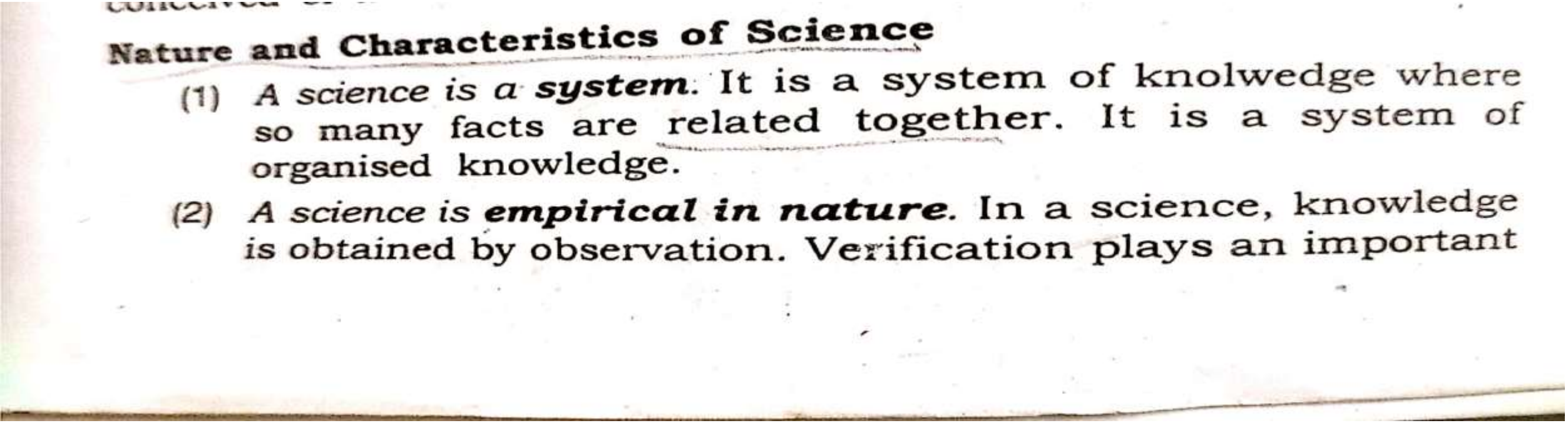
RESEARCH METHODOLOGY

Science

Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe



Nature and Characteristics of Science

(1) *A science is a* ***system***. It is a system of knolwedge where so many facts are related together. It is a system of organised knowledge.

(2) *A science is* ***empirical in nature***. In a science, knowledge is obtained by observation. Verification plays an important

role in science. Verification is based on the facts which we observe and experience.

(3) *A science is based on* ***critical discrimination***. It is objective and impartial.

(4) *A science* ***deals with the general nature*** *of things and events,* and it consists of general explanations and principles.

(5) *A science is a* ***body of seasoned knowledge***. Laws are formulated in a science on the basis of reflection and reasoning.

(6) *A science is* ***self-corrective in nature***. Whenever new facts are found, the old conclusions are revised, if the new facts demand so. It is based on systematic doubt and search for new facts.

(7) *A science is* ***objective in nature.*** A science does not depend on subject attitudes like feeling, temperature, bias, etc. A science takes facts as they are in an impartial manner. A science is neutral and free from any prejudice.

(8) *A science* ***formulates laws***. Facts are explained with reference to laws. Laws are explained by constructing theories which relate the laws to a coherent system.

(9) Another feature of science is *its* ***function of prediction***. On the basis of laws, a science can predict the happening of certain events.

Scientific Method

L.L. Bernard has defined the term 'Scientific Method' as "Science may be defined in terms of its major process that takes place within it. These are testing, verification, definition, classification, organization including predication and application."

George A : According to *Lundberg* "the scientific methods consist of systematic observation, classification, and interpretation of data".

of new tools, concepts and theories.

Characteristics of Research

Since definitions of this sort are rather abstract, a summary of some of the *characteristics of research* may help to clarify its sprit, meaning, and methodology.

(a) Research is directed towards the solution of a problem.

(b) Research emphasises the development of generation of principles or theories that will help in predicting future occurrences.

(c) Research is based upon observable experience or empirical evidence.

(d) Research demands accurate observation and description.

(e) Research involves gathering new data from primary or first hand sources or using existing data for a new purpose.

(f) Research activities are more often characterised by carefully designed procedures, always applying rigorous analysis.

(g) Research requires expertise, *i.e.*, skill necessary to carry out investigation, search the related literature and to

understand and analyse the data gathered.

(h) Research strives to be objective and logical, applying every possible test to validate the procedures employed, the data collected and the conclusions reached.

(i) Research involves the quest for answers to unsolved problems.

(j) Research requires courage.

(k) Research is characterised by patient and unhurried activity.

(l) Research is carefully recorded and reported.

Difference between social science and natural science research

of life and the ... differences in brief.

Social Science Research and Natural Science Research

Social Science Research	*Natural Science Research*
1. In social science research we commonly find "subjectivity"	1. In natural science, objectivity is generally seen.
2. Personal prejudices and bias may distort the data and hence the conclusion.	2. Personal prejudices and bias do not affect the data or result.
3. A social scientist's laboratory is society or world at large and his equipment is human being. He has no control over his laboratory, his equipments or factors which influence them.	3. Natural scientist works in laboratory where he can control the conditions and environments.
4. The results of investigation are at best generalisations.	4. Results of investigations are well-defined natural laws.
5. Social phenomena are known as symbolically through words as welfare, tradition, customary.	5. Physical phenomena may be known directly through senses (eyes, ear, etc.).

6. The data obtained in social sciences may vary simultaneously.	6. The data obtained in physical sciences are more reliable.
7. The rate of progress of social science research is less due to less finance available.	7. The rate of progress in scientific research is high due to finance available.

Objectivity in research

However, there are many *sources and possibilities of bias* in a social enquiry. The following are the different types of bias :

(a) There may be the personal bias of the researcher.

(b) The informer may himself be biased.

(c) There may occur sampling bias in the collection of data due to unrepresentative sampling.

(d) The questionnaire may be biased.

(e) There may be a faulty method of data collection, and the data themselves may be faulty or biased.

(f) Fault analysis and generalisations may also be due to personal bias.

(g) There may be biased common sense.

(h) The attitude and aptitude of the researcher may also be biased either against or in favour of a notion or theory.

Inductive Method

Advocated by the German Historical School, this method is also called historical, empirical and *'aposteriori'* method. This school used economic history as the basis for developing economic science, in which process, they used to draw general conclusions from history. These conclusions are tested and verified with reference to the economic facts. Hence, the inductive method involves a logic in which, we mount from particular to general. This method has two forms namely : i. Experimentation Method and ii. Statistical Approach . Under the former, the inductive method tests the generalisation and conclusions arrived at using the deductive logic and the latter is used for framing laws and generalisations based on the voluminous facts collected from the various segments of the economy. These two methods are discussed in detail below.

Merits of Inductive Method

1. This method helps to arrive very reliable generalisations and conclusions as this is based on the collection and analysis of the individual facts and conducting experiments.
2. Policy formulation can be properly done only with this method than with the deductive method.
3. Unlike the deductive method, this method is based on scientific procedure enhancing its reliability. For example under the statistical approach, once the sample is selected properly, the conclusions are bound to be accurate.
4. This method enjoys universal application than the deductive method.

Demerits of Inductive Method

1. Though this method is based on statistical procedure, yet, statistical results are not conclusive evidence. Especially, when statistics is applied while studying human behaviour, the extent of accuracy is only an expectation and not a reality.
2. Detailed data collection is not always possible under all circumstances. Further, sampling procedure adopted covers only a few elements selected at random, based on the probability theory. Hence, the productive power of any statistical model based on sample data is always subject to dispute. Hence, inductive method is not free from this basic defect.

Deductive method

This method involves the formulation of generalisation first and based on them to derive inferences, which in turn will form the basis for policy formulations. For example, the law of diminishing marginal utility states that as an individual consumes more and more units of particular commodity he will get less and less utility from that commodity. From this generalisation, it could be inferred that people with large stock of money [rich people] will derive lesser utility from money and people with smaller stock of money [poor people] will derive higher utility from money. Hence, when the government wants to devise its tax policy, it should not make the taxation proportional. This is because, rich with large stock and lesser utility for money will be affected less while the poor will be affected more. In other words, the burden of taxation will hit the poor more than the rich. Hence the taxation should be progressive.

Merits of Deductive Method

1. This method is very simple because it starts with certain simplified assumptions and on that basis several inferences are drawn.
2. The scope of conducting experiment in economics is very limited. In such a circumstance this method is an ideal way of analysis.
3. This method may be considered as reliable, as it makes liberal use of logical derivations and mathematics, and the conclusions drawn are likely to be more accurate and reliable.

Demerits of Deductive Method

1. This method cannot lead to realistic policies as the fundamental propositions may not hold good under all circumstances. If the assumptions associated with the fundamental premises are wrong then the logical derivation of differences may not be correct.
2. The advocates of this method have not thought it necessary to test the conclusions arrived at on the basis of this method. Hence empirical evidence is lacking to test the conclusions based on this method.

Steps in Scientific Method

There are five major steps in scientific method. They are : (1) Planning, (2) Research design, (3) Data gathering, (4) Data analysis and (5) Interpretation of results.

1. *Planning for Research :* Useful and meaningful social research should be planned carefully in every respect, including what to do with the information after it has been gathered. Planning involves knowing beforehand not only exactly what you are going to do and how you are going to do it, but also what you expect to find out and possible alternative explanation of the results.

2. *Research Design :* The term research design refers to the process of planning an entire study so that specific elaborations may be tested. It requires that you know what you wish to know in advance.

3. *Data Gathering :* Once a social researcher has already formulated his research design, he must decide how to gather the information called for by that design. There are two basic types of data gathering. Data can be gathered from primary sources; such techniques include participant and direct observation and survey techniques such as interviews, questionnaires, attitude scales. No matter how collected, data must be valid, reliable and representative if sound conclusions are to be based on them.

4. *Data Analysis :* Once the data has been gathered, it will be

complex phenomena. Different forces are working which affects the social unit. Hence, an integrated study is needed to understand the social unit under consideration.

4. Qualitative Analysis : This method is known as qualitative analysis. It does not just merely collect the information concerning all aspects of life but also depend on perception and gives us a clear insight into life. For example, in this method, we not only study how many crimes a man has committed but also investigate the factors which compelled him to commit a crime when we study a man as a criminal.

5. Interrelationship can be Studied : Different factors can act and react upon each other. So does the casual factors, also one has to take into consideration these mutual interrelationship of casual factors.

6. Behaviour Pattern can be Studied : The case study being a qualitative tool of analysis, it studies not only the cause and effect relationship of the factors but also the reasons for change in the behaviour of the unit concerned. For instance, what are the reasons which causes increase in crimes in a particular social unit.

7. It Helps to Generalise Social Science : The case study method is helpful in testing the hypothesis and thereby building the generalised social science to get the knowledge richer and richer.

8. Flexible Method : The case study method is flexible in nature. The researcher has complete freedom to change or omit or distort the variables under study.

9. Mutual Interrelationship can be Studied : In case study method an effort is made to know the mutual interrelationship of casual factors.

10. Complementary Study : The case study method stresses the need of complementary study for getting proper solution to the problems.

Definition of Case study

Pauline V. Young has defined it in his book entitled, 'Scientific Social Surveys and Research', as "a comprehensive study of a social unit, be that unit a person, a group, a social institution, a district or community".

determine the

Characteristics of the Case Study Method

In modern social research, case study method is extensively used to meet different problems in different disciplines. It is a 'qualitative' technique which was once thought to be the exclusive characteristic of the case study approach. Following are the important characteristics of the case study method.

1. *Single Unit Analysis :* The case study method is generally known as 'single analysis method'. Under this method, one single social unit or more of such units can be studied for the study purpose. One single unit means single person, family, institution or community may be studied under this head. For instance, study of a particular bank comes under the purview of case study method.

2. *Intensive Study :* The method is generally applied to study a particular unit intensively. Generally, this study covers a long period of time to know the history of the unit concerned. For instance, if a bank is studied as the case study then a period of 5 to 10 years is taken for consideration. This gives us historical evolution of the bank in question.

3. *Integrated Study :* In this method, one has to make a complete study of the social unit covering all facts. A social unit always has

1. **Historical Approach**

As the name suggests, in this approach historical data is given importance to undertake analysis and interpret the results. Following this approach, a researcher would collect past data for his research. This is because, such historical data or experiences are not repetitive. That is accurate reproduction of historical events or achievements cannot be repeated, as is possible in the case of a scientific experiment. For example, one can only collect information about First World War and cannot recreate the First World War. But it is possible to produce oxygen in a laboratory any number of times repeating the experiments conducted in the past. A scholar using this approach has to depend on libraries for referring to the magazines or periodicals for collecting data. This process requires enormous patience on the part of the researcher. That is, he has to locate the sources of data, then study the data available, then select the data he requires and then record the data available. Each one of these stages is time consuming. However, this approach enables a researcher to develop his understanding of the topic by analysing the historical data.

Types of Scaling Technique

1.Attitude scales which are used to measure the morale, Character, social participation , social responsibilities, frustration fatigue optimism, pessimism ect,

2.Rating scales are used for the purpose of measuring socio economic status ,social status etc.

Meaning of sample

A sample is a smaller representation of a large whole

Sampling methods

Probability Sampling Methods (Random)	Non-probability Sampling Methods (Non-Random)
(a) Simple random sampling (unrestricted random sampling) (b) Stratified Sampling (i) Stratified Sampling (ii) Systematic Sampling (iii) Cluster & Area Sampling or Multiphase/Stage Sampling (iv) Sequential Sampling	(i) Accidental Sampling (ii) Quota sampling (iii) Purposive Sampling (iv) Convenience Sampling

Reference books

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2)Research Methodology ,P.Ravilochanan,Margham Publication,Chennai.

3)Research Methodology: Methods and techniques, C.R.Kothari, New age Publications,New Delhi.