

Quadrant II – Notes

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Scientific Methods of Research

Process of Scientific Method

There are five steps in scientific method

- 1) **Planning of 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 what you are going to do, how you are going to do, and also what you expect to find out .
- 2) **Research Design:** The term research design refers to the process of planning an entire study so that so that specific elaborations may be tested.
- 3) **Data Gathering:** Once a social researcher has already formulated his research design, he must decide how to gather data called for by that design. Data can be gathered from primary source. i.e. through observation method, interviews, questionnaire etc or through secondary source, i.e. from journals, reports and other publications.
- 4) **Data Analysis:** data analysis involves complicated statistical manipulation, and the use of computers. It includes tabulation, counting, cross-tabulation through which different variables are organised and compared.

5) **Interpretation:** After the data has been quantified and ordered through analysis, the researcher makes an interpretation of the results.

Criteria of Scientific Method

i. **Empiricism:-** Researcher relies upon his experience through senses more than on anything else.

He decides the truth of any statement on the basis of his experience.

He is not ready to accept anything which is not directly or indirectly related to experience.

Experience is the source of knowledge and also the ultimate criterion.

The researcher insists that every statement or a conclusion drawn from it must be tested on the experimental results. This is known as empiricism.

This does not mean that scientist relies solely upon experiences.

He is not ready to accept each and every experience he gets. He knows that senses can deceive man.

For e.g. any rod half immersed in water looks broader and bent. Similarly the Sun looks larger at sunrise and sunset and smaller at noon.

- The researcher knows that these experiences are inconsistent with his other experiences.
- He knows that there is order and consistency in Nature.
- He tries to bring order and consistency in all his experiences. This is done through research
- In this way experience and reason help each other and through their combination, science originates and also develops.

ii. **Objectivity:** Objectivity is the second criteria of scientific method.

- Objectivity means to see a thing as it is and not as it looks.
- It is very difficult to be objective especially for a person who is in social sciences.
- There is a chance of his observation and conclusion being subjective because of his personal passions, desires, bias etc.

- Objectivity means whoever may observe, wherever one may observe the record of the observation must be the same.
 - In social science this objectivity is not to attain. For example, if a scientist studying the effects of nationalisation of industries or nationalisation of banks is not objective his inferences will not be valid.
 - If he is biased towards capitalism or if his interests are rooted in capitalism, he will not be able to see the benefits of nationalisation; he will only see its defects.
 - On the other hand, if he is biased towards communism, he will not be able to see the defects of nationalisation he will see its benefits.
 - To make a realistic assessment of nationalisation a scientist is required to be objective.
- iii. **Neutrality:** A researcher is required to be neutral about finding of his research.
- He must take care that his observations, analysis and conclusion are not influenced by his personal bias and opinions.
 - Suppose a scientist wants to test a proposition (such a proposition is called a hypothesis).
 - For testing the hypothesis, he collects data.
 - Now it is possible that his data may go against proposition under study. In such a situation he should be ready to give up the hypothesis not the data.
 - Neutrality means a scientist should be ready to accept the conclusion of his experience even if they are against his expectations
 - A scientist should be clear like water.
 - Researcher should be ready to accept the conclusion which he arrives as a result of his experiment or example, suppose an economist collects data to see whether policies adopted by our Government since independence have contributed towards social justice or not.
 - If on the basis of his data he arrives at the conclusion that they have not contributed to social justice, he should be ready to accept this result even if it is in favour of the ruling party.

iv. **Generalisation:** the object of a research is to control nature through his understanding.

- For controlling nature he needs to know the law of nature.
- For instance, suppose, he finds that when production of a useful commodity decreases its price increases; when production of another useful commodity decreases, its price also increases.
- When production of a third useful commodity decreases, its price also increases.
- From these he states a general rule that 'when production of useful commodity decreases, its price increases. Such a generalisation is the soul of science.
- A scientist is more interested in knowing that a particular thing always occurs in a particular situation than in knowing that a particular thing occurs in a particular situation.
- The objective of scientist is to state a general rule from the study of particulars.
- Generally, we get particular individual experiences. These experiences are restricted by time and place; what we observe takes place at a particular place and at a particular time.
- From such events we formulate laws which are eternally true i.e. true at all times and at all places.
- This process of obtaining general rules from particular cases is called generalisation.

v. **Verifiability:** Verifiability is another criterion of Scientific method.

- In science everybody has an authority to verify the laws derived by a scientist.
- Observation collected, laws stated, theories put forward by one scientist are verified by another scientist.
- No laws or no theory is accepted by scientist unless they are convinced of its validity or it is verified.
- In science nobody's authority is accepted, however, great that scientist may be.

- The observation, verification, reason is the final authority.
- When a law or theory is verified by other scientists then only that law or theory is accepted.
- The law of demand and supply, the law of diminishing returns, the law of diminishing marginal productivity are well established laws because they are verified again and again at different places and at different times by different scientists.
- In fact, science grows because of verification.
- In science new information is collected, new observations are recorded and new laws are formulated this is a continuous process.
- If the new observations are consistent with old laws, the laws are strengthened.
- If the new observations are not consistent with the old laws, a scientist tries to formulate new laws consistent with new observation.
- In this way through verification science becomes more and more powerful.