4. Steps of Scientific Methodology in Social Science

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4.1 Introduction:

Human is a part of animal and social kingdom and both kinds of kingdom directly affected human life and both kingdoms are changeable with many dimensions. In changes of human life some changes happened naturally, and some changes are made by human because he can't survive without positive changes in life. All kinds of changes in human society that changes divided into two forms, one is positive changes and second in negative changes. Positive changes make human life easy and negative changes make difficulty in human life. Research is needed of both kinds of changes, positive and negative because positive changes want innovation and innovation comes from research and at the condition when the human search solution for making negative changes/problems positive for society than also human want research, their conclusion, data based suggestion. Generally, all subjects are divided in three discipline life sciences, social sciences and humanity and all above disciplines have different way/dimensions of research. Life science depends on laboratory, social science depends on field work and humanities depend on library work. Major characteristics of research are ratability, objectivity and validity. These above merits or need of research are easy for life science related research work, but comparatively that are more difficult for social science related research because the whole society is laboratory for social science and each respondent of the study group is objecting. Society is changeable than human behaviors naturally changeable and all data depend on answer of the respondents. Scientific method is a solution about above problem that helpful for make reliability, validity and objective in our research work.

4.2 Research:

"Research is ideally the careful, unbiased investigation of a problem based in so far as possible upon demonstrable facts involving refined distinctions, interpretation and usually some generalization."

(C. V. Good, Dictionary of Education, p.346)

"Research is the manipulation of things, concepts of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge whether that knowledge aids in the practice or in an art."

(Encyclopedia of Social Sciences, p.281)

4.3 Steps of Scientific Research:

Scientific research methodology conduct research work step by step.

"What is called scientific method differs in encouraging and developing the almost possible doubt, so that what is left after such doubt is always supported by the best available evidence."

(M. R. Cohen and E. Nagel, An Introduction to Logic and Scientific Method, p.195)

"Science is a method in which any facts are dealt with and some useful knowledge derived the reform. The material of science is co-existence with the whole physical universe, not only that universe as it now exists, but with its past history and all life therein. The man who classifies facts on any kinds, whatsoever, who sees their mutual relations and describes their sequences, is applying scientific method and is a man of science."

(Karl Pearson, Op. Cit, pp. 12-13)

Scientific research methods, especially in the field of social science conduct research work I follow given steps:

4.3.1 Selection of Problem:

Selection of Problem is first, but the major part of scientific research because whole research work focused on the problem of research. Selection of problem is also known as statement of the problem. There are lots of sources which are helpful for a selection of problems like a census of India, any burning social phenomena, heading of newspapers and sometime some government and non-government institution also propose a research problem. Before any researcher select his/her research topic, the researcher wants to sure some future phenomena like availability of the study group and he/she will get data about the proposed research topic.

Review of literature and selection of problem get not a neat fix place in steps of scientific method sometime researcher reviews some secondary sources like research paper, books, etc.

Than researcher make title for research, at this condition reviews or literature placed first step of the scientific method. The researcher wants to take some important precaution when he/she finalized research title, which are:

a. Any local terminology not placed in the title.
b. Number, age group, numerical word and ethical issue related terminology not mention in the research topic.
c. The researcher could be aware about special references like place, study group not places as subtitle of research topic.

4.3.2 Review of Literature:

Review of literature is also a major part of scientific research. Review of literature also knows as gap of study because it shows research problem which selected from the researcher is how frequent and also shows the status of this particular topic or problem like who and how a research conducted on this particular topic?

"A literature review is a study – or, more accurately, a survey – involving scholarly material, with the aim to discuss published information about a specific topic or research question. Therefore, to write a literature review, it is compulsory that you are a real expert in the object of study. The results and findings will be published and made available to the public, namely scientists working in the same area of research."

(Online source: https://scientific-publishing.webshop.elsevier.com/research-process/importance-literature-review-research-writing)

Generally, Review of literature helps a researcher in follows area:

a. Review of the literature shows how a researcher conduct and design research work because when a researcher search and review some research paper, synopsis, books, newspaper and other secondary sources than researcher get lots of ideas for research topic like which kind of research design taken by previous work? Which research tools/technique was useful for it? Which area and people could be suitable for research? Etc. And also researcher gets knowledge about previous work's objective and conclusion. So, on the above basis researcher design research framework and also change his work if already had done something by him.

b. Review of literature also helps when a researcher wants to defend his result/conclusion. Which is based on his primary data because generally a researcher concludes his work from his primary data, but the authenticity of researcher data could be questionable like a researcher shows in a table which represents an educational level or literacy rate of respondents. And table shows 50 percent respondents literate and 5o percent respondents are literate. According to this figure researcher generalized this is a good condition for respondents. But in this condition 50 percent could be better and could be bad. The researcher can make his above statement, but when the researcher has an authentic review like if the researcher have census of data of his study area which shows literacy rate of his study area is 30 percent and research got literacy rate is 50 percent in his sampling than he can make their statement 50 percent literacy rate is good condition in the study group. So, review of literature helps researcher for defending his conclusion.

4.3.3 Objectives:

Set of objectives is very sensitive stage for a researcher because whole research work, selection of research area, selection of research technique, the process of data collection, data analysis and report writing etc. depend on objective of research. The objectives of researcher perform as a guide for researcher and also objectives of aware researcher about limitation of research. Researcher want to follow some precautions at the time of objectives setting for research:

a. Objective of research must relate to the topic.
b. No longer statement mentioned in the objective.
c. Any objective, there data is not collected by the researcher are not mentioned in objective.
d. The objectives are short and with well-defined terminologies.

4.3.4 Formation of Hypothesis:

The hypotheses are also working like objective. Hypothesis makes guideline for the researcher because hypothesis known as pre-conclusion that require check on the basis of data. The hypothesis is the most important step for exploration of the cause effect relationship between different variable.

"A hypothesis is a tentative generalization, the validity of which remains to be tested. In its most elementary stages, the hypothesis may be any hunch, guess, imaginative idea or intuition whatsoever which the basis of action or investigation becomes."

(G. A. Lundberg, Op. Cit. p.9)

Generally, three type of hypothesis used by researcher which are; hypothesis sating existing empirical uniformities, hypotheses concerned with complex ideal-types, hypotheses related with analytical variables. When researcher formulate his/her hypothesis than researcher want to take some important precautions like conceptual clarity, specificity and precision, empirical referents, simplicity, related to available techniques and also related with theory.

4.3.5 Selection of Research Method and Techniques:

Selection of research method and techniques are affected by title, objective, hypothesis of research and other side research method and technique put an effect on data collection, analysis and discussion of tables. Research method and technique is mid stage of scientific research method. In the nature research method and related technique are divided in two ways, first is quantitative and other is qualitative research. Firstly, selection of research method depends on selected research design by a researcher. Generally, four research designs are used in the field of social science which are;

a. Descriptive Research Design
b. Explorative Research Design
c. Explanatory Research Design
d. Experimental Research Design

Secondly, sampling is a major stage of research because the selection of type of sampling, number of samples is very scientific criteria, especially when a researcher want to statically analysis in research than statically analysis depend on number of sampling like T-test etc.

"Sampling (statistical) is the process or method of drawing a definite number of aggregate from which the sample is taken."

(H. P. Fairchild (ed.), Dictionary of Sociology, p.265.)

Generally sampling divided in two types one is random sampling and second in non-random sampling.

a. Random Sampling:
b. Non-Random Sampling:

Research Technique:

Research techniques work under research method. Research techniques are changeable means it could be change according to the nature of research like if the study group is approachable for a researcher than researcher use schedule and if that is not possible than researcher can use the questionnaire. Generally, follows research technique are used in social science research by researchers:

A. Questionnaire: "Fundamentally, the questionnaire is a set of stimuli to which literate to which literate people are exposed in observe to observe their verbal behavior under these stimuli."

(G. A. Lundberg, Social Research, p.183)

"It does constitute a convenient method of obtaining a limited amount of information from a large number of persons or form a small selected group which is widely scattered,"

(Wilson Gee, Social Science Research Methods, p.314)

Types of Questionnaire:

* On the basis of Information

    a. Questionnaire of Facts
    b. Questionnaire of opinions

* On the basis of Structure

    a. Structured Questionnaire:

        * According to purpose
        * Supportive Questionnaire

    b. Non-Structured Questionnaire: Open and Symbolic

* On the basis of Nature of Question

    a. Closed Questionnaire: Like tick type question.
    b. Open Questionnaire: Long question open for answer.
    c. Mixed Questionnaire: Tick/objective and long question
    d. Pictorial Questionnaire: For illiterate respondents

B. Schedule: "The schedule is the name usually applied to a set of questions which are asked and filled in by an interviewer in face-to-face situation with another person."

W. J. Goode and P. K. Hatt, Methods in Social Research, p.133.

Types of Schedule:

According to G A Lundberg

a. Schedule for collection of objective facts
b. Schedule for study of attitudes and opinions
c. Schedule for study of Status and Functions

According to P V young

a. Observation schedule
b. Rating schedule
c. Document Schedule
d. Institutional-Survey Schedule

On the basis of Research

a. Observation schedule
b. Rating schedule
c. Institutional-Survey Schedule
d. Interview Schedule
e. Document Schedule

C. Case Study: "Case study is a way of organizing social data so as to preserve the unitary character of social object being studied. Expressed somewhat differently, it is an approach which views any social unit as a whole."

(W. J. Goode and P.K. Hatt, Methods in Social Research, p.331)

Types of Case Study:

a. Study of an individual
b. Study of a group or community

D. Interview:

"The Interview may be regarded as a systematic method by which one person enters more or less imaginatively into the inner life of another, who is generally a comparative stranger to him."

P. V. Young, Scientific Social Surveys and Research, p.242.

Types of Interview:

A- Classification according to the Number of Informants

- a. Personal Interview
- b. Group Interview

B- Classification on the basis of Objectives

- a. Diagnostic Interview
- b. Treatment Interview
- c. Research Interview

C- Classification on the basis of contact

- a. Direct Interview
- b. Indirect Interview

D- Classification on the basis of Formality

- a. Formal Interview
- b. Informal Interview

E- Classification on the basis of Methodology

- a. Focused Interview
- b. Non-directed Interview
- c. Repetitive Interview

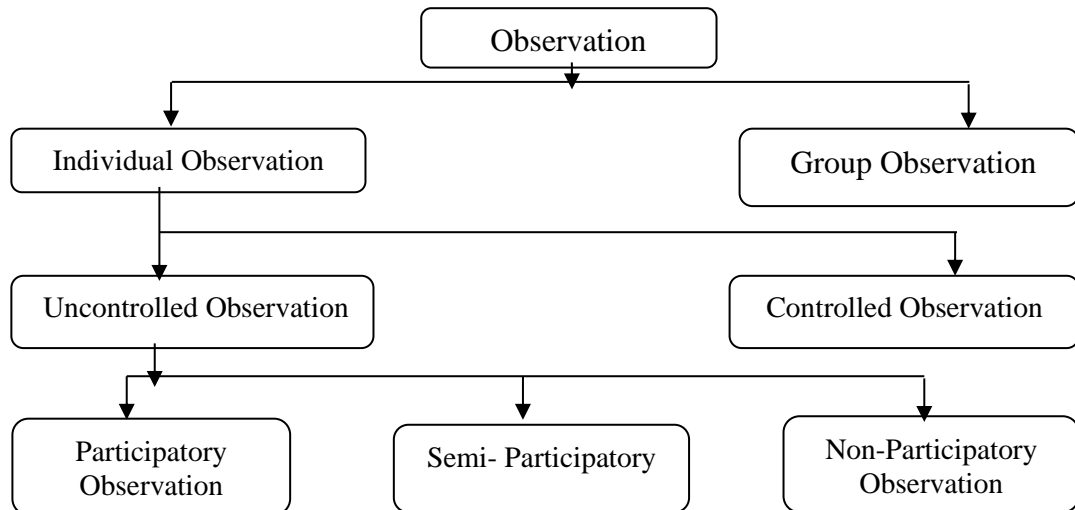F- Classification on the basis of Structuring

- a. Poll-type Interview
- b. Open Interview
- c. Unstructured Interview

E. Observation:

"Observation-a deliberate study through the eyes- may be used as one of the methods for scrutinizing collective behavior and complex social institutions as well as the separate units composing a totality."

P. V. Young, Scientific Social Surveys and Research, p. 199

Types of Observation:

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                            ┌──────────────────┐
                            │   Observation    │
                            └──────────────────┘
                   ┌───────────────────┴───────────────────┐
                   ▼                                         ▼
      ┌──────────────────────┐                 ┌──────────────────────┐
      │ Individual Observation│                 │  Group Observation   │
      └──────────────────────┘                 └──────────────────────┘
                   │                                         │
                   ▼                                         ▼
      ┌──────────────────────┐                 ┌──────────────────────┐
      │Uncontrolled Observation│                │Controlled Observation│
      └──────────────────────┘                 └──────────────────────┘
          ┌────────┼────────────────────┐                  │
          ▼        ▼                     ▼                  ▼
  ┌─────────────┐ ┌──────────────────┐ ┌────────────────────────┐
  │Participatory│ │ Semi-Participatory│ │   Non-Participatory    │
  │ Observation │ │                  │ │     Observation        │
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F. Content Analysis:

"Systematic content analysis attempts to define more causal description of the content, so as to show objectivity the nature and relative strength of the stimuli applied to the reader or listener."

(Waples and Berelson Quoted in Berelson and Janowitz (eds.), Reader in Public Opinion and Communication, p.26)

4.3.6 Data Collection:

Process or step of data collection is the backbone for every research which is depending on primary data. Data collection in society is a complex and big challenge for researchers. There is always a dilemma between researcher and respondents because when a researcher inter his study group than the respondent group always feel dilemma of we and them. According to researcher they are we and respondent group are they and other side respondents group think they are we and researcher are they. Means in the field two different cultures, social background, living style, values, and culture differences are in the face to face stage because researcher's culture is naturally difference compression to respondent culture and same thing for the respondent group also. In this condition researcher want to accept and respect respondents culture because first step of data collection is that researcher want to make believe in respondent groups and that is only possible when researcher respect respondents culture, these idea known as cultural relativism in the field of anthropology and in opposite side when researcher did not respect respondents culture than its call ethnocentrism. So, the first step of data collection is that researcher establishes his/her repo in the study group. Then secondly researcher want to explain the objective of research and also make believe about confidentiality of data after these researcher can collect data with passion. Some important precaution which is must for the researcher is followed:

a. Time and place of the interview must be according to respondents comfort.

b. The researcher asks question step by step.
c. Researcher can't make any false promise to respondents and also take aware about sensitivity of questions. The researcher did not make any sensitive question and also any questions that hurt respondents feeling.
d. Ethical question always a sensible thing in the process of data collection so researcher wants to aware about it.
e. If a researcher wants to make his/her research work in tribal community or any other community which is new for a researcher than researcher, always want to learn dialect/language, values and customs of the study group. Because if the researcher has knowledge about his study group than there are no or less chances he ask any kind of question which is hard and rough for respondents.
f. Key Informants: Key informant is another important thing in the process of data collection, especially is a field related research work. The researcher wants to keep a key informant at the time of data collection because roll of key informant like a bridge between researcher and respondents. The researcher wants to have some precaution at the time of key informant selection like,
g. Key informant is a member of the study group because key informant is member of study group than he/she has knowledge about the study group culture.
h. Key informant nature is neutral in his community because if the key informant has biases about and member, family, etc. than at this condition key informant roll is doubtful for respondents.
i. Key informant is related to the topic of research like researcher keep baiga, gunia (baiga and gunia are local healer in tribal community) local healer, etc. when researcher work in the field on health status.

4.3.7 Editing of Data:

When researchers are in the process of data collection than researcher collecting lots of data. Generally researcher collected his data from his schedule but many times he got other information also which are not mention in their schedule but that could be important for researcher objectives, And other reason because of researcher collect more and more data because he don't want to go field again for some missed data that's why when he feel any data could be useful for him than he collected but when he return from field and he stared data analysis than he feel some data are not related with their objectives and hypothesis than he want to edited his data. If he did not edit data and he adds whole data in research that was collected by him than objectives of the research are affected negatively. But there is one more thing for a researcher; he keeps his extra data for his future work like research paper publication, seminar presentation etc. because primary data are always useful.

4.3.8 Coding:

Coding is a technical step of the scientific method. Generally coding process of data used for quantitative research. When researcher come from the field than researcher edit his/her data. After editing data researcher code their schedule from subjective to objective like to schedule if education status is present in words like illiterate, primary school, middle school, high school, high school etc. Than researcher convert it illiterate is 1, primary school is 2, middle school is 3 etc. After complete his coding work than data is ready for tabulation. At present, many software used by researchers for tabulation likes MS-EXCEL etc.

So, researchers can use MS-EXCEL for tabulation or researcher can use the schedule as master schedule. The researcher makes all coding in one schedule.

4.3.9 Classification and Data Entry:

Generally, the data are divided from two ways one is quantitative data and secondly qualitative data. After completion of editing of data researcher want to classify his date according to objective of research.

"Classification is essentially a form of putting, together things which have certain similarities as to be able to deal with them more easily."

(Peter H. Mann, Methods of Sociological Enquiry, p.18.)

Classification is directly related with tabulation so that is necessary research must to know which kind of table could be made and after classification of data researcher ready for data entry. At present time lots of computer software is present in data entry like MS-EXCEL, SPSS 16.0 TO SPSS25.0 version, SYSTAT etc. According to researcher facilities he can use above software for data entry.

4.3.10 Tabulation and Analysis:

The tabulation is a step which is related to arrangement of data for analysis. In other word we can say tabulation is the first process of explore conclusion of our research work. Tabulation work started with classification of data. Generally, in the form of tabular data are shown in raw and columns. "Tabulation is a part of the technical process in the statistical analysis of data. The essential operation in tabulation is counting to determine the number of cases that fall into the various categories."

(C. Selltiz et. al., Research Methods in Social Relations, pp.-406.407.)

After complete the process of tabulation than researcher stated process of data analysis. Data analysis depends on the nature or demand of research. Generally, in the basic form researcher analysis their data with frequency and percentage. If objective of research depend co-relation with depended and to depended data than researcher can also use statistical analysis like T-test, F-test etc.

4.3.11 Graphical Presentation:

Graphical presentation of result is depending on need of research. Generally graphical presentation of data used for comparative study like presentation of census of India, the age groups of respondents etc. In the field of social science researcher can use many types of graph like pie charts, bar diagrams etc. "A properly constructed diagram appeals to the eye, and also to the mind, because it is practical, clear and easily understandable even by those unacquainted with the method of presentation.

(A. L. Boddington, Statistics and its Application to Commerces, p.140)

4.3.12 Report Writing:

Report writing is the last stage of the scientific method. According to step of report writing we can say report writing is a huge and sensitive stage of report writing. Report writing is representative of our whole research work. Generally, report writing have followed these stages:

a. Cover Page
b. Certificates (according to rules of university)
c. Acknowledgement
d. List of tables
e. List of graphs
f. List of diagrams
g. Introduction
h. Research Area and Peoples
i. Research Methodology and Technique
j. Chapters (According to requirements of research topic which include discussion, tables, graphs)
k. Conclusion and suggestion
l. References/Bibliography
m. Appendices

Above steps could be changed if research guide need. Generally, all kinds of subject which includes anthropology and other have followed above steps.

4.4 Importance of Scientific Methods:

Generally, social sciences have issues about the validity of research because research work of social science is depending on data related with response to human. Human nature is changeable he/she can change his/her response anytime because human life as well as his each and every movement are affected by many factors. On the whole we can say if human behaviors/response is changeable, so data could be changed. So, the researcher can't the authorities his conclusion for long time validity and also hundred percent stable theories or conclusion. Because if data s is affected than whole conclusion are affected, that's why social science need a particular scientific methodology which have a particular scientific methodology which have at least three merits which are reliability, validity and objectivity. Scientific methodology has above kind of characteristics.

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