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Research Methodology: Review Article

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Abstract:

Introduction: Research is an art of scientific investigation for new knowledge and it is an academic activity and as such it should be viewed in technical sense.

Objectives of Research: To explore, diagnose, describe and to establish causal relationship.

Types of research: Basic, applied, empirical, qualitative, quantitative and others. Significance of research: Helps in framing of policies, useful in business, innovation of unknown facts, gain knowledge, leads to development of social welfare and society.

Research process: Includes discovering and defining the research problem, literature, survey, developing a working hypothesis, research design, executing research design, analysis of data, hypothesis testing, data interpretation and reneralization, report writing.

Conclusion: Research is an immortal process, till the existence of society on earth and it is a journey of truth, discoveries and inventions. With the growth of fast moving society, there is more need for research, research methods and researcher.

Keywords: Discoveries, invention, hypothesis

1. Introduction

All progress is born with inquiry. The quest for knowledge is an immortal process and in its very simplest form this process has been called as research [1]. Research evolves through our own inquisitiveness and this makes us to probe into the unknown facts and makes us to understand. Hence, inquisitiveness has been called as the mother of all knowledge [2]. The way in which the research will be conducted is seen in terms of the research philosophy, research strategy, research instruments, research objective and the quest for solving the problem [3]. Research is an art of scientific investigation for new knowledge [4]. Gathering knowledge for knowledge sake is called as research.

“Doubt is often better than overconfidence, for it leads to inquiry and inquiry leads to innovation” is the famous line of Hudson . Research is an academic activity and as such it should be viewed in technical sense. The research traditions have a long history from the times of classical Greek philosophers with Plato and Aristotle. During sixteenth and seventeenth century research evolved as a main stream in sociology under Karl Marx, Muller, Kant and Hegel. There are many differences and also interdependence between one subject and the other subject. Any researcher who is ready to undertake research should know the concepts and methods of research. Frankly speaking, a research work to be successful should have well established facts, well developed plan, an approach to develop new theories in a systematic manner. According to the observation, many authors are trying to combine different research methods to get the good and quality research. Hence, research is just an addition to the existing knowledge and making its advancement and generalizations.

2. Definition of Research

- Research is defined as an “art of gathering knowledge for the sake of knowledge.”
- Research is defined as a “systematic approach regarding generalizations and formulation of new theories.”[5]
- According to Zina O’ Leary [6]: Research is a creative and strategic thinking process that involves constantly accessing, reassessing and making decisions about the best possible means for obtaining trustworthy information, carrying out appropriate analysis and tracing credible solution.

- According to Clifford Woody (7): Research is a method for the discovery of truth which is really a method of critical thinking.
- According to D.Slesinger and M. Stephenson (8) in the Encyclopedia of social sciences defined research as “the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of a art.”

Before proceeding further it is very important to know the difference between research methods and research methodology.

- Research Method is defined as the methods or techniques used by the researcher. It explains the modus of conducting the research [1].
- Research methodology is a way of solving the problem systematically and in proper manner. It is also defines as science of using methods or techniques for conducting the research. Thus when we are talking of research methodology, we not only talk about research method but also the logic behind it to use the technique.

3. Objectives of Research

Research is conducted for the growth of knowledge by digging deep into the unknown facts and unexplored theories. Even though each and every research has its own set of objectives, but still research can be conducted on the following four broad objectives in mind:

- **To Explore:** Research can be carried out by the researcher with the intention of exploring the unexplored phenomenon or facts. This type of research is carried out before the formulation of hypothesis. Such types of research are called as exploratory or formulative research studies.
- **To Describe:** Sometimes research are conducted to portray the characteristic of an individual, group or society or to describe a particular situation or an event. Eg: A study can be conducted on different religious festival in different parts of India. These type of studies are also called as Ex post facto studies.
- **To Diagnose:** This study helps to understand the frequency of a particular event which is associated with another event. Descriptive studies are normally used by the investigators and doctors eg A patient coming for a treatment is diagnosed by the doctor through various questions, checkups and tests to give the exact output.
- **To Establish Casual Relationships:** A research can be conducted for testing the hypothesis between the dependent variables with independent variables. This type of research are also called as hypothesis testing research studies. Eg: A study can be conducted to establish the relationship between dengue vaccine and its effectiveness in controlling dengue disease.

3.1. What makes people to take research activity

For the academic purpose

- To obtain degree, jobs, promotions
- To solve the unsolved problems
- To get work satisfaction by doing creative work
- To get respect in the society

4. Types of Research

Research can be classified on the basis of time, purpose, settings, place and technique. Some research have similarities and some have little variations. But all the types of research has its own significance.

- **Basic Research:** It is also called as pure research. Research for the sake of enhancement of knowledge is termed as Basic Research. It is done with the intention of overpowering of the unknown facts. It is concerned with the generalizations and also with the formulation of new theory. Basic research may not produce solutions or results to the present problem but it contributes something to the scientific knowledge. Though its work may have zero importance, but it may become useful in the future.
- **Applied Research:** It is also called as practical research or ‘need based’ research. The main intention is to find solutions to the current problems being faced by an institution, society, business or in government offices. Research to identify social, political and economic changes, which has adverse effects in different sectors are some of the examples of applied research. This type of research is mainly carried on with the secondary data.
- **Empirical Research:** It is often referred to as experimental research. In this primary data is collected, analyzed, interpretation is done and subjected to hypothesis testing. Researcher should develop his experimental designs and should provide working hypothesis before the commencement of his research for good output.
- **Qualitative Research:** As the name itself suggests, this research is concerned with the qualitative process. It generally works with the study of human behavior. By this research one can find the body language, attitude, opinions, feelings etc from the opposite person through observation. It is mainly helpful for Psychiatrists and interviewers. Many techniques are being used like word association test, sentence completion, drawing pictures, Thematic Apperception Test. It is needed in times where quantitative research do not work. Hence, it is also called as ‘Motivation Research’.

- **Quantitative Research:** This research is mainly concerned with the measurement of phenomenon in terms of quantity. Many a times a debate is conducted between qualitative and quantitative terms. An example for the quantitative research is carrying out senses for collecting population, social, economic statistics of a particular area. They are subjected to statistical analysis. It relays mainly on primary data like survey method and questionnaire method. However, one can observe the inter-dependence between one another.
- **Descriptive Research:** As the name itself indicates, this research directly deals with description. It includes different data collection like survey method and fact finding techniques. The main character of this research is that, the researcher do not have control over the variables. He should describe what has happened and what is happening. Most Ex post facto projects use descriptive research.
- **Some other types of research:** Apart from the above types of research, there are many other classifications like **Longitudinal Research** which is spread over for a long period of time. In this changes takes place gradually. **Historical Research** which is concerned with the collecting of auto biographies, letters, documents, enquiries for knowing the past. **Simulation Research** deals with the creation of an artificial environment which is quite similar to real environment. Depending upon the need of the situation we can create and adjust to it.

5. Significance of Research

- It helps in framing of policies: Research helps in the framing of various government policies. Nearly all the government policies and budgets are planned and executed through research with the help of researcher. Annual budget, monthly budget, monetary and economic policies are all framed by the government. The government is assisted by various organization for framing the policies through research.
- Basic aim is to gain knowledge: It leads to many ideas and changes old facts.
- It is used in business organization: Many business companies hire researcher to work on various things. It is used in studying the changes taking place in the market. It helps in capital budgeting, tax management and cost saving policies.
- It leads to discovery and innovation of unknown facts and unexplored theories. It leads to the growth of the society and its citizens. It gives chance to the researcher to go deep into the subject and to innovate it.
- It avoids superstitious beliefs, myths and prejudices: Many people are still not aware of the research activities and its importance. Many ancient beliefs and myths have been proven wrong with the help of research.
- It leads to development of social welfare and society.
- It is useful for PhD students to write their thesis.

Thus Research is a fountain of knowledge, which helps in solving all government policies, business problems, avoids superstitious beliefs and helps in the development and maturity of society and its citizens.

6. Research Process

Before going further into the details of research methodology, it is very important for anyone to know in depth of how the research is conducted. The following steps gives us a clear cut idea of how the process is done.

- **Discovering and defining the research problem:** The first thing to start a research is to discover the problem and finding a solution to it. The researcher may be an expert in that subject but he should get the exact point of problem. The best way to understand and to simplify it is to discuss with one's own colleagues or with some other experts. Researcher should be conscious of the problem in which he should be able to identify, define and formulate it. Sometimes there will be data available but it will be too expensive. So researcher should work on this. Then comes the definition of the problem. An identified problem should be well defined. Thus it plays a main role in the study. In the words of Albert Einstein "The formulation of a problem is far more essential than its solutions, which may be merely a matter of mathematical or experimental skill."(1). So, by the end of this subject objectives will be clearly defined.
- **Literature Survey:** The next step in the research is literary survey. After discovering a problem, one should become familiar with the problem and write down the summary of the topic clearly. In this step, research should go through the comprehensive reading of the literary texts, biographies, databases which are related to the study. Literature survey helps the researcher by specifying his problem in a meaningful manner and also gives a clear cut idea of using methods and techniques for the purpose of study. One can visit libraries and also should go through some search engines like Google and yahoo in the internet, to get more information about the subject.
- **Developing a working hypothesis:** A research in any field of study do not give proper results unless and until we develop a working hypothesis. It is a tentative statement or assumption regarding the solution to the problem of study. It is an assumption which is used to draw the logical consequences. It is the key point of study and hence it should be limited and should contain much knowledge. It is helpful for researcher for predictions and also maintains complete focus on the study. It should be precise and clearly defined. It gives an idea of the type of data to be used and type of method or techniques for the study. In some research activities like exploratory or formulative, hypothesis is not used for testing.
- **Research Proposal:** After developing a working hypothesis, researcher should seek the permission of respective head of the institution or government offices or in business companies. It is a brief summary which gives an idea of modus operandi of conducting the research. The presentation should be done in synopsis. In this the researcher should write about how, what,

when, where, budget for the study and also time required to conduct the study. In business organizations with the above topics, the researcher should write down his qualification and use of the study.

- **Research Design:** When the researcher gets the approval of going ahead, the next step is research design. Research Design is the blue print of a research. Research designs are the plans which helps in guiding the researcher in analyzing and collection of data. It should be built on the purpose of the study and should be dynamic. It should be done in such a way that, researcher should get maximum benefit from it. Research Design contains three parts.

Sampling Design: It is not possible for a researcher to carry on the research with a huge population in a given span of time. Hence a researcher takes a small part of the large group for the collection of data. For a research activity, a minimum population is selected which includes all the parameters in it. In sampling every segment of the whole population should be included to get a clear and good results. Hence, we can say that plans which are devised to draw a sample is called as sampling design.

A researcher can take up the probability sampling method or non probability sampling method. In Probability sampling each element has a known probability of being included in the sample whereas in Non-Probability samples do not allow the researcher in determining the samples.⁶

Instrument Design: In this the researcher works on how, when, what, where the data has to be gathered. The researcher while designing a schedule or questionnaire should be aware of the type of data to be collected, communication approach, question pattern, question wording. This helps the researcher to collect his data in a easy manner.

Data collection design: The method of gathering or collecting the data is planned in data collection design. There are many types for collecting the data. The two types of collecting data are Primary data and Secondary data.

Some of the important methods for collecting the Primary data are as follows:

Questionnaire: The method of collecting data in vast geographical areas is done through Questionnaire method. Hence questionnaires are mailed to the research areas and they are distributed among the respondents. It is a time saving and economical method but the main drawback is that the answers given by the respondents are not accurate.

Interview: The investigators prepare a set of questions and asks them in a serial wise to the respondents. There are different types of interview like personal, group, mock and telephone interview. It is fast procedure. We can get extra information which is related to the topic. But it is costly. Some respondents may try to hide some answers. It saves much time of the investigator.

Observation: This is also one type of collecting data primarily. In this researcher observes the day to day process of the society or a single person. Sometimes researcher has to involve in the process. It discovers the human behavior of the respondent. No doubt this method is cost effective but the data collected is also limited. It can't predict the happenings of the future.

Secondary data can be collected through books, published articles, internet and syndicate services. Syndicate services are companies which collect and sell data to various people who are in need. It is suitable for researcher who wants to survey on large population. The disadvantage of this method is that the researcher will not enjoy extra information and it is very costly. Though the data can be collected in a short span of time but the accuracy cannot be stated.

- **Executing the research design:** After preparing a good design for the process of research, the researcher should move on to the next step of execution. From this stage the researcher starts executing the research design. Training should be given to the surveyors and a working manual should be given to them. The collection of data should be carefully handled.
- **Analysis of data:** Soon after the collection of data, the researcher turns to the process of analyzing the collected data. The raw data will be tuned. There are many things used for analysis like coding, tabulation, editing and statistical analysis. Data will be collected in the form of questionnaires or schedules. Hence the data collected in short forms will be elaborated through coding. Editing can be done at the time of collecting or collecting the data. Through editing the researcher removes all the mistakes in the project. It will be polished. Through tabulation the researcher do the work of preparing the tables.
- **Hypothesis testing:** After the work of analysis the researcher goes on with very important step of testing the hypothesis which he had formulated earlier. Testing of hypothesis is defined as testing of proposition or a group of propositions set forth as an explanation for the occurrence of some specified group of phenomenon either asserted merely as a professional conjecture to guide some investigation or accepted as highly probable in the light of established facts. (5). Various tests will be conducted by the researcher like chi square test, t tests and f test which will be developed by a statistician. By this the researcher will be able to come to conclusion of his work. The difference of values will be solved.
- **Data Interpretation and Generalizations:** Some studies won't be having testing hypothesis, in that studies data interpretation will be carried out for the explanation of the results. They are explained on the basis of existing theories. In studies where hypothesis are tested, where the data is analyzed and tested repeatedly, generalizations are used to build new theories. Hence, with the help of generalizations one can build new theory.
- **Report writing:** This is the last step in research activity, without this research will be incomplete. The style of writing a report depends upon the researcher. There are two types of report; Written report and Oral Report. Any kind of report should have the following contents.

Preliminary section : consists of title, table of contents, list of tables, summary and importance of study.

Main text : consists problem, objective, note on research methodology, conclusion of research.

End section : consists of items like questionnaires used, glossary of new terms, acknowledgment.

7. Steps for writing the report

Report writing is one of the tough task and time consuming. One should go through a detailed study of their study. It includes following steps:

7.1. Report Format

There are three types of formats like

- Logical pattern in which the topic is written from general to complex or from complex to general.
- Chronological pattern is based on time of work done.
- Psychological Pattern in which the complex information is stated first and general findings are written later to get a conclusion.

7.2. Preparing report outline

Once the analyses of data is finalized the next stage is preparing an outline. There are two types of outline

- Sentence outline which highlights the essentials in a sentence form and is best for the inexperienced researchers.
- Topic outline uses only key words.

7.3. Preparation of rough draft

After deciding the report outline, the researcher should workout on the placement of graphics, pictures and graphs. In this the entire research should be written.

7.4. Rewriting and refining the research

It is a long exhaustive process. In this writes and rewrites the errors and also hides the weakness of the research.

7.5. Preparing Bibliography

Bibliography is a document of the sources used in a research. The researcher should write down all the details of the consulted people and referred books and articles for the research.

7.6. Writing the final proof

It is the final stage in a research. In this the researcher should write the final statement which should be very attractive and meaningful. In this some steps can be excluded and sequence of the steps can also be changed depending upon the type of research.

8. Criteria for a Good Research

- Every research should have a well defined goal.
- It should increase the existing knowledge and should contribute new facts and theories.
- It should have a systematic plan of work on budget, time and requirements for research
- It should be correct if cross checked by the readers.
- It should be logical. A logical statement gives new ideas and helps in conclusion of research.
- It should speak the truth and should not hide anything.

9. Research in India

India is a vast country. It is one of the fastest developing countries in terms of economy. Though it has a long history from the time of Vedas in the field of science and research, yet it has not gained a complete momentum in the field of research. Now a days it has started investing on research because of its importance in all the sectors. The role of government sectors, business companies and academic institutions in promoting research is being duly recognized and efforts are made to encourage research in almost all the sectors. But there are some problems which are being faced by a researcher in India. They are as follows:

- Unavailability of qualified personnel: Research is a work which should be done by the experts in their respective fields. Even though India has got more number of qualified personnel but many of them do not know the importance of research. Many researchers are going to foreign countries for their studies.
- Lack of scientific training: This is the main problem in India. Many of the research activities conducted by the researchers do not sound methodologically correct. Many people just do the work of copy and past method. Before a researcher undertake or start his project, he should get a good training and also complete information of the study.
- Lack of funds: Even though a researcher trying to work on his respective topic, but he will be getting less funds or no funds at all to his project. Even the business organization and some government sectors do not fund more than 5% of their revenue sales.
- Lack of interaction between academicians on one side and business & government organizations. Development should be made for the liaison of these sectors.
- Misuse of data provided by the investors.
- Lack of availability of the data published.

10. Conclusion

To conclude, Research being one of the ancient method for discoveries and inventions has got a great significance in society. It is an immortal process, till the existence of society on earth. Thus the research is a journey of truth, discoveries and inventions. It is only through research, the society is consistently developing. With the growth of fast moving society, there is more need for research, research methods and researcher.

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