

## **Module 1 - Research Methodology**

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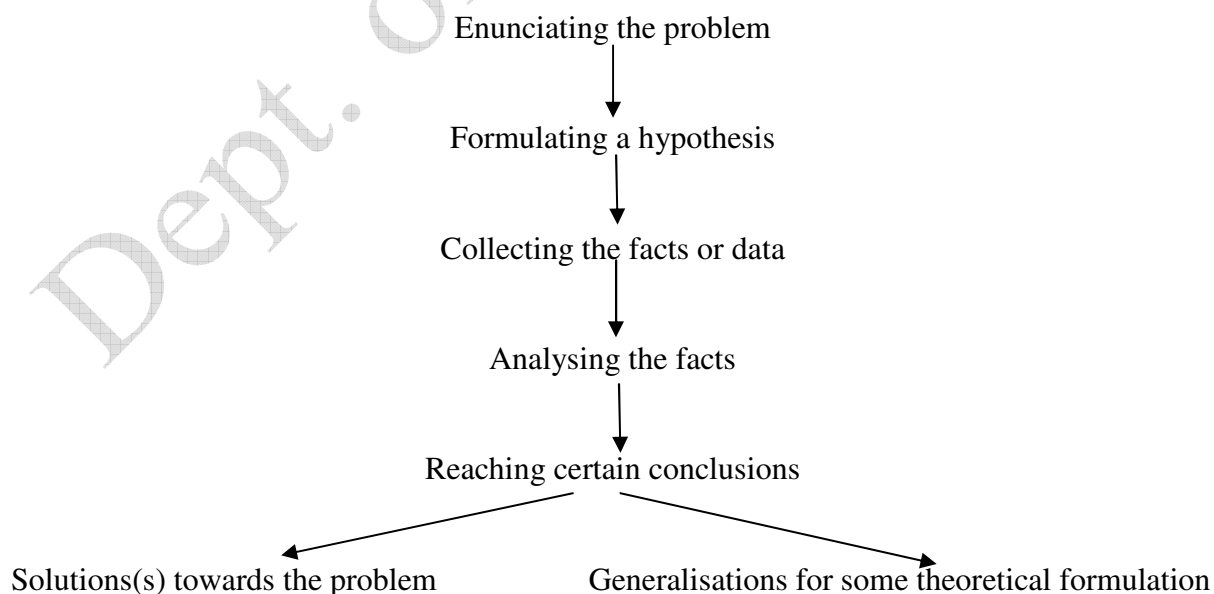
### **Definition of Research**

Research refers to a search for knowledge.

It is a scientific and systematic search for pertinent information on a specific topic.

Research refers to the systematic method of enunciating (clearly stating) the problem, formulating a hypothesis (proposed explanation made on the basis of limited evidence), collecting the facts or data, analysing the facts and reaching certain conclusions either in the form of solutions(s) towards the problem or generalisations for some theoretical formulation.

### **Research Methodology**



### **Objectives of Research**

1. **Exploratory or formulative research:** To gain familiarity with a phenomenon or to achieve new insights into it.
2. **Descriptive research:** To portray accurately the characteristics of a particular individual, situation or a group.
3. **Diagnostic research:** To determine the frequency with which something occurs or with which it is associated.
4. **Hypothesis-testing research:** To test a hypothesis of a causal relationship between variables

### **Motivations in Research**

The factors that motivate people to undertake research are

1. Desire to get a research degree along with its consequential benefits
2. Desire to face the challenge in solving the unsolved problems
3. Desire to get intellectual joy of doing some creative work
4. Desire to be of service to society
5. Desire to earn respect
6. Desire to get better employment
7. Curiosity about new things

### **Types of Research**

1. Descriptive vs. Analytical
2. Applied vs. Fundamental
3. Quantitative vs. Qualitative
4. Conceptual vs. Empirical
5. one-time research or longitudinal research
6. field-setting research or laboratory research or simulation research
7. clinical or diagnostic research
8. exploratory or it may be formalized
9. Historical research
10. conclusion-oriented and decision-oriented

### 1. Descriptive vs. Analytical

**Descriptive research** also called Ex post facto research, includes surveys and fact-finding enquiries of different kinds. It describes the present state as it exists.

In this method the researcher has no control over the variables. He can only report the facts. for example: frequency of shopping, preferences of people, etc.

The methods of research utilized in descriptive research are survey methods of all kinds, including comparative and correlational methods.

In **analytical research**, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the material.

### 2. Applied vs. Fundamental

**Fundamental research** is mainly concerned with generalisations and with the formulation of a theory. For example: 1. Research concerning some natural phenomenon or relating to pure mathematics.

2. Research studies, concerning human behaviour carried on with a view to make generalisations about human behaviour.

“Gathering knowledge for knowledge’s sake is termed ‘pure’ or ‘basic’ research.”

**Applied research** aims at finding a solution for an immediate problem facing a society or an industrial/business organisation.

For example: 1. research aimed at certain conclusions or solution facing a concrete social or business problem.

2. Research to identify social, economic or political trends that may affect a particular institution or the copy research or the marketing research or evaluation research are examples of applied research.

Note: Copy Research is an aspect of advertising research and includes both the pretesting and posttesting of advertisements or commercials in print or broadcast.

### 3. Quantitative vs. Qualitative

**Quantitative research** is based on the measurement of quantity or amount.

It is applicable to phenomena that can be expressed in terms of quantity.

**Qualitative research** is concerned with phenomena relating to quality or kind.

For example: 1. investigating why people think or do certain things (Motivation Research)

2. research designed to find out how people feel or what they think about a particular subject or institution (Attitude or opinion research).

#### 4. Conceptual vs. Empirical

**Conceptual research** is that related to some abstract idea or theory.

It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

**Empirical research** or experimental type of research relies on experience or observation alone, often without due regard for system and theory.

It is data-based research, coming up with conclusions which are capable of being verified by observation or experiment.

It is necessary to get at facts firsthand information, provide a working hypothesis (guess the probable results), get enough facts to prove or disprove his hypothesis, set up experimental designs to bring forth the desired information.

In such research, the experimenter has control over the variables and his deliberate manipulation of one of them to study its effects.

#### 5. One-time research or Longitudinal research

**One-time research** is confined to a single time-period

**Longitudinal research** is carried on over several time-periods.

#### 6. Field-setting research or laboratory research or simulation research

**Field-setting research or laboratory research or simulation research**, depend upon the environment in which it is to be carried out.

#### 7. Clinical or diagnostic research

**Clinical or diagnostic research** Such research follow case-study methods or in depth approaches to reach the basic causal relations.

Such studies usually go deep into the causes of things or events that interest us, using very small samples and very deep probing data gathering devices.

#### **8. Exploratory or it may be formalized**

The research may be **exploratory or it may be formalized**. The objective of exploratory research is the development of hypotheses rather than their testing, whereas formalized research studies are those with substantial structure and with specific hypotheses to be tested.

#### **9. Historical research**

**Historical research** is that which utilizes historical sources like documents, remains, etc. to study events or ideas of the past, including the philosophy of persons and groups at any remote point of time.

#### **10. Conclusion-oriented and Decision-oriented**

Research can also be classified as **conclusion-oriented** and decision-oriented. While doing conclusion oriented research, a researcher is free to pick up a problem, redesign the enquiry as he proceeds and is prepared to conceptualize as he wishes.

**Decision-oriented** research is always for the need of a decision maker and the researcher in this case is not free to embark upon research according to his own inclination. Operations research is an example of decision oriented research since it is a scientific method of providing executive departments with a quantitative basis for decisions regarding operations under their control.

### **Research Approaches**

There are two basic approaches to research:

1. Quantitative approach
2. Qualitative approach

Quantitative approach involves the generation of data in quantitative form.

The data can be analysed.

Quantitative approach can be further sub-classified into

1. Inferential approach
2. experimental approach
3. simulation approach

**Inferential approach** forms a data base from which to infer characteristics or relationships of the data entities.

This is like a survey research where a sample of data is studied and it is then inferred that the data entities have some specific characteristics.

**Experimental approach** has a much greater control over the research environment. Some variables are manipulated to observe their effect on other variables.

**Simulation approach** involves an artificial environment within which relevant information and data can be generated.

This permits an observation of the dynamic behaviour of a system under controlled conditions.

Simulation approach can also be useful in building models for understanding future conditions.

**Qualitative approach** to research is concerned with subjective assessment of attitudes, opinions and behaviour.

Research depends on researcher's insights and impressions.

### **Significance of Research**

Research inculcates scientific and inductive thinking and it promotes the development of logical habits of thinking and organisation.

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

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For example, government budgets

The problems of cultivators, business and industry, working conditions, trade union activities, even the size and nature of defence services are matters requiring research.

Research has its special significance in solving various operational and planning problems of business and industry. Operations research, market research and motivational research are considered crucial in business.

Market research is the investigation of the structure and development of a market for formulating efficient policies regarding 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 maximisation.

Motivational research determines why people behave as they do concerned with market characteristics.

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

The significance of research can also be extended to:

1. Those students who are to write a master's or Ph.D. thesis, research means a career or a way to attain a high position in the social structure.
2. To professionals in research, research is the source of livelihood.
3. To philosophers and thinkers, research leads to the outlet for new ideas and insights.
4. To people in arts and literature, research helps in the development of new styles and creative work.
5. To analysts and intellectuals, research may mean the generalisations of new theories.

## **Research Methods versus Methodology**

### **Research Methods**

All those methods which are used by the researcher during the course of his research are termed as research methods.

Research methods can be put into the following three groups:

1. Methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;
2. Statistical techniques which are used for establishing relationships between the data and the unknowns
3. Methods which are used to evaluate the accuracy of the results obtained.

### **Research Methodology**

Research methodology is a way to systematically and scientifically solve the research problem.

Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.

Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not.

Research methods are part of Research methodology.

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 analyzing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.



## **Research Process**

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

The various steps involved in a research process are not mutually exclusive; nor they are separate and distinct.

They do not necessarily follow each other in any specific order.

However, the following order concerning various steps provides a useful procedural guideline regarding the research process:

- 1. Formulating the research problem**
- 2. Extensive literature survey**
- 3. Development of working hypotheses**
- 4. Preparing the research design**
- 5. Determining sample design**
- 6. Collecting the data**
- 7. Execution of the project**
- 8. Analysis of data**
- 9. Hypothesis-testing**
- 10. Generalizations and interpretation**
- 11. Preparation of the report or the thesis**

### **1. Formulating the research problem:**

The researcher must firstly decide the general area of interest.

Formulating the research problem involves understanding the problem thoroughly and stating the same in meaningful terms from an analytical point of view.

Initially the problem may be stated in a broad general way and then the ambiguities relating to the problem can be resolved.

Then, the feasibility of a particular solution is considered before the formulation of the problem is set up.

### **2. Extensive literature survey:**

Once the problem is formulated the researcher should undertake extensive literature survey connected with the problem.

For this purpose, academic journals, conference proceedings, books, government reports, published or unpublished bibliographies etc.. are to be referred.

The earlier studies, if any, which are similar to the study in hand should be carefully studied.

### **3. Development of working hypotheses:**

After extensive literature survey, researcher should state the working hypothesis or hypotheses.

Working hypothesis is a tentative assumption made in order to test its logical or empirical consequences.

Hypothesis should be very specific and limited to the piece of research in hand because it has to be tested.

#### **Developing a working hypotheses:**

- (a) Discussions with colleagues and experts about the problem.
- (b) Examination of data and records concerning the problem.
- (c) Review of similar studies in the area.
- (d) Investigation involving original field interviews with interested parties .

Some problems do not need working hypotheses, specially in the case of exploratory or formulative researches the hypothesis.

### **4. Preparing the research design:**

The function of research design is to provide relevant evidence with minimal expenditure and effort.

#### **The preparation of the research design involves:**

- (i) the means of obtaining the information
- (ii) the availability and skills of the researcher and his staff (if any)
- (iii) Organization of information
- (iv) time available for research
- (v) finance available for the research.

### 5. Determining sample design:

A sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population.

Thus, the plan to select 12 of a city's 200 drugstores in a certain way constitutes a sample design.

The important sample designs are as follows:

**(i) Deliberate sampling:**

It is also known as purposive or non-probability sampling.

It involves deliberate selection of particular units from the population.

**(ii) Simple random sampling:**

It is also known as chance sampling or probability sampling where each and every item in the population has an equal probability of inclusion.

**(iii) Systematic sampling:** Sometimes it is practical to pick every  $n^{\text{th}}$  element on a list. Sampling of this type is known as systematic sampling.

**(iv) Stratified sampling:** If the population is non-homogeneous, then stratified sampling technique is applied. In this technique, the population is stratified into a number of nonoverlapping subpopulations or strata and sample items are selected from each stratum.

**(v) Quota sampling:**

Quota samples are non-probability samples which are generally judgement samples rather than random samples.

**(vi) Cluster sampling and area sampling:** Cluster sampling involves grouping the population

and then selecting the groups or the clusters rather than individual elements for inclusion in the sample.

Under area sampling we first divide the total area into a number of smaller non-overlapping areas, then a number of these smaller areas are randomly selected and all units in these small areas are included in the sample.

**(vii) Multi-stage sampling:** This is meant for big inquiries extending to a considerably large geographical area like an entire country.

In this, the first stage may be to select large primary sampling units such as states, then districts, then towns and finally certain families within towns.

**(viii) Sequential sampling:** The 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.

#### **6. Collecting the data:**

Primary data can be collected through experiment or through survey.

In an experiment, the researcher records some observations.

In the case of a survey, data can be collected by *observation, personal interview, telephone interviews, mailing questionnaires or Through trained enumerators*

#### **7. Execution of the project:**

The researcher should see that the project is executed in a systematic manner and in time.

#### **8. Analysis of data:**

The analysis of data involves coding, tabulation and then drawing statistical inferences.

#### **9. Hypothesis-testing:**

After analysing the data, the researcher can test the formulated hypotheses earlier.

Various tests, such as Chi square test, *t*-test, *F*-test, have been developed by statisticians for the purpose.

Hypothesis-testing will result in either accepting the hypothesis or in rejecting it.

#### **10. Generalisations and interpretation:**

If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalisation, i.e., to build a theory.

#### **11. Preparation of the report or the thesis:**

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

The layout of the report should be as follows:

- (i) the preliminary pages;
- (ii) the main text
- (iii) the end matter.

The preliminary pages should carry title, acknowledgements, foreword, table of contents, list of figures, list of tables, list of graphs and charts given in the report.

The main text of the report should have:

- (a) Introduction: It should contain objectives of the research, scope of the study, limitations and explanation of the methodology adopted in accomplishing the research.
- (b) Summary of findings
- (c) Main report: The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections including background, methodology and results.
- (d) Conclusions
- (e) Bibliography i.e., list of books, journals, reports, etc., consulted, should also be given in the end.

### **Criteria of Good Research**

1. The purpose of the research should be clearly defined.
2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement.
3. The procedural design of the research should be carefully planned.
4. The researcher should report the flaws in procedural design and estimate their effects upon the findings.
5. The analysis of data should be sufficiently adequate. The validity and reliability of the data should be checked carefully.

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6. Conclusions should be justified by the data and limited to those for which the data provide an adequate basis.
7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity.

**The qualities of a good research are**

1. Good research is systematic
2. Good research is logical
3. Good research is empirical: Research is related to real situations and deals with concrete data that provides a basis for external validity.
4. Good research is replicable

**End of Module 1**

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