis? How do you develop it?)

After extensive literature survey, researcher should state working hypothesis, which is tentative assumptions made in order to test its logical or empirical consequences. Hypothesis should be very specific and limited to the piece of research in hand. Its role is to guide the researcher by delimiting the area of research and to keep him on the right track. The approach for developing hypotheses:

- (a) Discussions with colleagues and experts about the problem.
- (b) Examination of data and records.
- (c) Review of similar studies on similar problems.
- (d) Exploratory personal investigation such as field interviews.

4. Preparing the research design: Once the research problem is formulated, researcher should prepare a research design, which refers to state the conceptual structure within which research would be conducted. The preparation of the research design involves:

- (i) The means of obtaining the information.
- (ii) The availability and skills of the researcher.
- (iii) Explanation of how the selected means will be organized and the reasoning for the selection
- (iv) The time available (v) The cost factor

5. Determining sample design:

(Q: Define the concept of sampling design with example. How a researcher determines a sample design? Distinguish between probability and non-probability samples)

All the items under consideration in any field of inquiry constitute a 'universe' or 'population'. A complete enumeration of all the items in the 'population' is known as a census inquiry. This type of inquiry needs a lot of time, money and energy and not possible in practice. Hence, a **sample** is used, which includes only a few items selected from the universe, for the study. Ex: 12 out of a city's 200 drugstores constitutes a sample design. A **sample design** is a definite plan determined for obtaining a sample from a given population before any data are actually collected. The researcher decides it, considering the nature of the inquiry and other related factors.

There are two types of samples:

- (i) Probability (chance) samples: Each element has a known probability of being included in the sample. These are based on simple random sampling, systematic sampling, stratified sampling, cluster/area sampling
- (ii) Non-probability (purposive) samples: These do not allow the researcher to determine this probability. These are based on convenience sampling, judgement sampling and quota sampling techniques.

Important sample designs:

(Q: Discuss the different types of sample designs commonly used in research. Describe situations where each design would be most appropriate)

- (i) **Simple random sampling:** In this type, each item in the population has an equal chance of inclusion in the sample and each one of the samples has the same probability of being selected in case of finite universe. Ex: To select a sample of 300 items from a universe of 15,000 items, each item is assigned a number from 1 to 15,000. Then, 300 five digit random numbers within the range are selected from the random number table. This gives each item an equal probability of being selected resulting in random sample.
- (ii) **Systematic sampling:** When sampling frame is available in the form of a list, sampling process starts by picking some random point in the list and then every n^{th} element is selected until the desired number is secured. Ex: select every 15th name on a list, every 10th house on one side of a street etc.

(iii) **Stratified sampling:** If the population is not a homogeneous group, then it is stratified into a number of non-overlapping sub-populations or strata and sample items are selected from each stratum. In 'stratified random sampling' items are selected from each stratum based on simple random sampling.

(iv) **Cluster sampling and area sampling:** It involves grouping the population and then selecting the groups (clusters) rather than individual elements for including in the sample. The sample size must be larger than the simple random sample to ensure the same level of accuracy. Ex: To draw a sample of 450 credit card holders from a population of 15,000 credit card holders of a departmental store, the list of 15,000 card holders are formed into 100 clusters of 150 card holders each. Three clusters are selected for the sample randomly.

Area sampling is used when the total geographical area of interest is big one and list of the population is not there. In this, the total area is first divided into a number of smaller non-overlapping areas, called geographical clusters, then a number of smaller areas are randomly selected, and all units in these small areas are included in the sample.

(v) **Multi-stage sampling:** It is the further development of cluster sampling. This technique is used for big inquiries, such as, large geographical areas like an entire country. Under multi-stage sampling the first stage may be to select large primary sampling units such as states, then districts, then towns and finally certain families within towns. If the technique of random-sampling is applied at all stages, the sampling procedure is called as **multi-stage random sampling**.

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

(vii) **Deliberate sampling:** This is a type of non-probability sampling. This involves purposive/deliberate selection of particular units of the universe for constituting a sample which represents the universe. When the elements of the sample are selected based on the ease of access, it is called **convenience sampling** and may give biased results when the population is not homogeneous. Ex: gasoline buyers, selecting a fixed number of petrol stations and conducting interviews at these stations. In **judgement sampling** the researcher's judgement is used for selecting items of the sample as representative of the population. Ex: a judgement sample of college students, taken to collect reactions to a new method of teaching.

(ii) **Quota sampling:** It is a form of non-probability sampling. In this, the cost of taking random samples from individual strata is so expensive that interviewers are given quota to be filled from different strata, the actual selection of items for sample being left to the interviewer's judgement. The size of the quota for each stratum is proportionate to the size of that stratum in the population.

In **mixed sampling** several methods of sampling are used in the same study. One should consider random sampling to eliminate bias and sampling error can be estimated. Purposive sampling is considered desirable when the universe happens to be small and a known characteristic of it is to be studied intensively, or for convenience and low costs.

6. Collecting the data: There are several ways of collecting the data, the researcher should select one of these, taking into consideration the nature of investigation, objective and scope of the inquiry, financial resources, available time and the desired degree of accuracy, ability and experience of the researcher.

Primary data can be collected either through experiment or through survey. In the experimental method, the researcher conducts the experiments, observes some quantitative measurements, with the help of

which he examines his hypothesis. In the case of a survey, data can be collected by any of the following ways:

(i) **By observation:** In this, the collection of information is by way of investigator's own observation, without interviewing the respondents. The information obtained relates to what is currently happening and is not complicated by attitudes of respondents. This method is expensive, the information provided is very limited and not suitable when large samples are needed.

(ii) **Through personal interview:** The investigator seeks answers to a set of pre-conceived questions through personal interviews carried out in a structured way where output depends upon the ability of the interviewer.

(iii) **Through telephone interviews:** In this, the researcher contacts the respondents on telephone for collecting information. This is used in industrial surveys, in developed regions, when there is a very limited time.

(iv) **By mailing of questionnaires:** Questionnaires are mailed to the respondents with a request to return after completing the same. It is commonly used method in economic and business surveys. Before applying this method, a Pilot Study for testing the questionnaire is conducted to reveal the weaknesses of the questionnaire. It must be prepared very carefully, to collect the relevant information effectively.

(v) **Through schedules:** In this, the enumerators are appointed, given training, and are provided with schedules containing relevant questions. Data are collected by filling up the schedules by enumerators on the basis of replies given by respondents.

7. Execution of the project: The researcher should see that the project is executed in a systematic manner and in time so that the data collected would be adequate and dependable. If the data are to be collected through interviewers, arrangements should be made for proper selection and training of the interviewers. Watch carefully for unanticipated factors in order to keep the survey realistic and under statistical control, so that the collected information is in accordance with the pre-defined standard of accuracy.

8. Analysis of data: After the data have been collected, researcher should classify the raw data into some purposeful and usable categories. Editing is done to improve the quality of the data. Coding operation is done, to transform the categories of data into symbols. After coding, tabulation is done, wherein the classified data are put in tables using computers to save time. Analysis work after tabulation is done by computing various percentages, coefficients, etc., by applying statistical formulae and subjected to 'tests of significance' to determine with what validity data can be said to indicate any conclusions. Ex: The analysis of variance is used in analysing whether three or more varieties of seeds grown on certain fields yield significantly different results or not.

9. Hypothesis-testing: Hypotheses, formulated earlier, are subjected to various statistical tests such as Chi square test, t-test, F-test, depending upon the nature and object of research inquiry, and the tests will result in either accepting or in rejecting the hypothesis. If the researcher had not formulated hypotheses, generalizations established on the basis of data are stated as hypotheses to be tested by subsequent researches.

10. Generalisations and interpretation: The real value of research lies in its ability to arrive at certain generalisations (build a theory). If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalization. If the researcher had no hypothesis to start with, he explains his findings on the basis of some theory. It is known as **interpretation**.

11. Preparation of the report or the thesis:

(Q: Outline the key components of a well-structured research report or thesis. Explain the importance of each section in the overall layout)

Finally, the researcher has to prepare the report of what has been done by him. Important considerations:

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

(i) Preliminary pages: Has title and date followed by acknowledgements and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts given in the report.

(ii) The main text: Has the following,

(a) Introduction: It contains a clear statement of the objective of the research, an explanation of the methodology adopted, the scope along with various limitations.

(b) Summary of findings: It is a summary of findings and recommendations in non-technical language.

(c) Main body of the report: It should be presented in logical sequence and broken-down into identifiable sections.

(d) Conclusion: Towards the end of the main text, researcher should finally sum up the results of his research clearly and precisely.

(iii) The end matter: At the end of the report, appendices, bibliography, i.e., list of books, journals, reports, etc. consulted, Index should be given.

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

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

4. Calculated 'confidence limits' and the constraints considered must be stated.

1.5.1 Criteria of Good Research

(Q: Outline and explain the essential criteria of good research. How do these criteria ensure the validity, reliability, and overall quality of research findings?)

Scientific research should satisfy the following **criteria**:

1. The purpose of the research should be clearly defined.

2. The research procedure used should be described in detail.

3. The procedural design of the research should be carefully planned to yield objective results.

4. The researcher should report with complete frankness, estimate flaws in procedural design.

5. The data should be valid and reliable. The appropriate methods should be used to analyse the data.

6. Conclusions should be confined to those justified by the data.

7. Greater confidence in research is warranted if the researcher is experienced and reputed in research.

The qualities of a good research:

1. Good research is systematic: Research is structured with specified steps in a specified sequence in accordance with the well-defined rules. It uses creative thinking and avoids guessing and intuition in arriving at conclusions.

2. Good research is logical: The research is guided by the rules of logical reasoning and the logical process of induction and deduction. Induction refers to reasoning from a part to the whole whereas deduction refers to reasoning from some premise (fact/principle) to a conclusion.

3. Good research is empirical: The research is related to a real situation and deals with concrete data that provides a basis for external validity to research results.

4. Good research is replicable: This allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

DEFINING THE RESEARCH PROBLEM

In research process, the first and important step is selecting and properly defining a research problem.

1.6 WHAT IS A RESEARCH PROBLEM?

(Q: What is research problem? Enumerate the conditions to be met while formulating the research problem. Identify the components of a research problem.)

Research problem: refers to some difficulty which a researcher experiences in a theoretical / practical situation and wants to obtain a solution for the same. Research problem requires a researcher to find out by which course of action the objective can be attained optimally in a given environment.

A research problem should meet the following **conditions**:

- (i) There must be an individual (or a group or an organisation), 'I', to whom the problem can be attributed. 'I' occupies an environment, 'N', which is defined by values of the uncontrolled variables, Y_j .
- (ii) There must be at least two courses of action, C1 and C2. A course of action is defined by values of the controlled variables. Ex: the number of items purchased at a specified time.
- (iii) There must be at least two possible outcomes, O1 and O2, for the course of action, and there must be at least one outcome that the researcher wants, i.e., an objective.
- (iv) The courses of action available must provide some chance of obtaining the objective, which are not same. Thus, if $P(O_j | I, C_j, N)$ represents the probability that an outcome O_j will occur, then $P(O_1 | I, C_1, N) \neq P(O_1 | I, C_2, N)$.

The **components** of a research problem:

- (i) There must be an individual / group which has some problem.
- (ii) There must be some objectives to be attained at.
- (iii) There must be alternative means (courses of action) for obtaining the objectives.
- (iv) There must remain some doubt in the mind of a researcher with regard to the selection of alternatives.
- (v) There must be some environment to which the difficulty pertains.

1.7 SELECTING THE PROBLEM

(Q: Discuss the main issues which should receive the attention of the researcher in selecting(formulating) the research problem.)

The research problem undertaken for study must be carefully selected by taking help from a research guide and considering following points:

- (i) Overdone subject which is should not be chosen, as it will be a difficult task to find new insight in it.
- (ii) An average researcher shouldn't select a controversial subject.
- (iii) Too narrow or too vague problems should be avoided.
- (iv) The selected research subject should be familiar and feasible so that the related research material and resources are within one's reach.

(v) Consider other criteria such as the importance of the subject, the qualifications and the training of a researcher, the costs involved, and the time factor.

Before the final selection of a problem is done, a researcher must ask himself the following **questions**:

- (a) Whether he is well equipped in terms of his background to carry out the research?
- (b) Whether the study falls within the budget he can afford?
- (c) Whether the necessary cooperation can be obtained from those who must participate in research as subjects?

If the answers to all these questions are positive, one may become sure about the practicability of the study.

(vi) The selection of a problem must be preceded by a preliminary study when field of inquiry is new.

(vii) Finally, the researcher must have passion for work and problem selected.

1.7.1 Necessity of Defining the Problem

(Q: What is the necessity of defining a research problem? Explain.)

The problem to be investigated must be defined unambiguously to discriminate relevant data from the irrelevant ones, to work out the research design well and carry on all the consequential steps involved while doing research smoothly.

Researcher can find answers to following questions only when the research problem has been well defined: What data are to be collected? What characteristics of data are relevant and need to be studied? What relations are to be explored? What techniques are to be used for the purpose?

1.8 TECHNIQUE INVOLVED IN DEFINING A PROBLEM

(Q: Describe fully the techniques of defining a research problem. or

“The task of defining the research problem often follows a sequential pattern”. Explain. or

In the context of defining a research problem, give your comments on the statement: “Knowing what data are available often serves to narrow down the problem itself as well as the technique that might be used.”.)

Defining a research problem properly and clearly in a systematic manner is a prerequisite for any study and is more essential than its solution.

The **technique** for defining the problem has the following steps:

(i) Statement of the problem in a general way: In the beginning, the problem should be stated in a broad general way usually by the guide, keeping in view either some practical concern / scientific or intellectual interest. The researcher must narrow it down and phrase the problem in operational terms considering feasibility of a solution.

(ii) Understanding the nature of the problem: For this, the researcher has to discuss it with those who first raised it in order to find out how the problem originally came about with what objectives. He should keep in view the problem environment and discuss with the experts in the area.

(iii) Surveying the available literature: The researchers should survey and examine all available literature concerning the problem before defining the problem. This is done to find out what data and materials are available, to narrow down the problem and to find the gap in the literature. All these will enable a researcher to move up starting from the existing premise, indicate the type of future difficulties and may suggest new lines of approach to the present problem.

(iv) Developing the ideas through discussions: The researcher must conduct **experience survey**, wherein he would discuss his problem with his colleagues and others who have rich experience in the same/similar area. They help him to sharpen his focus of attention on specific aspects, develop new ideas, formulate general approach to the given problem, techniques that might be used, possible solutions, etc.

(v) Rephrasing the research problem: Finally, the researcher must rephrase the research problem into operational terms which may help in the development of working hypotheses. The following **points** must be observed while defining a research problem:

- (a) Technical terms, with special meanings used in the statement of the problem, should be clearly defined.
- (b) Basic assumptions / postulates relating to the research problem should be clearly stated.
- (c) A straight forward statement of the value of the investigation should be provided.
- (d) The suitability of the time-period and the sources of data available must be considered.
- (e) The scope / the limits within which the problem is to be studied must be mentioned explicitly.

1.8.1 An Illustration

Q:How do you define a research problem? Consider a research problem in a broad general way and apply the techniques for defining it clearly in a systematic manner.

Ans:

Defining a research problem follows a sequential pattern: the problem is stated in a general way, the ambiguities are resolved, thinking and rethinking processes are applied to formulate the problem in specific terms, so that it is a realistic one considering available data, resources and giving way for the development of working hypotheses for solving the problem.

Consider a research problem in general way:

“Why is productivity in Japan so much higher than in India?”

1. Identify the ambiguities in the question:

What sort of productivity is being referred to? With what industries the same is related? With what period of time the productivity is being talked about?

2 . Improve the above problem by removing the ambiguities by rethinking and discussions with the experts: “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?”

3. Further rephrase the problem to put in better operational terms:

“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 differentials between the two countries by industries?”

The researcher must consider the necessary data available, time-period, and all relevant other factors before finally defining a research problem.

References:

Kothari, C.R., 2004. Research methodology: Methods and techniques. New Age International.

(Note: Questions are given for illustrative purpose only)