LEGAL RESEARCH METHODOLOGY: AN OVERVIEW

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Abstract:-

Research methodology is the process for direct approach through mixed types of research techniques. The research approach supports the researcher to come across the research result findings. Research methodology refers to the practical of any given piece of research. The researcher systematically designs a study to ensure valid and reliable result to address the research aims and objectives. In a dissertation, thesis, academic journal article covers the aspects of research methodology. A good research methodology provides legally sound findings. Research designs and methods are used for data collection. The first part of the research method is to highlight the dissertation/thesis/journal design. Second part focuses about qualitative and quantitative data collection methods. Third part points the general research frame work. Legal research methodology indicates legal activities with case laws comments. This research article may be conduct as the research guide throughout the study periods.

Keywords: Legal Research Methodology, Design, Sampling, Data Sources.

1.Introduction:-

Research is a process of identifying and investigating a fact or problem with a view to acquiring an insight into it or finding an apt solution to it. Legal research can be defined as a process of systematic finding law on a particular point and makes development in the discipline of law. However, the finding law is not so easy. It involves a systematic search of legal materials, statutory, supplementary and judicial pronouncements. For making development in the discipline of law, one needs to go into the underlying principles or reasons of the law. These activities ought to have a systematic approach. An approach becomes systematic when a researcher follows scientific method.

Generally, law is prejudiced by the existing social values and ethos. Most of the times, law also attempts to mould or change the existing social values and attitudes. Such as the Act was passed to prevent women from becoming a sati, an Act to secure the untouchables, an act to stop child marriages etc., all these and more can be cited as an example. Such a complex nature of law and its function require systematic approach to the understanding of law and its operational facets. A systematic investigation into these aspects of law helps in knowing the existing and emerging legislative policies, laws, their social relevance and efficacy, etc.

The present course intends to acquaint the students of law with scientific methods of investigation into law. It also intends to make them familiar with nature, scope and importance of legal research. Legal research therefore involves gathering information for a purpose and it is the purpose that usually determines the type of research undertaken and how it is conducted.

Legal research would, in a similar vein, involve the collection of legal materials for the purpose of discovering new facts that would contribute to the body of knowledge in a legal field or subject. Legal research is defined by legal studied since it is the materials that are used in legal studies and the topics that are taught and learnt that determine legal research. In a similar light legal studies are also defined by legal research as the discoveries of legal research shape legal studies.

Research is usually a daunting task and the style adopted may differ according to the educational system, the supervisor or even the researcher as like many other tasks, developing a personal style is the most important factor to enjoying the process and achieving desired results.

The researcher needs to conduct his/her research through research methodology. He/she formulates his/her problem, objective and present the result from the data obtained during the study period. The research design and methodology point out the research outcome at the end with the objective of the study. Research methodology is used during the research process. It includes the research strategy to the result dissemination.

2. Meaning:-

Legal research means research in that branch of knowledge which deals with the principles of law and legal institution. There are three main sources of law, viz. legislation, precedent and custom. Juristic writings are another important though secondary source of law and their importance is depend on the fact whether it is given due recognition by courts or the legislature or jurists in solving problems or not. The aim of law is to regulate the human behaviour in the present day society. Legal research must be directed to the study of the relation between the world of the law and the world that the law purports to govern.

Research is an enquiry for the verification of a fresh theory or for supplementing prevailing theories by new knowledge. Knowledge is the extension of an existing knowledge, no research can be said to be absolutely new. A researcher while undertaking a project for his work possesses much of information about it and while conducting research, he/she proceeds onward to acquire more information about it and formulates certain hypothesis on that basis. Research is original and fundamental contribution to the knowledge on legal subject. Thus it is a continuous process of acquiring knowledge through enquiry into existing laws.

According to the Webster Dictionary, "Research is a careful, critical inquiry or explanation in seeking facts or principles."

According to Encyclopedia Dictionary, "Research is an act of searching into a matter closely and carefully, inquiry directly to the discovery of truth and particular scientific investigation of the principles and facts of any subject.

Stephenson considered the research as, "the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge."

According to Manheim, "Research is the careful, diligent and exhaustive investigation of a specific subject-matter, which has as its aim the advancement of mankind's knowledge."

Redman and Merry define the research as, "Systematized efforts to gain knowledge."

Lundberg, "Research is a method sufficiently objective and systematic to make possible classification, generalization and verification of the data observed."

Legal researchers do make systematic research in to social, political and other fact conditions which give rise to the individual rules, acts or codes. They also examine the socio-legal and other effects of those acts or rules. A research of this kind is called, "Fact research in law." Research may be pursued to obtain better knowledge and understanding of any problem of legal philosophy, legal history, comparative study of law or any system of positive law-International or Municipal.

The purpose of legal research is to find "authority" that will aid in finding a solution to a legal problem. Primary authorities are the rules of law that are binding upon the courts, government and individuals. Examples are statues, regulations, court orders and court decisions. They are generated by legislatures, courts and administrative agencies. Secondary authorities are commentaries on the law that do not have binding effect but aid in explaining what the law is or should be. The resources available to find legal authority are vast and complicated leading many law schools to require students to take a class in legal research.

There are also a number of specialized finding tools that enable one to search for relevant materials in primary authorities. The index volumes for statutes and regulations compilations provide a quick guide to relevant rules and regulations. There are also privately published versions of statues that are annotated. Case repots contain the decisions in cases that have been deemed important enough to publish. Case digests enable a researcher to look up a particular area of the law and find a list of case decisions that are suggested in relevant case repots. If one has the common name of a law (e.g. The Langham Act), a popular name table can provide a quick reference to where the law can be found in the statue compilation.

Computer databanks have provided the legal profession with quick and efficient tools to do research. LEXIS and WESTLAW, two prominent legal search engines provide databases that have case repots, statues, legal periodicals, law reviews and various secondary authorities. State and specially law collections pulling together diverse types of authority are now appearing on CD-ROM and the Internet.

3. Characteristics of legal research:-

Law may be termed as a behavioral science as it regulates human behavior. It is expressed in words which are used in particular context. Whatever be the source of law, it can't provide remedy for all the situations and for all the time to come. Changes in society demand that law should move with the time if it has to remain alive and active and it can remain alive, active and useful. The object of legal research, therefore, is to find out deficiencies in the existing laws and to suggest suitable measures to eliminate them. If there is an area for which there is no law at all the objective of legal research would be to suggest suitable legislation for that area; but if there is a law for that area but due to one reason or the other, it doesn't work, its aim would be to suggest reform in the existing law, so as to make it workable. Thus the significance of legal research lies in the submission of proposal for reform in the existing law to be enacted, customary or judicial.

- The legal research deals with the social and behavioral phenomena. It studies behavior of human beings as members of society and their feeling responses, attitudes under different circumstances.
- The legal research is carried on both for discovering new legal facts and verification of the old ones.
- The legal research tries to establish causal connection between various human activities.
- The legal research tries to give solutions of legal problems.

4. Objectives of legal research:-

The objects of legal research may be classified into two parts-Firstly academic objects and secondly utilization objects.

The academic purpose of legal research is acquisition of knowledge. The objects of legal research is to get true and intimate knowledge of human society and legal matters and understand the laws that are operating behind various social activities of man.

The other purpose of research is utilitarian in nature. Human society suffers from a number of social evils like murders, suicides, thefts, robberies, quarrels and trespass. It is now conclusively proved all these evils in the organization human society.

The following may be taken as objectives of legal research:

- To discover new facts;
- To test and verify old facts;
- To analyze the facts in new theoretical framework;
- To examine the consequences of new facts or new principles of law or judicial decisions;
- To develop new legal research tools ;
- To propound a new legal concept;
- To analyze law and legal institutions from the point of view of history;
- To examine the nature and scope of new law or legal institution;
- To ascertain the merits and demerits of old law or institution and give suggestion for a new law or institution in place of an old one;
- To ascertain the relationship between legislature and judiciary and to give suggestion as to how one can assist the other in the discharge of one's duties and responsibilities;
- To develop the principles of interpretation for critical examination of statutes.

The objectives of legal research, as of any other research, may be obtained by any one of the following processes:-

- ✓ Evolutive; or
- ✓ Explicative; or
- ✓ Identificatory; or
- ✓ Projective; or
- ✓ Collative; or
- ✓ Impact analysis; or
- ✓ Interactive; or
- ✓ Interpretative.

4.1. Evaluative Process:-

Evaluative research is one which seeks to identify the roots of a social evil and tries to prohibit it by law, e.g. eradication of dowry, prohibition of sati, prohibition of child marriage, legalizing widow marriage etc. Historical facts play most important role in this kind of research.

4.2. Explicative process:-

Explicative process is one which tries to ascertain the nature, scope and source of law in order to explain what law is, e.g. law relating to administrative action and legal control, matrimonial relief etc.

4.3. Identificatory process:-

An identificatory process is one whose objective is to ascertain the people for whose benefit a legal rule is enacted, e.g. research carried on to find out the beneficiaries of land reform, beneficiaries of reservation among Scheduled Cast and Scheduled Tribes and Backwards, the group of industrial establishments kept out of the area of operation of a piece of legislation, e.g. activities outside the area of the Factories Act,1948,industrial establishments not covered by the Provident Funds Act, etc. employees entitled to the benefit of provident fund and insurance fund, etc.

4.4. Projective process:-

A projective process is one which aims at examining the degree of social acceptance to a policy the state is planning to implement. This kind of research attempts to find out at the very beginning, the mood of the people or masses, or electorate or industrial workers, whether they will accept the proposed scheme or not, or they will accept it with certain modifications. Truly speaking, it is a survey beforehand rather than a research work to find out the feasibility of the proposed scheme.

4.5. Collative process:-

A collative process is one which tries to find out the effect of existing law, in relation to other existing law, i.e. its objective is to compare the two set of rules to find out which one is more workable and by which the desired effect may be achieved.

4.6. Impact analysis process:-

This kind of research is carried on to find out the impact of an established or newly formed legal principle, rule or institution. In the area of planning this kind of study assumes much significance. On the basis of the outcome of the research necessary changes may be made wherever necessary. It helps us to change our outlook towards the objective sought to be achieved. Thus it is a preliminary step to law reform.

4.7. Interactive process:-

Law does not operate in vacuum. It operates in society. There are a number of other factors, which interact with it. These factors are of various types such as formal or non-formal, permanent or transitory. A legal researcher can't be insensitive to such factors of society which annihilate the entire fabric of law. Since law is a part of the society, therefore, the law should be such as that it can work in the society.

4.8. Interpretative process:-

This kind of research aims at interpreting the various words and phrases used in defining the law. The researcher makes effort to give a particular word, a specific meaning by using his own logic and authoritative opinion of the people. This kind of research is confined mostly to the study of statutes, text and judicial pronouncement and is done by analyzing the words. It helps acquire clarity, consistency, uniformity in the meaning of the legal writing.

4.9. Scope of legal research:-

In modern times law has assumed much significance. It provides for and dominates almost all activities of human beings, it has been accepted that law is perhaps most important of social change. When an individual deals with his property or he enters into employment or he causes injury to someone, he fails to pay his dues or he deals with his spouse and children or the Government affects his property or his personal rights, he comes in contract with law and either he or his opponent obtains remedy in accordance with the existing law and where there is no law, according to the discretion of the Court. The scope of legal research may base on justice, equity and good conscience, thus, be summed up as follows:-

- It helps the Government in formulating suitable laws in pursue its economic and social policies.
- It helps in solving various operational and planning problems pertaining to business and industry and tax.
- It helps the Courts in solving the problem without much delay and in such a way that the problem may not require at all or at least in near future.
- It helps the legal practitioner in taking a decision as to how he should tackle the problem in hand.

Law may be termed as a behavioral science as it regulates human behaviors. It is expressed in words which are used in particular context. Whatever may be the source of law, it can't provide remedy for all the situations and for all the time to come. Changes in society demand that law should move with the time if it has to remain alive and active and it can remain alive, active and useful.

Research is an enquiry for the verification of a fresh theory or for supplementing prevailing theories by new knowledge. Research knowledge is the extension of an existing knowledge, no research can be said to be absolutely new. Research is original and fundamental contribution to the knowledge on legal subject

or discipline leading for its advancement. The act of searching into a matter closely and carefully, inquiry directed to the discovery of truth.

5.1. Legal research Design:-

Legal research design is the appropriate framework for legal study. Legal research design is a very significant decision to make research approach. It determines the relevant information obtained from the research study. The research design offers relevant aspects of the phenomena to the research profile. The research design enables the researcher to gather data from wide range of respondents. Research strategy, research design, research methodology, the study area, data sources (primary data sources and secondary data sources), population consideration and sample size determination (Questionnaires and workplace measurement) in order to explore the objective of the study. The study is various strategies to obtain data from all aspects during the study period. The purpose of the research design is to clarify the research plan and aim of the researcher.

Research design must at least, contain-

- A clear statement of the research problem.
- Object of the research.
- Procedures and techniques to be used for gathering information.
- The population to be studied.
- Methods to be used in processing and analyzing data.

The above stated design decisions; one may split the overall research design into the following parts:-

- ✓ Sampling design:- The sampling design which deals with the method of selecting items to be observed for the given study.
- ✓ Observational design:- The observational design which concerns with the question or how many items are to be observed and how the information and data gathered are to be analyzed.
- ✓ Operational design:- The operational design which deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

5.2. Preparation of the Legal research design:-

A research design is the arrangement of circumstances for collection and analysis of data in a manner that aims to merge relevance to the research purpose in procedure. Research design, in fact, has a great bearing on the reliability of the results arrived at and such constitutes the firm foundation of the entire edifice of the research work. We need a research design, a plan, in advance of data collection and analysis for our research project.

6. Legal Research Problem:-

The formation of the topic in to a research problem is the first step in a scientific enquiry. The term "problem" comes from the Greek word "proballein" which means anything through forward, a question proposed for solution, a matter stated for examination.

R.S. Woodworth defines problem as, "a situation for which we have no ready and successful response by instinct or by previously acquired habit. We must find out what to do."

John Dewey states," the need of clearing up confusion, of strengthening out ambiguity, of overcoming obstacles, of covering the gap between things as they are and as they may be when transformed is problem."

Cohen and Nagal, "it is a superficial view that the truth is to be found by studying the facts." It is the difficulty of problem which guides our research for some order among the facts in terms of which difficulty is to be removed.

A problem in simple word is some difficulty experienced by the researcher in a theoretical or practical situation. When we have to begin a new project we usually plan regarding what, why, where, when, how, how much, by what means etc. This is with reference to an inquiry or a research study which constitutes a research design. A research design is the arrangement of circumstances for collection and analysis of data in a manner that aims to merge relevance to the research purpose in procedure.

6.1. Formulation of Legal research problem:-

There are several issues or problems arising in the society. We have to understand and select some important issues or problems so that our work supply a solution on that issue or it can be used as a guideline for the preparing the solution. Research must be carried out with a motive or object. We will have to decide the "universe" of our study. There is plethora of information but only the relevant material has to be taken into consideration. Only the required category has to be selected. The researcher gets the timeline to work. Hence a stipulated time period has to be fixed. Data as we know one has to collect from various sources- primary and secondary sources. Analysis of content is central activity whenever one is concerned with the study of nature of the verbal materials. After the data have been collected, the researcher has to sum up the collected data and organize it in such a manner that will yield answers to the research questions.

A problem can be called legal research problem only when it satisfies the following conditions:-

- The problem must be worth studying.
- It must have social and legal relevance.
- There must be facts needed for research.

- It must come out with practical solution to the issues.
- It must be up to date.
- It must involve clarity of meaning and scope of study.
- It must be original.
- It must be verifiable and testable.

6.2. Criteria of legal research Problem:-

Goode and Hatt gives the following criteria for the selection of problem:-

- The researcher's interest, intellectual curiosity and drive.
- The urgency of the problem.
- Practicability.
- Anticipating customs.
- Resources, training and personal qualifications.

6.3. Statements consist of five parts:-

- Statement of general topics.
- Goals.
- Specific objectives.
- Definitions.
- Relationship to exiting knowledge.

7. Review of Tentative Literature relevant to selected problem:-

The researcher must be well-equipped to experience some difficulty or challenge. The researcher must know the relevant theories in the fields, reports and records. Once a problem is formulated a brief summary of it should be prepared. For this the researcher must undertake an extensive survey of the available literature on the subject, preferably connected with the problem. For this purpose, the abstracting and indexing journals, published and unpublished bibliographies should first of all be examined. Academic journals, conference proceedings Government reports, reference books and text books, depending on the nature of the problem must be seen. One source of information leads to another. Therefore, earlier study if any, relating to the topic should be carefully examined. A good library is must for this purpose. In our country, very few law libraries are in a position to help a researcher in this regard because most of the libraries are ill-equipped and lack up to date literature. A part from the library of the Indian Law Institute and libraries of some Universities rest are not of much help to a researcher. The libraries of the High Courts and Supreme Court are in a better position to assist a researcher, but every researcher can't reach them.

Therefore, most of the researcher in our Country, have to rely on the meager resources available to them and that is perhaps or the biggest reason, why legal researches are not of very high standard.

A scholar of law, at this stage, is expected to cautiously outline his work and survey around to lay his hands on standard material. Some important reference material can be look into as follows:-

- Standard textbooks written by reputed authors.
- Reference books having on the research problem.
- Legal periodicals locate research articles.
- Case reports with the judicial exposition of the problem.
- Conference, Seminars proceedings.
- Government Committee Reports.
- General web pages.
- Earlier studies done.

Literature review helps the researcher to know and to have his preliminary impression about:-

- The investigated and uninvestigated aspects of the problem.
- The explanations offered or issues rose with without offering solutions thereof.
- The offered explanations of the problem and their inter-relationship.
- Competence of previous authors or researchers in explaining the problem.
- Conceptual issues rose.
- The operational framework of previous researchers.
- Research techniques used in the previous research.

Main purposes of literature review can be summarized as follows:-

- The work done on the particular topic in the past.
- Calculate / estimate the limitations of the work.
- Get familiar with research techniques used.
- Make out the kind of material/data used.
- Appreciate competence of the data used for drawing the calculation.
- Know the vital arguments advanced.
- Acquaint with patterns of the presentation of previous arguments.
- Established relationship between these arguments and the concepts.

8. Kinds of legal research:

Legal research work may be divided into:

(1).Doctrinal or traditional research;

(2).Non-doctrinal or empirical research.

8.1. Doctrinal research or traditional research:

A doctrinal research means a research that has been carried out on a legal proposition by way of analyzing the existing statutory provisions and case laws by applying logic and reasoning power.

It involves analysis of case law, arranging, ordering and systematizing legal propositions and study of legal institutions, but it does more-it creates law and its major tool through legal reasoning or rational deductions. In the opinion of Boomin, this kind of research represents more a practical regulative ideal of how the judicial process ought to be conceived by the judiciary than theoretical analysis of its actual structure and functioning. If it is found to be unjust, it may be modified or changed to meet the present requirement.

This kind of research is carried on by all the Judges, Lawyers and law teachers.

The two most important examples of doctrinal research are the law of torts and administrative law. These two areas of law have been developed by the Judges rather than the theoretical researchers.

The secondary sources like text books on law, commentaries don't possess as much authority as the original sources possess. Hence, quality of doctrinal research depends upon the source of material on which the researcher depends upon for his study.

The doctrinal legal research attempts to verify the hypothesis by a firsthand study of authoritative sources. A doctrinal researcher should know how to use a law library for the major portion of his research methodology concerns with the identification of authoritative sources and use the techniques to find them out.

8.1.1. Doctrinal research looks at the following issues:-

- The aim of preferred values.
- The problems posed by the gap between the policy goal and the present state of achievement.
- Availability of alternative choice for the implementation of goals.
- The predictions and consequences that were made.

8.1.2. Features of doctrinal research: The following are the essential features of doctrinal research;

- The scholar organizes his study around legal proposition;
- Appellate Court reports and other conventional legal materials are readily accessible.

8.1.3. Characteristics of Doctrinal Research:-

- Propositions based study.
- Conventional legal theory and court decisions report are the sources for doctrinal research.
- It includes the law as it is existing form.

8.1.4. Advantages of doctrinal research:-

- It provides lawyers, judges and others with the tools needed to reach decisions on immense variety of problems within a limited time frame.
- It provides sound background for outstanding scholarship and it helps in smooth functioning of the legal system of the society.
- The doctrinal research may provide appropriate guidance and hence it is of informational value.
- There are certain concepts, e.g. ultra-virus doctrine which can be improved.
- It is more flexible in character.

8.1.5. Disadvantages of doctrinal research:-

- It operates in society, therefore knowledge of social policy, facts and social value in essential for the researcher.
- A doctrinal researcher faces difficulties in giving concrete shape to his work.
- A doctrinal researcher analyses legislations, case laws and customary principles to draw his interferences.
- The language of law is difficult to understand and to interpret.

8.2. Non-doctrinal research or empirical research:-

Conducting empirical research in law is of recent origin. Empiric means "relying solely on observation and experiment not theory." The empirical research is carried out by collecting and gathering data or information by a firsthand study into the universe. The empirical research technique is also called as "fact research". Arthur Nussbaum observed, "by fact research in law, we mean the systematic search in to the social, political and the other fact conditions which give rise to individual rules and examination of the social, political and other effects of these rules."

Empirical research is an enquiry that attempts to discover and verify general rules allowing understanding. The methods like observation, interview, questionnaire, survey and case study are used to discover the human conduct. All enquires are not suitable to empirical methods. Any enquiry whose objective is to determine what is good and what is evil can't discover the admissible physical evidence. Research into the value system and moral questions are also not amenable to empirical methods.

The empirical research is carried on by collecting or gathering information by first hand study of the subject, it relies on experience or observation without due regard to any theory or system and hence it is also called as experimental type of research. In this type of research, the researcher attempts to investigate effect or impact by actual examination or observation of the functioning of law legal institutions in the society. It also concerns with the identification and creating an awareness of the new problems which need to be tackled through law conducting empirical research. This kind of research is not very popular among the researchers especially lawyers and judges.

8.2.1. Characteristics of empirical research:-

- It tries to find out the impact of non-legal events upon the legal decision process.
- It seeks to identify and appraise the degree of variables which influence the outcome and legal decision-making.
- It tries to find out the effect of each decision on people and society.

8.2.2. Limitations of empirical research:-

Lack of financial support.

- Other disciplines had shed away from the study of legal order.
- The contributions of legal professors are very less due t their pre-occupation with their profession.
- Lack of training in the use of techniques of this research. Most of the steps of research such as collection of data, field work, formation of hypothesis etc. are unknown to the legal researcher.
- Legal researchers lack of a tradition that enable them to strengthen the empirical research.
- Unfavorable and arrangement attitude towards the empirical research.
- The use of qualitative measurement techniques are very difficult to understand by legal researchers.

8.2.3. Features of empirical research:-

- It lays a different and lesser emphasis upon doctrine.
- It seeks to answer broader and more numerous questions.
- It is not anchored exclusively to appellate reports and other traditional legal resource for its data.

- It may involves the use of research perspectives research designs, conceptual frameworks, skills and training not peculiar to law trained personnel.

8.2.4. Merits of empirical research:-

- It is not the empirical kind of research is always bad for legal purpose.
- The examination of actual functioning of law in society is extremely useful for ascertaining the acceptance of a new law or ascertaining the course of law reform.
- It gives us an insight for understanding as to what kind of law the present day society needs.
- Empirical research has given rise to the sociological school of jurisprudence.

8.2.5. Demerits of empirical research:-

- It is time consuming and costly.
- It needs a strong base of doctrinal research. The researcher must have strong base of legal doctrines, case law and legal institutions.
- It is extremely weak in solving a problem in hand.
- It can't give a direction as to what course the law should follow to be useful.
- It can't remain unaffected from human vices, upbringing and thinking.

9. Legal Reasoning- Deductive and Inductive method:-

Reasoning is a process of the thought aimed at reaching or justifying a conclusion. The process involves a consideration of facts, impressions, experiences and principles, objectives and ideals. Reasoning means logical reasoning and it is based upon a simple formula called the "Syllogism". Syllogism consists of a major premise, a minor premise and a conclusion. The major premise sets forth a proposition. The minor premise states a fact related to the proposition and the conclusion is one which follows from it. The decisions must be supported by reasons; they must not be the products of arbitrary action. To be reasonable does not necessarily mean to be logical, because sometimes, it leads to injustice, which should be avoided because, law deals with human beings rather than things.

Deductive and inductive are the two aspects of logical reasoning typical of scientific research.

9.1. Deductive Method:-

Deductive is that method of logical reasoning that goes from the general premises assumed to be true to a specific conclusion. In other words, deductive is the process of deriving conclusion from the premises that are assumed to be true. Deductive is the most common type of logic. The basic aim of deductive is to start with some assumption or premise and reach to a logical conclusion. Deductive arguments assert that the conclusion is arrived at, necessarily from the truth of the premises. Deductive

method is the opposite of Inductive method. The researcher is required to proceed from general to particular, from abstract to concrete and from formulae to examples. The procedure mostly consists of telling a formula and solving problems through these formulas. After the researcher finds a number of relevant problems being solved, he accepts the formula.

e.g. Human beings are mortal   1. All animals are mortal (Major Premise)

    A is a human being   2. Dog is an animal (Minor Premise)

    Therefore, A is mortal.   3. Therefore, dog will die (Conclusion)

The method of syllogism or deduction, however useful, has the following limitations:

- The conclusion of a syllogism is always derived from the content of premises. Therefore, if the premises are unrelated or if one of the premises is erroneous, the conclusion arrived at will not be valid.
- Another serious limitation of the deductive reasoning is its dependence upon verbal symbolism.
- Deductive reasoning can systematize what is already known and can identify new relationships as one proceeds from known to unknown, but it cannot be relied upon as a self-sufficient method for securing reliable knowledge.

9.2. Inductive Method:-

Inductive method is a scientific method. It is a method of arriving at a particular formula with help of sufficient number of concrete examples. Inductive method leads from concrete to abstract, from particular to general and from example to general rules. Thus it implies that it is based on induction which means providing on universal truth by showing if it is truth for a particular case .Thus it is a logical way of approach where by the researcher is induced to go on with reasoning.

Francis Bacon introduced the concept of inductive. Inductive is the process of taking data, a number of instances from experience, appeals to signs, evidence or authority and causal relationship, classifying them into categories and then determining logically from them one or more generally applicable rules. In other words, inductive is a method of logical reasoning that goes from specific set of premises based mainly on experience or experimental evidence to a general conclusion. Inductive arguments assert that the conclusion is arrived at not necessarily, but probably from the truth of the premises.

e.g. A is a human being

    A is mortal

    Therefore, human beings are mortal.

Inductive reasoning is going from the particular to the general. Rather than accepting premises laid down by authorities as absolute all the facts, to study these facts in order to reach minor generalizations, then to proceed from minor generalization refers, when examining all the instances of phenomenon under study is not practical, one may arrive at a generalization or theory by observing only some instances that make up the phenomenon. This is known as imperfect induction.

Complementarily between induction and deduction:
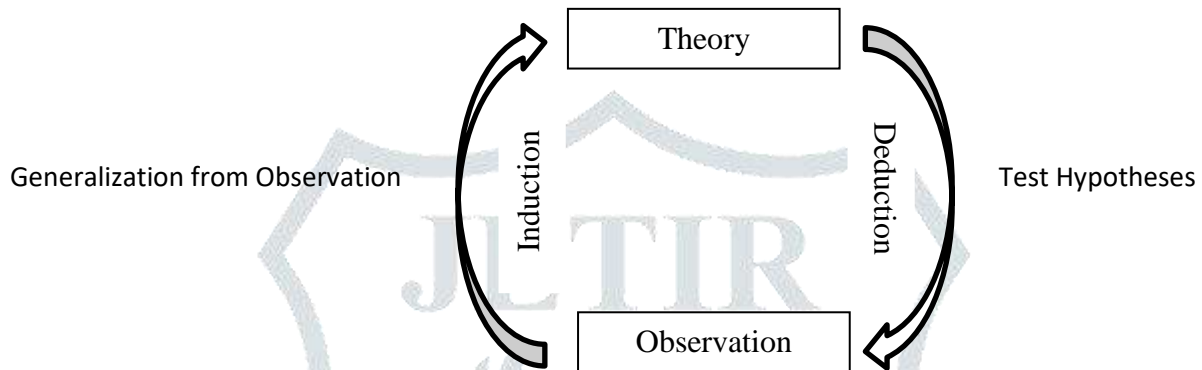
10. Sampling Method:-

A sample is defined as a smaller set of data that a researcher chooses or selects from a larger population by using a pre-defined selection method. These elements are known as sample points, sampling units, or observations. Creating a sample is an efficient method of conducting research. In most cases, it is impossible or costly and time-consuming to research the whole population. Hence, examining the sample provides insights that the researcher can apply to the entire population.

Sampling is a process used in statistical analysis in which a predetermined number of observations are taken from a larger population. The methodology used to sample from a larger population depends on the type of analysis being performed, but it may include simple random sampling or systematic sampling.

In research design, population and sampling are two important terms. A sample is a subset of the population. The sample size is the number of individuals in a sample. The more representative the sample of the population, the more confident the researcher can be in the quality of the results.

Sampling method is to obtain the maximum information about the population without examining each and every unit of the population. It is to find the reliability of the estimates derived from the sample, which can be done by computing the standard error of the statistic.

10.1. Methods of sampling from a population:-

The process of deriving a sample is called a sampling method. Sampling forms an integral part of the research design as this method derives the quantitative data and the qualitative data that can be collected as part of a research study. Sampling methods are characterized into two distinct approaches: probability sampling and non-probability sampling.

10.1.1. Probability sampling:-

Probability sampling is a method of deriving a sample where the objects are selected from a population-based on the theory of probability. This method includes everyone in the population, and everyone has an equal chance of being selected. Hence, there is no bias whatsoever in this type of sample. Each person in the population can subsequently be a part of the research. The selection criteria are decided at the outset of the market research study and form an important component of research.

10.1.2. Random sampling:-

Random sampling is analogous to putting everyone's name into a hat and drawing out several names. Random sampling is analogous to putting everyone's name into a hat and drawing out several names. Each element in the population has an equal chance of occurring. While this is the preferred way of sampling, it is often difficult to do. It requires that a complete list of every element in the population be obtained. Computer generated lists are often used with random sampling.

Simple random sampling is the most straightforward way of selecting a sample is simple random sampling. In this method, each member has an equal chance of being a part of the study. The objects in this sample population are chosen purely on a random basis, and each member has the same probability of being selected. For example, if a university dean would like to collect feedback from students about their perception of the teachers and level of education, all 1000 students in the University could be a part of this sample. Any 100 students can be selected at random to be a part of this sample.

10.1.3. Systematic sampling:-

Systematic sampling is easier to do than random sampling. Systematic sampling is easier to do than random sampling. In systematic sampling, the list of elements is "counted off". That is, every kth(sample interval) element is taken. This is similar to lining everyone up and numbering off "1,2,3,4; 1,2,3,4; etc.". When done numbering, all people numbered 4 would be used.

Systematic sampling is a sampling method where the researcher chooses respondents at equal intervals from a population. The approach to select the sample is to pick a starting point and then pick

respondents at a pre-defined sample interval. For example, while selecting 1,000 volunteers for the Olympics from an application list of 10,000 people, each applicant is given a count of 1 to 10,000. Then starting from 1 and selecting each respondent with an interval of 10, a sample of 1,000 volunteers can be obtained.

10.1.4. Stratified sampling:-

Stratified sampling also divides the population into groups called strata. However, this time it is by some characteristic, not geographically. For instance, the population might be separated into males and females. A sample is taken from each of these strata using either random, systematic, or convenience sampling.

Stratified random sampling is a method of dividing the respondent population into distinctive but pre-defined parameters in the research design phase. In this method, the respondents don't overlap but collectively represent the whole population. For example, a researcher looking to analyze people from different socioeconomic backgrounds can distinguish respondents into their annual salaries. This forms smaller groups of people or samples, and then some objects from these samples can be used for the research study.

10.1.5. Clustered sampling:-

Cluster sampling is accomplished by dividing the population into groups -- usually geographically. These groups are called clusters or blocks. The clusters are randomly selected, and each element in the selected clusters is used.

Cluster sampling is a type of sampling method where the respondent population is divided into equal clusters. Clusters are identified and included in a sample based on defining demographic parameters such as age, location, sex, etc. This makes it extremely easy for a survey creator to derive practical inferences from the feedback. For example, if the FDA wants to collect data about adverse side effects from drugs, they can divide the mainland US into distinctive clusters, like states. Research studies are then administered to respondents in these clusters. This type of generating a sample makes the data collection in-depth and provides easy to consume and act upon, insights.

10.2. Non-probability sampling:-

The non-probability sampling method uses the researcher's discretion to select a sample. This type of sample is derived mostly from the researcher's or statistician's ability to get to this sample. This type of sampling is used for preliminary research where the primary objective is to derive a hypothesis about the topic in research. Here each member does not have an equal chance of being a part of the sample population, and those parameters are known only post-selection to the sample.

We can classify non-probability sampling into four distinct types of samples. They are:

10.2.1. Convenience sampling:-

Convenience sampling is very easy to do, but it's probably the worst technique to use. In convenience sampling, readily available data is used. Convenience sampling, in easy terms, stands for the convenience of a researcher accessing a respondent. There is no scientific method of deriving this sample. Researchers have nearly no authority over selecting the sample elements, and it's purely done on the basis of proximity and not representativeness. This non-probability sampling method is used when there is time and cost limitations in collecting feedback. For example, researchers that are conducting a mall-intercept survey to understand the probability of using a fragrance from a perfume manufacturer. In this sampling method, the sample respondents are chosen purely on their proximity to the survey desk and their willingness to participate in the research.

10.2.2. Quota sampling:-

Quota sampling is a method of collecting a sample where the researcher has the liberty to select a sample based on their strata. The primary characteristic of this method is that two people cannot exist under two different conditions. For example: when a shoe manufacturer would like to understand from millennials their perception of the brand with other parameters like comfort, pricing, etc. It selects only females who are millennials for this study as the research objective is to collect feedback about women's shoes.

10.2.3. Judgement/Purposive sampling:-

The judgmental or purposive sampling method is a method of developing a sample purely on the basis and discretion of the researcher purely on the basis of the nature of study along with his/her understanding of the target audience. In this sampling method, people who only fit the research criteria and end objectives are selected, and the remaining are kept out. For example, if the research topic is understanding what University a student prefers for Masters, if the question asked is "Would you like to do your Masters?" anything other than a response, "Yes" to this question, everyone else is excluded from this study.

10.2.4. Snowball sampling:-

Snowball sampling or chain-referral sampling is defined as a non-probability sampling technique in which the samples have traits that are rare to find. This is a sampling technique, in which existing subjects provide referrals to recruit samples required for a research study. For example, while collecting feedback about a sensitive topic like AIDS, respondents aren't forthcoming with information. In this case, the

researcher can recruit people with an understanding or knowledge of such people and collect information from them or ask them to collect information.

10.3. How to determine a sample size:-

As we have learned above, the right sample size is essential for the success of data collection in a market research study. But is there a correct number for sample size? What parameters decide the sample size? What are the distribution methods of the survey? To understand all of this and make an informed calculation of the right sample size, it is first essential to understand four important variables that form the basic characteristics of a sample. They are:

- **Population size:** The population size is all the people that can be considered for the research study. This number, in most cases, runs into huge amounts. For example, the population of the United States is 327 million. But in market research, it is impossible to consider all of them for the research study.
- **The margin of error (confidence interval):** The margin of error is depicted by a percentage that is a statistical inference about the confidence of what number of the population depicts the actual views of the whole population. This percentage helps towards the statistical analysis in selecting a sample and how much error in this would be acceptable.
- **Confidence level:** This metric measure where the actual mean falls within a confidence interval. The most common confidence intervals are 90%, 95%, and 99%.
- **Standard deviation:** This metric covers the variance in a survey. A safe number to consider is 0.5, which would mean that the sample size has to be that large.

Calculating sample size:

To calculate the sample size, you need the following parameters.

- Z-score: The Z-score value can be found,
- Standard deviation
- Margin of error
- Confidence level

To calculate use the sample size, use this formula:

Sample Size = $(\text{Z-score})^2$ x Std Dev x (Std Dev) / $(\text{margin of error})^2$

Consider the confidence level of 90%, standard deviation of .6 and margin of error, +/-4%

$((1.64)^2$ x .6(.6)) / $(.04)^2$

$= (2.68x\ 0.36) /0\ .0016$

$= 0.9648 /0\ .0016$

$= 603$

603 respondents are needed and that becomes your sample size.

Try our sample size calculator for give population, margin of error and confidence level.

Sampling advantages:

As shown above, there are many advantages to sampling. Some of the most significant advantages are:

- **Reduced cost & time:** Since using a sample reduces the number of people that have to be reached out to, it reduces cost and time. Imagine the time saved between researching with a population of millions vs. conducting a research study using a sample.
- **Reduced resource deployment:** It is obvious that if the number of people involved in a research study is much lower due to the sample, the resources required are also much less. The workforce needed to research the sample is much less than the workforce needed to study the whole population.
- **Accuracy of data:** Since the sample is indicative of the population, the data collected is accurate. Also, since the respondent is willing to participate, the survey dropout rate is much lower, which increases the validity and accuracy of the data.
- **Intensive & exhaustive data:** Since there are lesser respondents, the data collected from a sample is intense and thorough. More time and effort is given to each respondent rather than having to collect data from a lot of people.
- **Apply properties to a larger population:** Since the sample is indicative of the broader population, it is safe to say that the data collected and analyzed from the sample can be applied to the larger population, and it would hold true.

To collect accurate data for research, filter bad panelists, and eliminate bias by applying different control measures. If you need any help with arranging a sample audience for your next market research project, get in touch with us on sales@questionpro.com. We have more than 22 million panelists across the world.

11. Hypothesis:-

11.1. Meaning-

A tentative solution suggested to a problem is called a hypothesis. MC Guigan (1989) has defined hypothesis as a testable statement of a potential relationship between two or more variables. A hypothesis is usually framed depending one or more of the following sources:-

✓ Facts established by previous investigations in the related areas.

✓ Through the investigator's reasoning, insight and logical derivation from a theory.

For any reason, if the investigator cannot make use of any of the above sources to frame a hypothesis, he will have to resort to null hypothesis, which assumes no relationship between the variables under consideration.

MC Guigan suggested the following criteria to frame a good hypothesis:-

- The hypothesis must be an adequate answer to the specific problem that demanded an answer.
- The hypothesis should have logical simplicity.
- The hypothesis should be exposed in a quantified from or be susceptible to convenient quantification.
- The hypothesis must be variable.
- The hypothesis must be stated in such a way as to allow it to be refuted.

Hypothesis is a supposition or proposed explanation made on the basis of limited evidence as a starting point for further investigation. It is a tentative solution suggested to problems. Hypothesis typically is either rejected as false or accepted as true. A research hypothesis is a specific, clear and testable proposition or predictive statement about the possible outcome of the research study based on a particular property of a population. Hypothesis is an idea or explanation for something that is based on known facts but has not yet been proved.

A hypothesis is the tentative assumption made in order to draw out and test its logical consequences. In its most elementary stage the hypothesis may be any hunch, guess, imaginative ideas which becomes the basis for action or investigation. The development of the hypothesis is important since it provides the focal point for research. It helps in the analysis of the material pertaining to the subject. It should be specific and limited to the piece of research in hand because it has to be tested. It helps in delimiting the area of research and keeps the researcher on the right track. It sharpens his thinking and focuses his attention on the more important facets of the problem.

After gathering and evaluating data, the next step is to draw tentative inferences or preliminary hypothesis. It is tentative solution which may be accepted or rejected, one may draw many hypotheses, one

of them may turn out to be the correct solution. Forming of hypothesis is not a simple process. The worth of these possible solutions depends largely on the intelligence and originality of the problem solver.

Gates and others suggest three steps in evaluating hypothesis:

- One should determine whether the conclusion completely satisfied the demands of the problem.
- He should find out whether the solution is consistent with other facts and principles which have been well established.
- He should make deliberate which for negative instances which might create doubt upon the conclusion.

11.2. Types of Research hypothesis:

(i).Simple Hypothesis: It predicts the relationship between a single dependent variable and a single independent variable.

(ii).Complex Hypothesis: Complex hypothesis is relationship among variables. In this hypothesis dependent and independent variables are more than two.

(iii).Directional Hypothesis: Directional hypothesis predicts the direction of relationship between the independent and dependent variables.

(iv).Non-directional Hypothesis: Non-directional hypothesis predicts the relationship between the independent and dependent variable and does not specific the relationship.

(v).Associate Hypothesis: Associate hypothesis predicts an associate relationship between independent and dependent variable.

(vi). Causal Hypothesis: Causal hypothesis predicts a cause and effects relationship between independent and dependent variable.

(vii).Logical Hypothesis: A logical hypothesis is a proposed explanation possessing limited evidence.

(viii).Statistical Hypothesis: A hypothesis which can be verified statistically called statistical hypothesis. The statement would be logical or illogical.

(ix).Question Form Hypothesis: In question form hypothesis investigation and research are adequately implemented by question.

(x). Null Hypothesis: A null hypothesis challenges the assertion of a declarative hypothesis and denies it altogether. It states that even where it seems to hold good it is due to mere chance. It is for the researcher to reject the null hypothesis by showing that the outcome mentioned in the declarative hypothesis does not occur a quantum of it is such that it cannot be easily dismissed as having occurred by chance. The criteria

for rejecting the null hypothesis may differ. Sometimes null hypothesis is rejected only when the quantity of the outcome is also large that the probability of its having occurred by mere chance. The null hypothesis should not be used as an alternative to the declarative one, but should be used in combination with it for statistical purpose. Null hypothesis can be tested statistically; they are often termed as statistical hypothesis. They are also called the testing hypothesis when declarative hypothesis are tested statistically by converting them into null form.

(xi).Alternative Hypothesis: Alternative hypothesis is one which a difference between two or more variables is anticipated by the researchers. Alternative Hypothesis denoted by H1 or Ha. Sample observations are influenced by non- random cause. It is a hypothesis that a random cause may influence the observed data or sample.

11.3. Testing of Hypothesis:-

Hypothesis is considered as the principal instrument in research. Its main function is to suggest new experiments and observation. In fact many experiments are carried out with the deliberate object of testing. Hypothesis testing is an act in statistics regarding a population parameter. Hypothesis testing is used to assess the plausibility of a hypothesis by using sample data. Data may come from a larger population or from a data generating process. Hypothesis testing is the process used to evaluate the strength of evidence from the sample and provides a frame work for making determinations related to the population. It provides a method for understanding observed findings in a sample under the study. The investigator formulates a specific hypothesis, evaluates data from the sample and uses these data to decide whether they support the specific hypothesis.

Hypothesis Testing is the often used strategy for deciding whether a sample data often such support for a hypothesis that generalization can be made. Thus hypothesis testing enables us to make probability statement about Population parameters. The hypothesis may not be proved absolutely, but in practices it's accepted if it has with stood a critical testing. Before we explain how hypothesis are tested through different Tests meant for the purpose, it will be appreciation to explain clearly the meaning of hypothesis and the related concepts.

11.4. Types of Hypothesis Test:-

11.4.1. Parametric test:

Parametric test usually assume certain properties of the parent population from which samples are drawn. Assumption like observation comes from a normal population. Sample size is large assumption about the population parameters like mean, variance etc. Must hold good before parametric test can be used but there are situation when the researcher cannot or does not want to make such assumptions.

(i)T-test:

- T-test is an inferential statistic to determine significant difference between the means of two groups.

- T-test is one of many tests used for the purpose of hypothesis testing in statistics. It is mostly used when the data sets recorded as the outcome from flipping a coin 100 times, would follow a normal distribution and may have unknown variances.

- T-test is used as a hypothesis testing tool allows testing of an assumption applicable to a population.

- T-test looks at the t-statistic, the t-distribution values and the degrees of freedom to determine the statistical significance to conduct a test with three or more means, one must use an analysis variance.

- T-test assesses the means of two groups statistically difference from each other. This analysis is appropriate when we compare the means of two groups.

- T-test is a statistical hypothesis test used to determine unknown population mean different from a specific value.

- The t-test is usually performed in samples of a smaller size less than 30.

The formula for a one-sample t-test is expressed using the observed sample mean, the theoretical population means, sample standard deviation, and sample size. Mathematically, it is represented as, **t = (x̄ − μ) / (s / √n)**

T-test formula:

T-tests can be performed either manually by using a formula or through some software.

The formula for the manual calculation of t-value is given below:

$$t = \frac{\bar{x} + \mu}{\frac{\sigma^2}{\sqrt{n}}}$$

where **x̄** is the mean of the sample, and **μ** is the assumed mean, **σ** is the standard deviation, and **n** is the number of observations.

T-test for the difference in mean:

$$t = \frac{\overline{X1} - \overline{X2}}{\sqrt{\frac{(n1-1)\sigma1^2 + (n2-1)\sigma2^2}{n1+n2-2}} \times \sqrt{\frac{1}{n1} + \frac{1}{n2}}}$$

where **x̄1** and **x̄2** are the mean of two samples and **σ1** and **σ2** is the standard deviation of two samples, and **n1** and **n2** are the numbers of observation of two samples.

T-test example:

If a sample of 10 rubber bands is found to have a mean breaking strength of 527 kgs, is it feasible to regard the sample as a part of a large population with a mean breaking strength of 578 kgs and a standard deviation of 12.72 kgs? Test at 5% level of significance.

Taking the null hypothesis that the mean breaking strength of the population is equal to 578 kgs, we can write:

H_0 : μ = 578 kgs
H_a : $\mu \neq$ 578 kgs
$\bar{x}$ = 527 kgs , σ = 12.72 , n = 10.
Based on the assumption that the population to be normal, the formula for the test statistic t can be written as:

$$t = \frac{\bar{x} + \mu}{\frac{\sigma^2}{\sqrt{n}}}$$

t = (527+578) / (12.72^2/√10)
t=1105/
t = 21.597

As H_a is two-sided in the given question, a two-tailed test is used for the determination of the rejection regions at a 5% level of significance which comes to as under, using normal curve area table:
$R : |t| > 1.96$
The observed value of t is -1.488 which is in the acceptance region since $R: |t| > 1.96$, and thus, H_0 is accepted.
(ii).F-test:

- F-test is used in order to carry out the test for the equality of two population variances. Samples have been drawn from a normal population with same variability.

- F-test is used to compare the statistical models as per the data available.

- ANOVA uses the F-test to determine the variability of the observations within the groups.

- Ratio is sufficiently large that not all the means are equal. Sir Ronald A. Fisher has given to this formula as F-test formula.

F- test using technology, the following steps are there:

- State the null hypothesis with the alternate hypothesis.

- Calculate the F-value, using the formula.

- Find the F- Statistic which is the critical value for this test. This F-statistic formula is the ratio of the variance of the group means divided by the mean of the within-group variances.

- Finally, support or reject the Null Hypothesis.

Formula for F-test to compare two variances:

A Statistical F Test uses an F Statistic to compare two variances, by dividing them. The result will always be a positive number because variances are always positive. Thus, the equation for comparing two variances with the F-test is:

To compare the variances of two different sets of values, the F-test formula is used. Applied on F- distribution under the null hypothesis, first, we have to compute the mean of two given observations and then after calculating their variance.

We always test that the population variances are equal while running an F-test. In other words, we always assume that the variances are equal to 1. Thus, our null hypothesis will always be that the variances are equal.

Examples for F-test formula:

F-test on the following samples:

Sample-1: having variance = 109.63, sample size = 41.

Sample-2: having Variance = 65.99, sample size = 21.

Solution:

Step-1:- First write the hypothesis statements as:

H_0: No difference in variances.

H_a: Difference in variances.

Step-2:- Calculate the F-critical value. Here take the highest variance as the numerator and the lowest variance as the denominator:

Step-3:- Calculate the degrees of freedom as: The degrees of freedom in the table will be the sample size -1, so for sample-1 it is 40 and for sample-2 it is 20.

Step-4:- As, no alpha level was given in the question, so we may use the standard level of 0.05. This needs to be halved for the test, so use 0.025.

Step-5:- We will find the critical F-Value using the F-Table. We will use the table with 0.025. Critical-F for (40, 20) at alpha (0.025) is 2.287.

Step-6:- Compare the calculated value to the standard table value. If our calculated value is higher than the table value, then we may reject the null hypothesis. Here, $1.66 < 2.287$. So, we cannot reject the null hypothesis.

(iii).Z-test:

Z-test is a statistical tool used for the comparison or determination of the significance of several statistical measures, particularly the mean in a sample from a normally distributed population or between two independent samples.

- Like t-tests, z tests are also based on normal probability distribution.
- Z-test is the most commonly used statistical tool in research methodology, with it being used for studies where the sample size is large than 30.
- In the case of the z-test, the variance is usually known.
- Z-test is more convenient than t-test as the critical value at each significance level in the confidence interval is the sample for all sample sizes.
- A z-score is a number indicating how many standard deviations above or below the mean of the population is.
- Z-test is performed in studies where the sample size is larger, and the variance is known.
- It is also used to determine if there is a significant difference between the mean of two independent samples.
- The z-test can also be used to compare the population proportion to an assumed proportion or to determine the difference between the population proportions of two samples.

Z-test formula:

For the normal population with one sample:

$$Z = \frac{\bar{x} + \mu}{\frac{\sigma^2}{\sqrt{n}}}$$

where x̄ is the mean of the sample, and **μ** is the assumed mean, **σ** is the standard deviation, and **n** is the number of observations.

Z-test for the difference in mean:

$$z = \frac{\overline{X1} - \overline{X2}}{\sqrt{\sigma^2 \left(\frac{1}{n1} + \frac{1}{n2}\right)}}$$

where x̄1 and x̄2 are the means of two samples, **σ** is the standard deviation of the samples, and **n1** and **n2** are the numbers of observations of two samples.

Z-test examples:

If a sample of 400 Policemen has a mean height of 67.47 inches, is it reasonable to regard the sample as a sample from a large population with a mean height of 67.39 inches and a standard deviation of 1.30 inches at a 5% level of significance?

Taking the null hypothesis that the mean height of the population is equal to 67.39 inches, we can write:

$H_0 : \mu = 67.39$ "

$H_a: \mu \neq 67.39$ "

$\bar{x} = 67.47$ ", $\sigma = 1.30$ ", $n = 400$

Assuming the population to be normal, we can work out the test statistic z as under:

$$Z = \frac{\bar{x} + \mu}{\frac{\sigma^2}{\sqrt{n}}}$$

$$Z = \frac{67.47 + 67.39}{\frac{1.30^2}{\sqrt{400}}}$$

As H_a is two-sided in the given question, we shall be applying a two-tailed test for determining the rejection regions at a 5% level of significance which comes to as under, using normal curve area table:

$R : |z| > 1.96$

The observed value of t is 1.231 which is in the acceptance region since $R: |z| > 1.96$, and thus, H_0 is accepted.

14.4.2. Non-Parametric Test:

Statistical method is used for testing hypothesis which are called non- parametric test because such test do not depend on any assumption about the parameters of the parent population. Most no of parametric test assume only nominal or ordinal data, whereas parametric test require measurement equivalent to test on interval scale.

(i). Chi-square test:

Pearson published a paper on the χ^2 test which is considered to be one of the foundations of modern statistics in 1900. Chi-square test based on chi- square distribution and parametric test is used for comparing a sample variance to a theoretical population variance. To determine whether the association between two qualitative variables is statistically significant, researchers must conduct a test of significance called the Chi-Square Test. A Chi-square test is a hypothesis testing method. Two common Chi-square tests involve checking if observed frequencies in one or more categories match expected frequencies.

Compute the test statistic:

- The chi-square statistic compares the observed values to the expected values.
- This test statistic is used to determine whether the difference between the observed and expected values is statistically significance.

The chi-square statistic is a measure of how far the observed counts are from the expected counts.

Example: Chi-square test for categorical data;

Suppose there is a city of 1,000,000 residents with four neighborhoods: A, B, C, and D. A random sample of 650 residents of the city is taken and their occupation is recorded as "Govt. Employee", "Private

Employee", or "Un-employment". The null hypothesis is that each person's neighborhood of residence is independent of the person's professional classification. The data are tabulated as:

	A	B	C	D	Total
Govt. employee	90	60	104	95	349
Private employee	30	50	51	20	151
Unemployment	30	40	45	35	150
Total	150	150	200	150	650

Let us take the sample living in neighborhood A, 150, to estimate what proportion of the whole 1,000,000 live in neighborhood A. Similarly we take 349/650 to estimate what proportion of the 1,000,000 are Govt. employees. By the assumption of independence under the hypothesis we should "expect" the number of Govt. employees in neighborhood A to be

$$150 \times \frac{349}{650} = 80.54$$

Then in that "cell" of the table, we have

$$\frac{(\text{Observed-Expected})^2}{\text{Expected}} = \frac{(90-80.54)}{80.54} = 1.11$$

The sum of these quantities over all of the cells is the test statistic; in this case=24.6. Under the null hypothesis, this sum has approximately a chi-squared distribution whose number of degrees of freedom is

(number of rows-1) (number of columns-1)= (3-1) (4-1)=6

If the test statistic is improbably large according to that chi-squared distribution, then one rejects the null hypothesis of independence.

A related issue is a test of homogeneity. Suppose that instead of giving every resident of each of the four neighborhoods an equal chance of inclusion in the sample, we decide in advance how many residents of each neighborhood to include. Then each resident has the same chance of being chosen as do all residents of the same neighborhood, but residents of different neighborhoods would have different probabilities of being chosen if the four sample sizes are not proportional to the populations of the four neighborhoods. In such a case, we would be testing "homogeneity" rather than "independence". The

question is whether the proportions of blue-collar, white-collar, and no-collar workers in the four neighborhoods are the same. However, the test is done in the same way.

(ii).Kruskal-wallis H-test: H-test is a non-parametric analysis of variance that does not require the assumption of population.

(iii).Sign test: Sign test is used in direction of difference to test, if population mean is equal to hypothesized mean. These are two types of (a) One sample sign test (b) Two sample sign test.

12. Tools and Techniques of data Collection:

The data available for the researcher are primary and secondary form.

12.1. Primary source of data collection:

The primary data are those which are collected afresh and for the first time and thus happen to be original in character. It is obtained from the original source of information. Data are collected during the experiments in an experimental research. We can obtain primary data either through observation or through direct communication with respondents in one form or another or through personal interviews. There are several methods of collecting primary data, particularly in surveys and descriptive researches. Important ones are, observation method, interview method, questionnaires, through schedules, content analysis etc.

After the data have been collected, the researcher has to sum up the collected data and organize it in such a manner that will yield answers to the research questions. Thus, the task to analysis is to shed light on the results. It implies editing, coding, classification and tabulation of collected data so that they are agreeable to analysis. The term analysis refers to the calculation of certain measures along with searching for pattern of relationship that exist among data groups. The primary data are most reliable and more confidence level of decision making with analysis of the events.

12.1.1. Observation method:-

The observational technique is to record behaviour as it occurs. Research techniques depend entirely on people's anticipatory reports of their own behavior. The observational techniques yield data that pertain directly to typical behavioural situations. Observation is independent of people's willingness to report. Many a time a researcher meets resistance from persons being studied. People may not have the time or they may be unwilling to be interviewed or tested. Studies may deal with subjects who are not capable of giving verbal reports of their behavior. Observation may make available a variety of research purposes. It may be used to explore the given area of subject matter or to gain insight into the research problem and provide a basis for development of hypotheses.

Observational techniques also have following limitations:-

- Observation of regular occurrences sometimes becomes difficult because of the possibility that unforeseen factors may interfere with the observational task. It is often impossible to predict the occurrence of an event exactly enough to be able to be present to observe it.
- The practical possibility of applying observational techniques is limited by the duration of events. Some occurrences that people may not be willing to report in direct observation.
- Often observational data can't be qualified. Social researchers will do well to bear in mind that observational data are not incapable of being calculated.

12.1.2. Merits of observation method:-

- It is more objective and scientific than introspection.
- Its findings are more reliable and more valid than introspection.
- It is economical as it is needs no laboratory and costly apparatus.
- It is flexible and can be used in gathering data in many situations.
- It prepares ground for experimental method.

12.1.3. Demerits of observation method:-

- There is great possibility of personal prejudice and personal bias of the observer.
- It is very difficult to observe everything.
- The record written by the observer may not be fully accurate.
- This method is very much time consuming.
- This method studies only overt behavior.

12.2. Questionnaire method:-

Questionnaire method is one of the most suitable methods for investigation of socio-legal problems. We use the tools of questionnaire for collecting data from large, diverse, varied and scattered persons from different places. Questionnaire is a list of questions to be answered by a group of people, especially to get facts or information about their views. It is used to obtain knowledge about facts known to the informant.

Questionnaire is a printed list of questions sent through mail to respondents to be returned by respondents after filling up the questionnaire. Questionnaire method of data collection is quite popular, particularly in case of big enquiries. It is being adopted by private individuals, research workers, private and public organizations and even by Government departments. In this method a questionnaire is sent to the persons concerned with a request to answer the questions and return the questionnaire. Quite often questionnaire is considered as heart of a survey operation. Hence it should be very carefully constructed.

If it is not properly set up, then the survey is bound to fail. This fact requires studying the main aspects of a questionnaire such as the general form, question formulation and wording. The questionnaire is mailed to respondents who are expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself. The respondents have to answer the questions on their own.

The method of collecting data by mailing the questionnaires to respondents is most extensively employed in various economic and business surveys. The merits claimed on behalf of this method are as follows:-

- It is free from the bias of the interviewer. Answers are in respondent's own words.
- Respondents have enough time to give answers.
- It easily to reach to the respondents.
- The results can be made more dependable and reliable.

12.2.1. Questionnaire sample size determination:-

A simple random sampling and purposive sampling methods are used to select the representative and respondents for the study. The simple random sampling ensures each member of the population gets equal chance to data analysis justification. Sample size determination is used to get reasonable information. Both probability (simple random) and non-probability (convenience, quota, purposive and judgmental) sampling methods are used in the nature of study. The characteristic of data sources permits the researcher to follow the various methods. This help the analysis the data obtained and increase the reliability of research outcome and its decision.

12.2.2. Nature of questions:-

- Questions should be few, short, clearly, worded, simple and easy to answer.
- They should be within the informational scope of the respondent.
- Tabulation plane must be kept in mind while framing question.
- Questions should have a direct bearing upon the problem.
- Indirect questions should be inter-related with each other.
- Indirect questions may be asked to gate a correct reply.
- Questions facilitating cross- checking may be given.
- There is minimum of writing work.
- Units of technical terms should be on the lines of the previous enquiry.
- The questions should not any doubt.

12.2.3. Types of questions:-

- Open- end questions.
- Structured questions.
- Dichotomous questions.
- Multiple choice questions.
- Leading questions.

12.2.4. Questions to be avoided:-

- Long questions.
- Complex questions.
- Personal questions.
- Suspicious questions.
- Embracing questions.
- Subject matter of enquiry questions.
- Inaccurate responsible questions.

12.2.5. Advantages of questionnaire method:-

- It is more economical in terms of money, when the resources are limited.
- It minimizes bias and maximizes the evidence collected.
- Surveys can be conducted quickly through questionnaire.
- It ensures anonymity.
- It places less pressure on the respondents.
- There is no need to go and see the respondents.
- The questionnaire is an impersonal document.
- It provides ample freedom and time to the respondent.
- They provided the valid information.
- They are useful in collecting all types of data- objective, quantitative and qualitative nature of data.

12.2.6. Disadvantages of questionnaire method:-

- Law rate of return of the dully filled in questionnaires.
- It can be used only when respondents are educated and cooperating.
- The control over questionnaire may be lost once it is sent.
- There is also the possibility of ambiguous replies.
- It is difficult to know whether willing respondents are truly representative.

- This method is likely to be the slowest of all.

12.3.The interview method:-

The interview method of collecting data involves presentation of oral-verbal motivation and reply in terms of oral-verbal responses. This method can be used through personal interviews and if possible, through telephonic interviews.

- Personal interview method requires a person in a face to face contact.
- In the case of direct personal investigation the interviewer has to collect the information.
- There is greater flexibility under this method as the opportunity to restructure questions.
- Observation method can be applied to recording verbal answers to various questions.
- Personal information can be obtained easily.
- Samples can be controlled more effectively.
- The interviewer can usually control persons, who answer the questions.
- The interviewer may catch the informant off-guard.
- The language of the interview can be adapted to the ability of the person interviewed.
- The interviewer can collect supplementary information about the respondent's personal character.

12.3.1. Demerits of interview method:-

- It is a very expensive method, when large and widely geographical sample.
- There remains the possibility of the bias of the interviewer, where certain types of respondents such as important officials or executives or high class people may not be easily approachable.
- This method is more time taking, when the sample is large.
- The presence of the interviewer on the spot.
- Interviewing times may also introduce systematic errors.
- Effective interview is often a very difficult requirement.

12.4. The case study method:-

The case study method is a very popular form of qualitative analysis and involves a careful and complete observation of a social unit. This unit can be a person, a family, an institution, a cultural group or even the entire community. It is a method of study in depth rather than breath. Thus, case study is essentially an intensive investigation of the particular unit under consideration. The object of case study method is to locate the factors that account for the behavior patterns of the given unit as integrated totality.

The case study is a detailed study of an individual conducted for the purpose of bringing about better adjustment of the person who is the subject to the investigation. So with the help of case study method the researcher tries to find out the root causes and takes steps to remove it.

12.4.1. Advantages of the case study method:-

- The case study method enables us to understand fully the behavior pattern of the concerned unit.
- Through case study a researcher can obtain a real and enlightened record of personal experiences.
- This method enables the researcher to trace out the natural history of the social unit.
- It helps in formulating relevant hypotheses along with the data which helpful in testing.
- The case study method helps a lot to the researcher in the task of constructing the appropriate questionnaire or schedule.
- The researcher can use one or more of the several research methods under the case study. The use of different methods such as depth interviews, questionnaires, documents, study reports of individuals, letters and the like is possible under case study method.
- Case data are quite useful for diagnosis, therapy and other practical case problems.

12.4.2. Limitations of the case study method:-

- Case situations are seldom comparable, therefore the information gathered in case studies is often not comparable.
- The case data are scientific data, so they do not provide knowledge of the "impersonal, universal, non-ethical, non-practical, repetitive aspect of phenomena.
- No set rules are followed in collection of the information and only few units are studied.
- It consumes more time and requires lot of expenditure.
- The usefulness of case data is always subject to doubt.
- Case study method can be used only in a limited sphere; it is not possible to use it in case of big society.
- Response of the investigator is an important limitation of this method. He must full knowledge of the unit and can answer about it.

12.5. Experts' opinion:-

The data are also obtained from the expert's opinion related to comparison of the knowledge, management, collaboration and technology utilization including their sub-factors. The data obtained from various ways are used for prioritization and decision making of improving factor priority. The research study needs an opinion in a subject which requires special assistance. The researcher calls an expert, a

special skilled person. This person will be known as expert and the opinion which he/she gives in the relevant subject,

13. Secondary Source of data collection:-

The secondary data on the other hand are those which have already been collected by someone else and which have already been passed through the statistical process. Whereas the secondary sources may be, work is merely compilation of available information. Literature reviews are collected from various secondary sources. Secondary data sources are obtained from literatures regarding the problem or topic. Data are collected from the manual reports, reputable journals, books, different articles, periodicals, magazines, newspapers, web sites and other sources are considered for research topic. The data also obtained from the existing working documents, manuals, procedures, reports, statistical data, policies, regulations, parliamentary decisions and judiciary pronouncements are taken into account for the review.

The secondary data are collected by someone other than the user. The data source gives insights of the research area. It makes some sort of research gap opined by the researcher. The secondary source of data collection may be internal and external information which cover a wide range of areas.

Literature review achieves the research objectives. The researcher has to conduct excessive document review and reports of the topic in both online and offline modes. From the methodological point of view, literature reviews can be comprehended as content analysis, where qualitative and quantitative aspects are mixed to assess structural as well as content criteria.

14. Methods of data analysis:-

The data analysis brings answer of the basic questions raised in the problem statement.

14.1. Quantitative data analysis:-

Quantitative research focuses on measurement and testing using numerical data. Quantitative methodology to be used when the research aims and objectives are confirmatory in nature. Quantitative methodology can be used to measure the relationship between two variables.

Quantitative data are obtained from primary and secondary sources. The data analyses are based on data type using Excel, SPSS 20.0, Office Word and other tools. The data analysis focuses on numerical/quantitative data analysis. Respondents' answers are coded and data analyses are made. Data are coded to SPSS 20.0 software which is obtained from questionnaires. It identifies, classifies and assigns a numeric symbol to data. It is done in only one way pre-coded. In this way all of the responses are pre-coded. All the collected data are entered to a statistical analysis software package SPSS version 20.0 on Windows 10 for the next step. The data analyses, exploration of data are made with descriptive statistics

and graphical analysis. The data analysis explores the relationship between variables and comparing groups. This is done using cross tabulation, chi-square, correlation and factor analysis and using nonparametric statistic.

Popular data analysis methods in quantitative research include:

- Descriptive statistics (mean, median, mode).
- Inferential statistics (correlation, regression, structural equation modeling).

14.1.1. Reliability of data:-

The reliability of measurements specifies the amount to bias (error free), hence it ensures consistent measurement across the time and various items in the instrument. Reliability analysis checks the stability and consistency of the data. The researcher checks the accuracy and precision of the procedure of measurement through reliability analysis. The measurement fulfills the requirements of reliability and produces consistent results during the reliability of data analysis procedure.

14.1.2. Reliability analysis:-

Cronbanch's alpha is a measure of internal consistency. It is closely related to a set of items in group. It is considered to be a measure of scale reliability. The reliability of internal consistency is measured on the Cronbach's alpha value. Reliability coefficient of 0.70 and above is considered acceptable in most research studies. In reliability analysis for internal consistency of likert-scale measurement after deleting 13 items is found similar.

14.1.3. Validity:-

Babbie defined validity as indicator to make reasonable measure of variables. It is the subjective judgement to measure in terms of relevance. The researcher ensures the study by developing the instruments using appropriate words and concepts in order to enhance clarity and suitability. The researcher summits the instruments to the research supervisor who is expert to ensure validity of measuring instruments and determine the valid on face value.

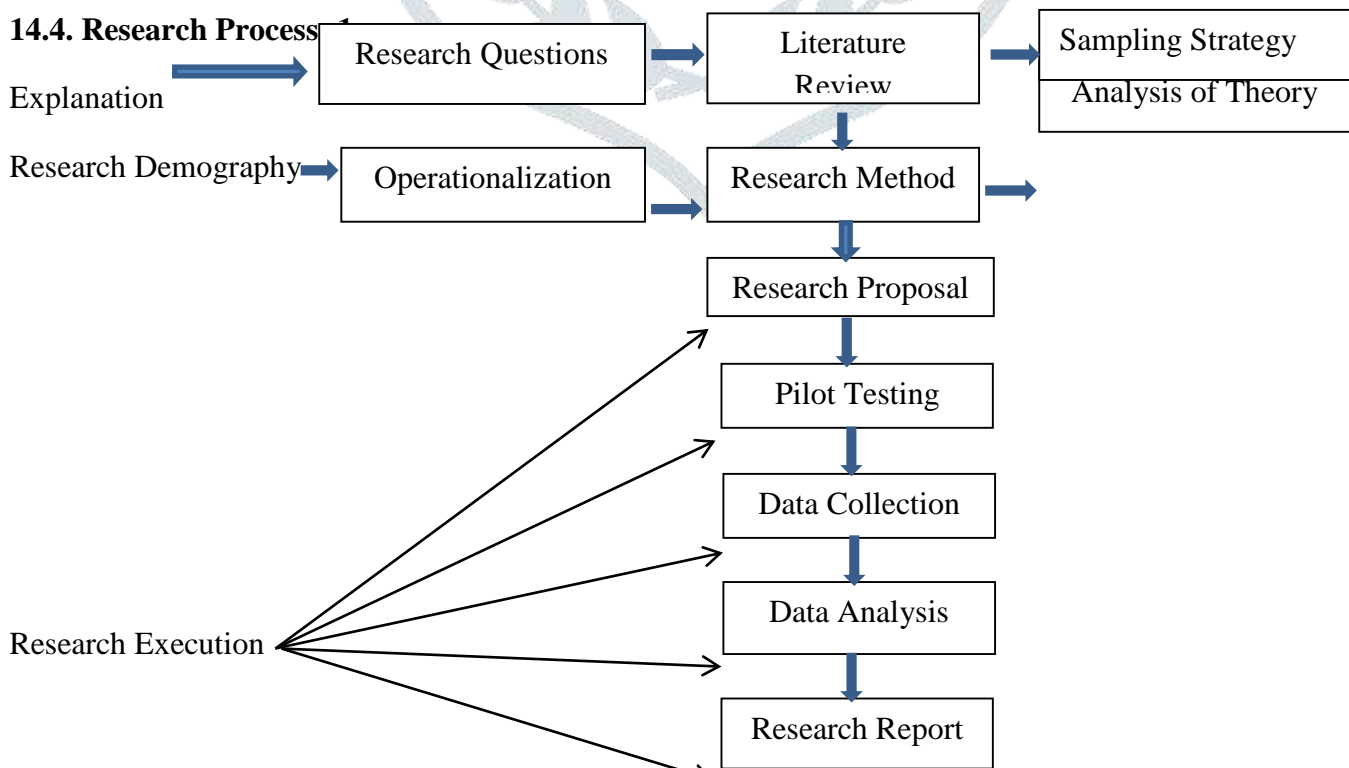The researcher follows the review of literature to develop the data collection methods before develop the measuring instruments. The researcher avoids uncertainties of contents in the data collection measuring instruments prior to the main study. The measuring instruments are inspected by statistician and research supervisor to ensure all the concepts pertaining to the study.

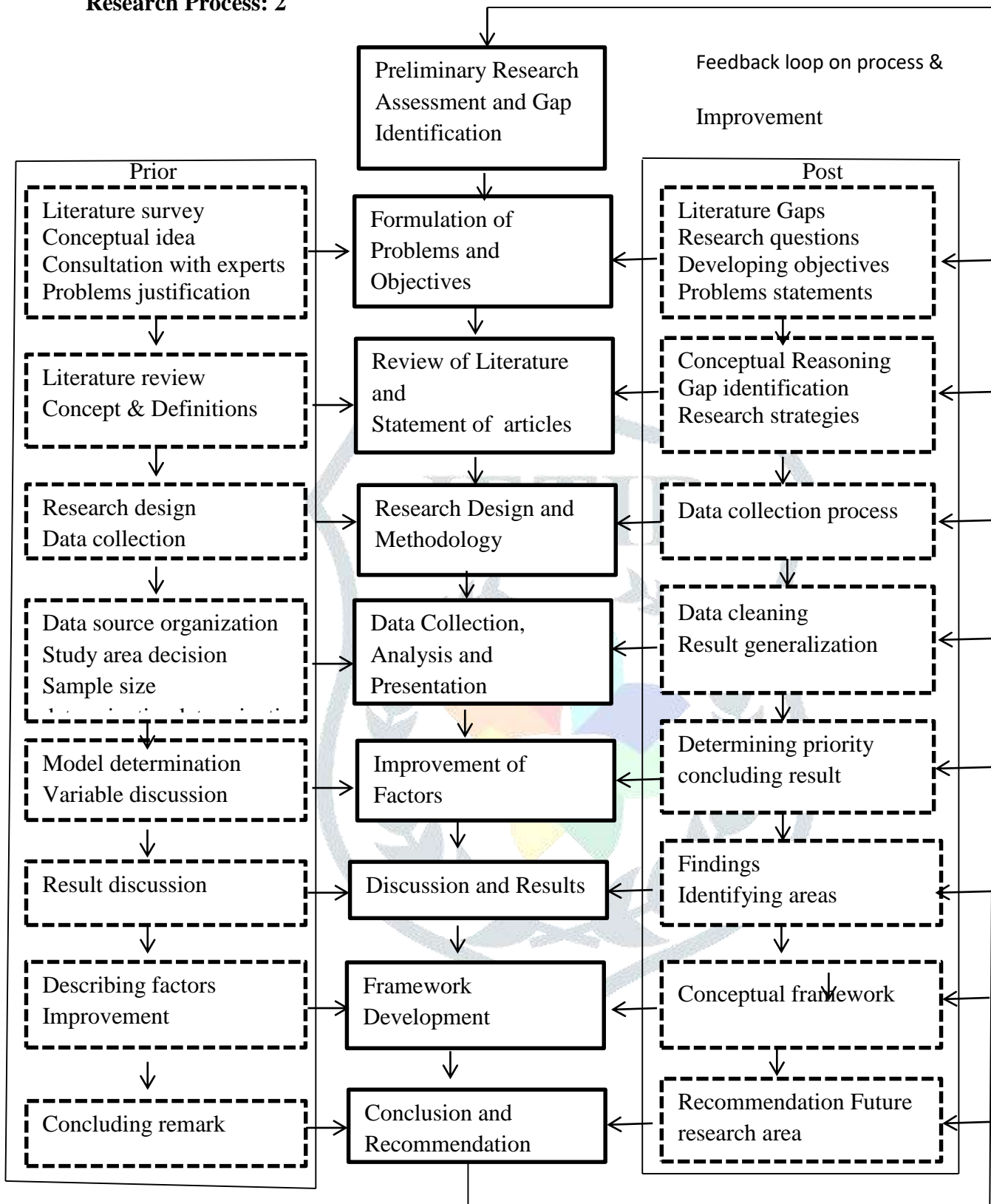### 14.2. Qualitative data analysis:-

Qualitative data analysis is used for triangulation of the quantitative data analysis. The interview, observation and report records are used to support findings. The data analysis is incorporated with the quantitative discussion results in the data analysis parts. Qualitative research refers to focus on collecting and analyzing words (written or spoken) and textual data. Qualitative analysis can focus on other softer data points such as body language and visual elements. Qualitative methodology to be used when the research aims and objectives are exploratory in nature. Qualitative methodology can be used to understand peoples' perceptions about an event that took place. Qualitative data analysis begins with data coding after one or more analysis technique is applied.

14.3. Data analysis software:-

The data are entered using SPSS 20.0 on Windows 10 and analyzed carefully. The analysis is supported with SPSS software to find out the gap. The software analyzes and compares the results of different variables used in the research questions. Excel is also used to draw the pictures and calculate some analytical solutions.

14.4. Research Process

Research Process: 2

Preliminary Research Assessment and Gap Identification

Feedback loop on process & Improvement

Prior

Literature survey
Conceptual idea
Consultation with experts
Problems justification

Post

Literature Gaps
Research questions
Developing objectives
Problems statements

Formulation of Problems and Objectives

Literature review
Concept & Definitions

Review of Literature and Statement of articles

Conceptual Reasoning
Gap identification
Research strategies

Research design
Data collection

Research Design and Methodology

Data collection process

Data source organization
Study area decision
Sample size

Data Collection, Analysis and Presentation

Data cleaning
Result generalization

Model determination
Variable discussion

Improvement of Factors

Determining priority
concluding result

Result discussion

Discussion and Results

Findings
Identifying areas

Describing factors
Improvement

Framework Development

Conceptual framework

Concluding remark

Conclusion and Recommendation

Recommendation Future research area

15. Conclusion and Suggestion:-

Law may be termed as a behavioral science as it regulates human behavior. It is expressed in words which are used in a particular context. Whatever be the sources of law, it cannot provide remedy for all the situations and for all the time to come. Changes in society demand that law should move with the time if it

has to remain alive and it can remain alive, active and useful, if it is as aware of its lacunae and takes step to overcome it with the passage of time. The object of legal research, therefore, is to find out lacunae or deficiencies in the existing laws and to suggest suitable measures to eliminate them. If there is an area for which there is no law at all the objective of legal research would be to suggest suitable legislation for that area; but if there is a law for that area but due to one reason or the other, it does not work, it aim would be suggest reform in the existing law be enacted. When research in undertaken as a part of the process of law reform.

Research is an enquiry for the verification of a fresh theory or for supplementing prevailing theories by new knowledge. Since every knowledge is the extension of an existing knowledge, no research can be said to be absolutely new. A researcher while undertaking a project for his work possesses much information about it and while conducting research, he/she proceeds onward to acquire more information about it and formulates certain hypothesis on that basis. Thus it is a continuous process of acquiring knowledge through enquiry into existing laws.

The research methodology indicates overall process of flow the research study. The data sources and data collection methods are used in both doctrinal and empirical study. The research studies and frame work are indicated in the research process from problem formulation to problem validation including all parameters. Research methodology is devised and framed for researchers, which help researcher to consider data collection and process from problem statement to research findings. Research methodology guides new researchers to approach research environment of the study.

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