ISBN: 978-93-90847-39-6

10. Introduction to Research Process

Dr. Kirti Makwana

Assistant Professor
Indukaka Ipcowala Institute of Management (IIIM),
Faculty of Management Studies (FMS),
Charotar University of Science and Technology (CHARUSAT),
India.

10.1 Introduction:

Research is a sequence of connected activities moving from a beginning to an end. Research generally starts with problem identification followed by research questions or objectives formulation. Proceeding from this the researcher determines how best to answer these inquiries and so chooses what data to collect, how to collect, and how it will be analyzed to answer the research question. Research work can be carried out for various reasons. A research study can be taken up to (i) try new research methods and techniques (ii) to satisfy the researcher's curiosity (iii) to establish the prevailing phenomena and (iv) to discover the conditions under which certain events occur. However, the point to be discussed first is identifying the sources, from where the research ideas come from.

10.2 The Process of Determining a Research Idea:

Research ideas come from everywhere. The issue with a researcher is knowing where to find them, shortlisting and narrow down the focus from the abundance of ideas that lead to investigative a research topic. A researcher working on a research idea assumes complete ownership of the research idea/problem. However, multiple researchers may be working on They can also help students develop a compelling case for their studies. similar ideas.

Figure 1: The Process of Determining a Research Idea

10.2.1 Reading Published Articles:

The world of investigators and their work should also be studied briefly to get a better understanding of them.

Many of the ideas that emerge from the various phases of research are generated by the people who study them.

This information gap can also be caused by different factors. For instance, it could be that the study that was reported did not focus on the specific age group of the child.

Since the article did not include children of that age, this means that the researchers did not have enough information about them to make a proper study. This means that they may want to study them in the future.

If a researcher thinks that studying children could improve a study, this may be the target of his or her next research.

There are also often gaps in the information that researchers sometimes use in their studies. In most cases, future research implications are easily identified in an article since the author typically uses terms such as “future research should” or “further investigation might be needed” or “scope for future research”.

If these ideas are interesting to you, then they most likely will become your idea to work with. However, according to the literal interpretation, these ideas may not be original and are considered legitimate contributions to the field of studies.

10.2.2 Reading Literature Reviews:

Reading literature reviews (LR) can help researchers narrow down their research ideas by identifying specific areas of interest.

These reviews can also be used to identify topics that interest them.

Literature reviews are very useful sources of information on a particular topic. Some journals mainly publish reviews, while others publish articles that deal with the same topic.

These reviews can generate many research ideas that can be used in different ways.

Aside from identifying research ideas, literature reviews can also serve as educational tools for researchers. They can also help students develop compelling cases for their studies.

The structure of a published literature review article is important as the first few paragraphs introduce the reader to the topic and provide an important reason why it is important. Usually, the author will start his or her introductory statement by briefly explaining what the topic is.

This helps the reader to get a general idea of what the topic is and why it's important. The goal of an LR is to examine the results and inferences of various studies related to a broad topic.

It can also cover investigations related to specific curricular areas or topics. A researcher will review the literature on the research topic and will explain what the topic is and why it is significant to the readers, and it will conclude with a very clear statement of the research question.

The reasons for undertaking the research usually fall into one of many categories. The research might be justified because "this particular research issue has not been explored previously," and it is critical to the researcher.

Another argument may be that even though that it has been examined, prior studies had faults in their study methods" and that it is crucial for the researcher.

The third sort of explanation may be that although the issue has been researched, it has not been examined with these specific samples.

10.2.3 Replicating Previous Studies:

Replications of previous research add to the expanding body of evidence on any subject. Even if the research topic is replicated it is still very important for the researchers to conceptualize the scientific and practical logic and applicability of the topic.

A researcher may replicate the previous studies with modifications in the variables (geographic/demographic etc.), methodology, use of tools for analysis, statistical methods etc. and emerge in effective and creative ways to bring out newer insights from the research.

10.3 Research Process:

Irrespective of the category of research conducted, the process involves the same basic steps.

The basic scientific method is used to develop a hypothesis, collect data, perform analyzing experiments, and report results.

As a journey, the research process is a series of decisions that a researcher has to find the answers to the enquiries that he/she wants to answer.

Numerous steps will help a researcher to explore the answers to the enquiries. Notwithstanding the nature of research conducted, the process involves the same basic steps.

The basic scientific method is used to develop a hypothesis, collect data, perform analyzing experiments, and report results. The figure below shows the step-by-step research process:

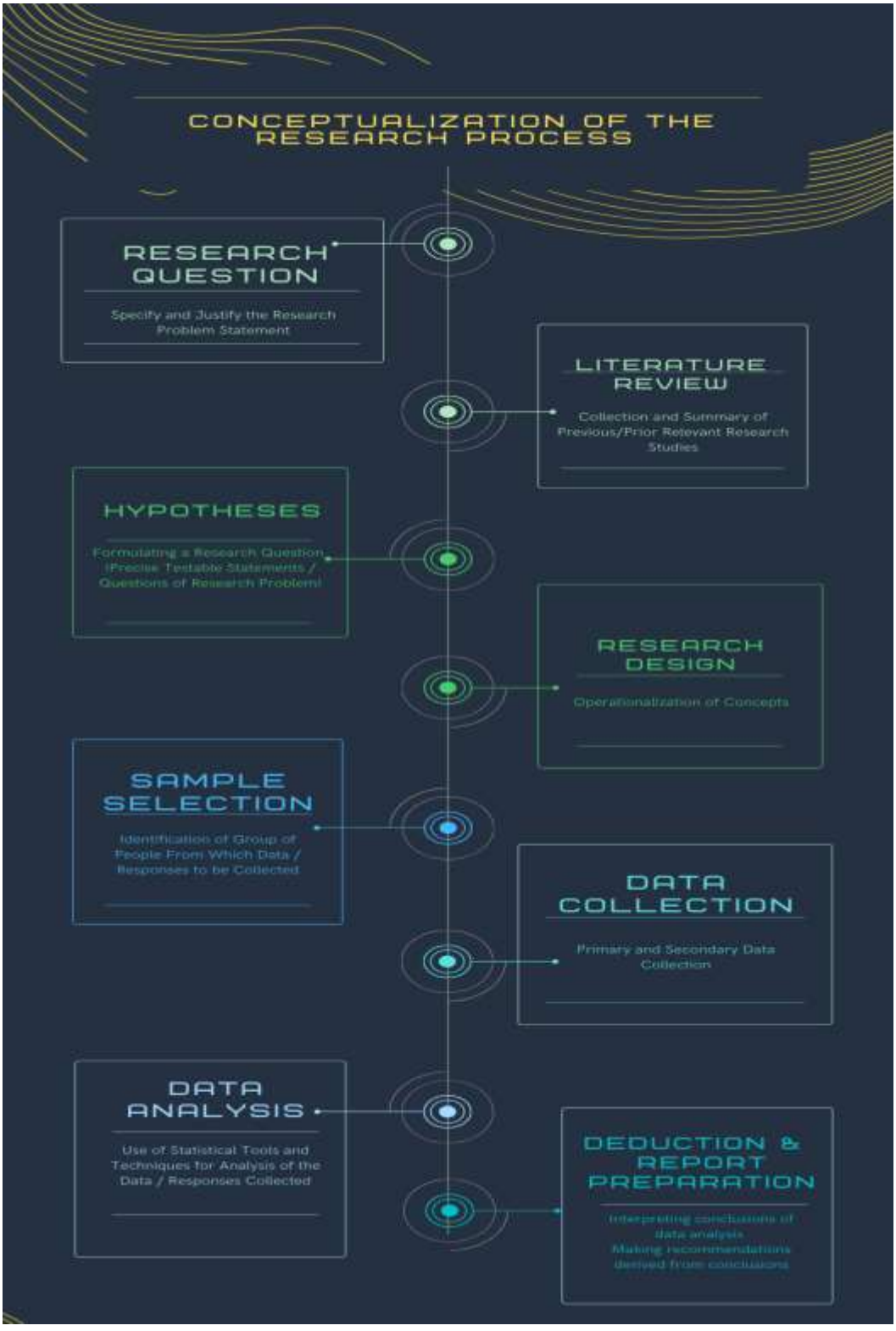

Figure 2: Research Process Steps

10.4 Step 1: Research Question

The first stage in the research process is to choose what a researcher wants to study i.e., identification of a research question.

This step is the most critical in the research cycle.

The various phases of the research involve identifying the sources of the problem that the study aims to address.

In social sciences, sources of research problems revolve around four **Ps:**

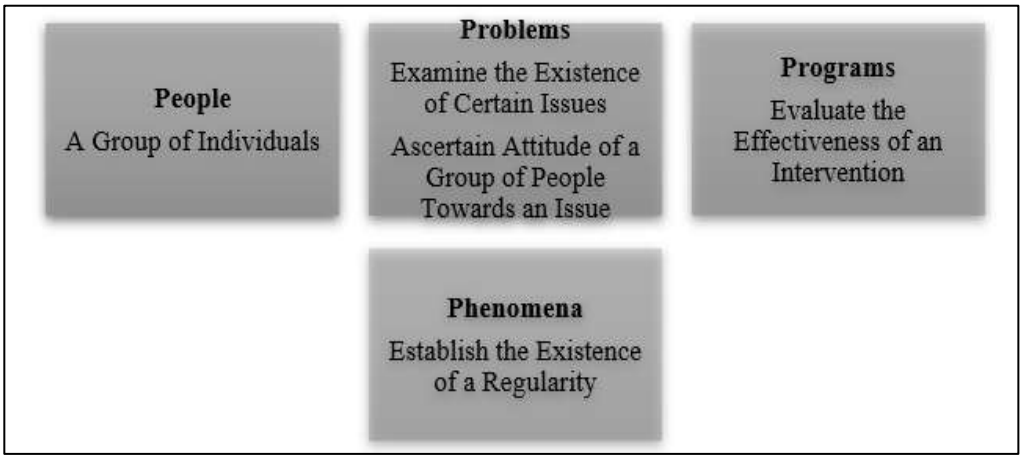

Figure 3: Sources of Research Problem

Maximum research works are constructed upon at least a blend of two *Ps*. Each research has dual facets:

Study Population

(Provide with the information / a researcher collects information about them)

- People : Individuals
- Organizations / Firms
- Groups
- Communities

Subject Area

(Information that a researcher needs to collect to find answers to the research questions)

- Problems: Issues, Situations, Associations, Needs, Profiles
- Program : Content, Structure, Outcomes, Attributes, Satisfactions, Consumers, Service Providers, etc.
- Phenomenon: Cause-and-effect Relationships, The Study of a phenomenon itself

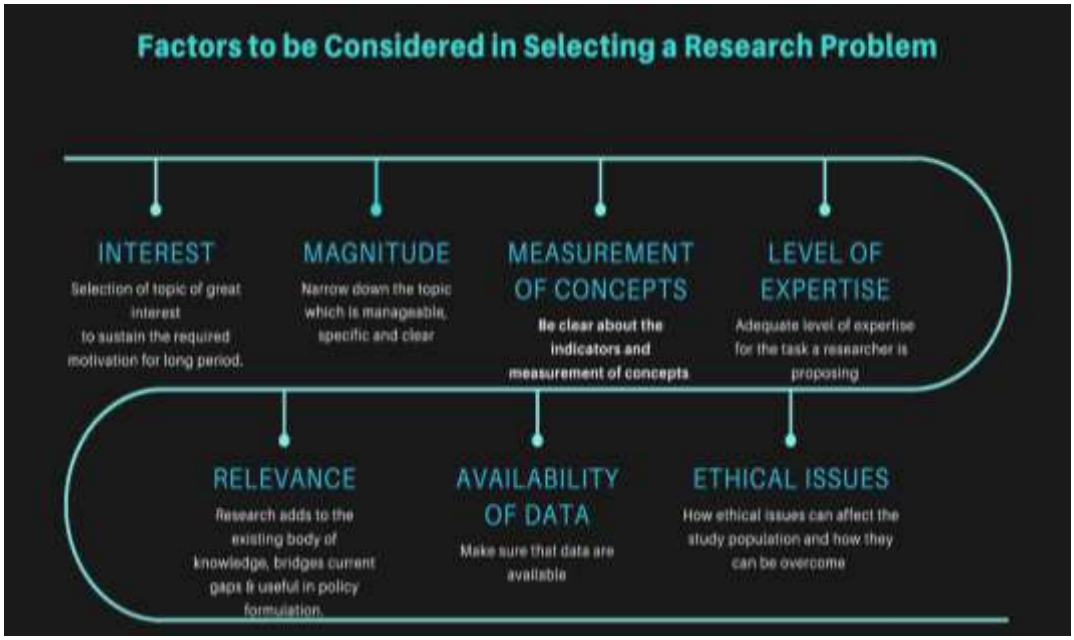

Figure 4: Factors to be Considered for Selection of a Research Problem

10.5 Step 2: Review of Literature

One of the critical primary responsibilities of a researcher is to review the existing literature to familiarize him/herself through the existing body of knowledge in the domain of interest/research. The review of literature is an essential step of the research process and provides a valued input to nearly all the operational steps. It starts even before the first step; when the researcher is simply thinking about the research problem which he/she wants to explore/ answer through the research journey. In the early stage of research, a literature review helps a researcher to build the theoretical background of the study, clarifies ideas and helps to plan methodology. In the later stages of the research, literature review improves and combines the researcher's knowledge base and helps to assimilate the researcher's research results with the present body of knowledge which either supports or challenges the prior research. A researcher should refer to the relevant scholarly research papers of the below-mentioned categories:

Research papers reporting original research (with a classic format of introduction/background, methods, results, discussion etc.)
Reviews of others work (a systematic review to a more broad analysis of others' work).
Opinion Papers (drawing on research and other evidence).
Methodological Papers (where particular research methods or research instruments are discussed, often by presenting data to illustrate particular points).
Policy Documents (helps a researcher to think about the research idea from a wider perspective).

During this stage of research, a researcher should remember that one source/reference will lead to one more. The past researches, relevant to the research problem should be cautiously refereed. A good library (physical sources and e-resources) will be a great support to the researcher during this phase. The write-up of the literature review should be created on key topics/themes; the arrangement of the topics/themes in the review should have a rational progression; numerous opinions, validated with precise quotes and citations from the literature and should follow to a suitable academic referencing style.

10.6 Step 3: Formulating a Hypothesis

Subsequently detailed literature review, a researcher should frame working hypothesis or hypotheses. Hypotheses and research questions are the accurate statements/questions of the research problem. A hypothesis is a prediction of what is expected to occur or a relationship between the concepts of interest. A hypothesis is a premonition, supposition, doubt, proclamation or an impression about a phenomenon, association or situation. A researcher calls them hypotheses and they turn out to be the base of an investigation. The hypothesis will be built upon any earlier research studies or the researcher' or somebody else's observations.

A hypothesis is generally tested with some form of experiment. A working hypothesis is a tentative supposition made to examine its rational or experiential significance. Hypotheses also affect the type of data to be collected, and the way data are analyzed. Hypotheses should be very precise, as they direct the investigator by restricting the research domain and retain the researcher on the correct track. Developing hypotheses needs a researcher to identify one independent variable of a sampling unit that causes, effects, or influences, another dependent variable or response variable of the similar or other sampling units. In exploratory research, the base of knowledge is so limited that, a researcher cannot formulate any meaningful hypotheses.

10.7 Step 4: Research Design

The next step for the researcher is to prepare a research design i.e., he/she will be required to define the theoretical framework in which the research study will be carried out. The groundwork on the research design simplifies the process of investigation to be as effective as likely yielding utmost information.

"A research design is a plan, structure and strategy of investigation so conceived as to obtain answers to research questions or problems. The plan is the complete scheme or programme of the research. It includes an outline of what the investigator will do from writing the hypotheses and their operational implications to the final analysis of data." (Kerlinger 1986: 279)

A research design has two main purposes:

i. Identification and/or development of procedures and the logistical measures essential to carry out the research
ii. To confirm their validity, objectivity and accuracy

One of the most significant necessities of a research design is to lay down everything evidently so the person who reads will comprehend the procedures and the method to follow them. A research design, consequently, should do the below-mentioned activities:

- Title the study design - that is, cross-sectional/before-and-after/comparative/control experiment/random control.
- Give comprehensive info about the subsequent facets of the research:
  - Who will form part of the study population, and in what way will the population be known?
  - Whether the research will be a sample study or a population study? Further, if the research study is based on a sample study then what will be the process to contact the respondents?
  - How will permission be asked?
  - Which process of data gathering will be used and why?
  - In the instance of a survey, where will the responses be given back?
  - Process of respondents to get connected with the researcher in case of any queries.
  - Place of conducting interviews
  - Method to take care of ethical matters

Once the research design is framed, the following step is to create/gather and select the proper tool for research. Based on the requirement of the research problem an investigator may select specific techniques such as observation, experimentation, case study, association, and survey. In case existing research tools are not available at that point the investigator might have to develop suitable tools to undertake the research.

10.8 Step 5: Sample Selection

For any research, an investigator has to carry out identification of the population of the research study which is a cluster of interest and for whom the research results will be relevant and generalized. Identification of **population** is to be defined precisely to make sure who falls within and outside it. A sample representation from the population is taken for the research purpose. **Sampling methods** are related to various methodological approaches. The random sampling method is considered the best for quantitative study design. It removes the selection bias.

Nevertheless, the sampling frame (complete list of the population) must be known for the random sampling method. While for qualitative study design purposive sampling may be used as the prospective respondents are carefully chosen for their potential to provide the most appropriate evidence for the research study based on identified characteristics. An appropriate **sampling frame** is desired and a choice is to be made if including entirely whole population who satisfy the inclusion rules or whether only a sample representative ought to be chosen. **Sample size** will depend on the resources and time available and some other conditions. Samples can be probability-based or non-probability-based. In the probability-based sampling method, every element has an equal chance of getting selected and a known probability of being included in the sample nonetheless the in non-probability-based sampling method each element does not have an equal chance of getting selected and a researcher cannot determine this probability of selection of any element.

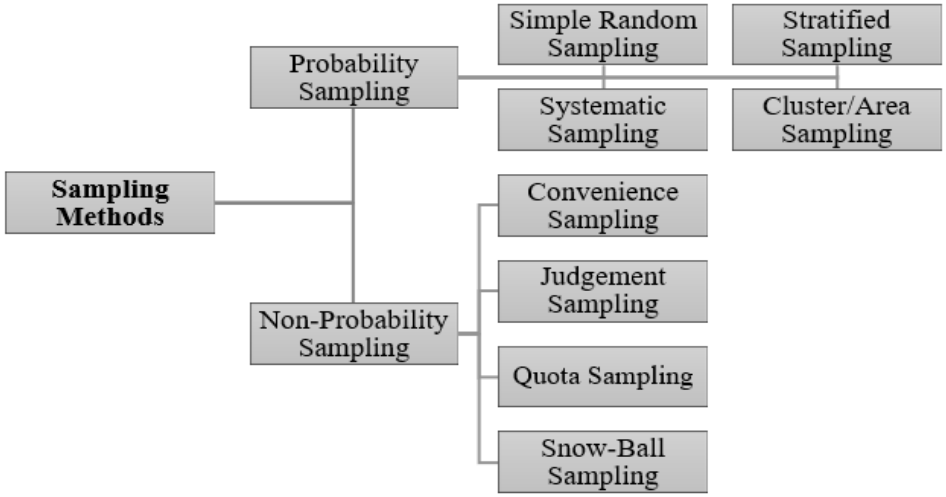

Figure 5: Sampling Techniques

10.9 Step 6: Data Collection

There are numerous ways of gathering the proper data. Primary data can be gathered either through experiments or through the survey. In the experiment, an investigator perceives quantitative measurements or the data. In a survey method, the data can be gathered in any one or more of the following ways:

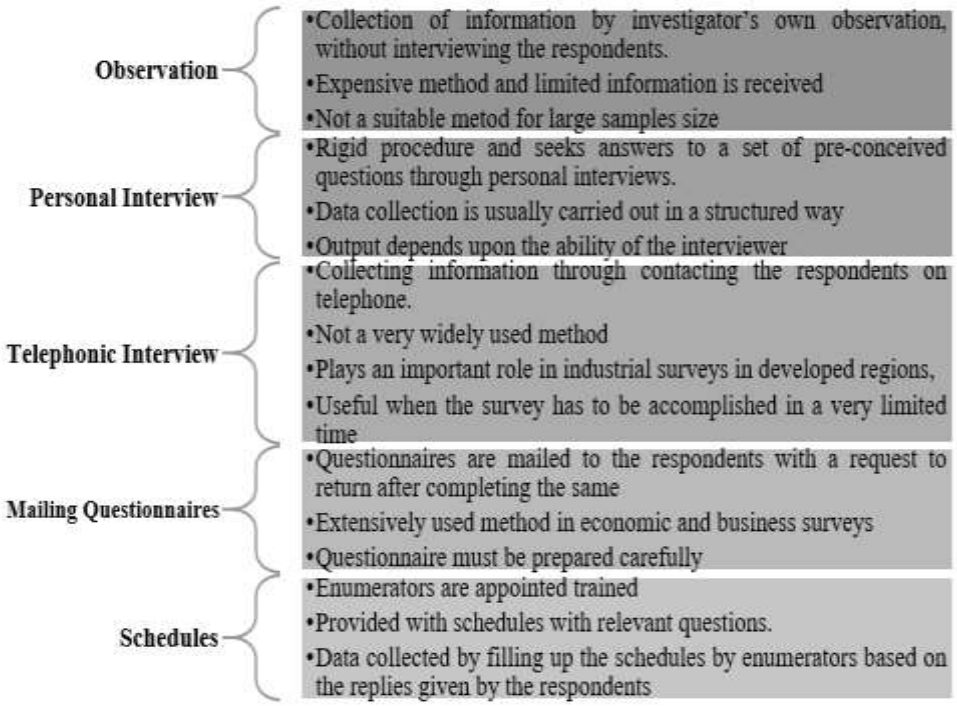

Figure 6: Data Collection Methods

10.10 Step 7: Data Analysis

The next stage after data collection is an analysis of data. This step of the research process includes the use of statistical tools and techniques to summarize and interpret relevant results. Data analysis needs a numeral of operations such as the formation of classes, converting raw data through coding, editing, tabularization then drawing statistical implications.

The data, particularly in huge studies, is tabularized by computers. Computers save time and likewise make it probable to study a huge quantity of variables that are affecting a problem instantaneously. Data analysis after tabulation is usually the calculation of percentages, coefficients, etc., through the application of various definite statistical methods.

Descriptive statistical analysis such as frequency, preparing graphs, charts, cross-tabulations, central tendency, dispersion etc. form part of quantitative data analysis. Inferential statistics are used to test the hypotheses. While in qualitative data analysis, a researcher segregates themes, finds trends, construes, describes, and even carries out theoretical evaluations.

After data analysis, the researcher can test the hypotheses (formulated earlier- step -3). Several tests, such as the Chi-square test, *t*-test, *F*-test, ANOVA etc. tests can be used by the researcher and hypotheses are confirmed through using one or more statistical tests, based on the requirement of the research inquiry. The most commonly used software is SPSS. However, currently, many licensed and open-source software are available such as R, MATLAB, Microsoft Excel, SAS, Minitab, Stata. Python etc.

10.11 Step 8: Deduction and Report Preparation

The next process is relating the evidence collected to the research question(s), drawing conclusions and inferences about the question(s) or hypotheses, acknowledging the limitations and future scope of the research. The researcher subsequently analyzing the result draws inferences. The researcher documents what the researcher has done, what was explored and what deduction the investigator has drawn from results.

This aids the reader to comprehend the research work. It permits other researchers to replicate/extend/ modify the research work. The research publications in scholarly journals or books make it accessible to all the concerns.

10.12 Summary:

This chapter included an outline of the research process, which was divided into eight steps. For a novice researcher, it is imperative to follow all the steps, though maybe not in the same order. With practice, he/she can take shortcuts. The eight steps comprise the entire range of a research endeavor, from problem formulation to writing a research report. The steps are operational, following a rational order, and specifying the numerous approaches and actions in a modest methodological manner.

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