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Concept / Meaning of Research

Research refers to the process of systematic enquiry or investigation into a specific problem or issue that lead to new or improved knowledge for solving problems.

According to F.N. Kerlinger: "Research is a systematic, controlled, empirical and critical investigation of hypothetical propositions about the presumed relations among natural phenomena."

Nature and Feature of Research

1) Objective :- A good research should be objective and it must answer the research questions. Therefore formulation of proper hypothesis is mandatory.

2) Control :- A good research must be able to control all the variables which requires randomization at all stage. There must be adequate control over all independent variables.

3) Generalizability :- We should be able to achieve almost some results by using same methodology so that we can apply the result to similar situations.

4) Free from personal biases :- A good researcher must be free from the researcher's personal biasness and must be based on objectivity and not on subjectivity.

5) Systematic :- A good research study should follow various well planned steps which helps to bring uniformity in research work and report writing.

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6) Reproducible :- A researcher should be able to get approximately the same results by using an identical methodology if investigation is conducted on a population having characteristics similar to the earlier study.

7) Directed towards solution of a problem :- Research identifies the problems and investigates on every aspects of the problems. It tries to find out the probable solutions of such problems through depth study. Thus, research is always directed to solution of the problem.

8) Logical :- Researcher collects the information from various sources and interprets the information. Research doesnot only present the result on the basis of interpretation but proves those results using various logics. Inductive and deductive studies are the examples of logical reasoning.

9) Replicable :- Conducting research using same methodology is replicability. Conducting research in the same subject repeatitively helps to increase the reliability of results.

Types of Research

① Basic or Fundamental Research :- A research which is conducted for the depth knowledge about any issue or for the development of theory is known as basic or fundamental research. Professors, academia and students do basic or fundamental research in ~~the same issue~~. so that more knowledge is generated in particular areas of interest.

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According to P.V Young. "Gathering knowledge for knowledge sake is termed as pure or basic research."

Basic research has the following characteristics-:

i) Develops fundamental principles
ii) Principles developed by basic research can be generalized.
iii) Finds major factors of practical problems.
iv) Helps to understand the problems in depth.
v) Develops various alternative solutions of various problems.

(2) Applied or Action Research :- A research that is conducted to find out a solution for an immediate problem faced by the society business organization is known as applied research. It provides answer of the problems raised on policy, programs, projects and procedures. It is more concerned with actual life.

According to P.V. Young, "Generating knowledge that could aid in the betterment of human benefit is termed as applied research."

Applied research has the following characteristics-:

i) It is related with solving real life problems.
ii) Conclusion of applied research can be implemented immediately.
iii) Applied research helps to prove concepts
iv) Applied research helps to formulate new policies and programs improving previous procedures and practices.

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THE SCIENTIFIC RESEARCH PROCESS

Scientific research process refers to the works or steps which are to be followed while conducting research. Such process helps to carry forward the research work and draw reliable conclusions.

Followings are the most widely used process of scientific research :-

(1) Realizing a problem :- First of all, a researcher should feel the problem for undertaking research. Problems are created due to change in environment or any other reasons. Researcher should realize and be worried with such problems. Realization can be made through feeling, study, experience and observation.

(2) Identification of Problems :- After realization the problem, researcher should try to find out the causes of the problems and the actual problem. Researcher should find out the problems and causes through the collection of information and analysis of situation. Research should define such problems that helps to minimize time and cost.

(3) Review of Literature :- Literature review refers to the study of previous research and documents. Researcher should find out the study gap from the review of literature. It helps to define the problem and find out the methods which are suitable to study over the research problem and issues.

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4) Hypothesis formulation:- Hypothesis refers to the estimated result of the research. It is estimated on the basis of past studies. It presents the relationship of two variables in the testable form. Researcher finds out the problems and related factors of problems through literature review. On the basis of the facts found from literature review, researcher formulates hypothesis.

5) Research design:- Research design is a framework of research. Research works are completed based on research design. It helps to collect evidence in less time and cost. Research design depends on the objectives of research. It clarifies the way of collecting data, method of analysis and bases of research.

6) Collection of data:- Collection of information on the basis of research problem and objectives is referred as data collection. It is the work performed in the field/outside the organization. Success of research depends largely on data collection. Reliable data collection helps to draw reliable conclusion.

7) Data analysis:- A researcher classifies all the collected data and information on the basis of their feature and nature. Classified data are then codified tabulated and presented in charts. Such presented data are analyzed using mathematical, statistical, financial and accounting tools. Most of the researchers use statistical tools for the analysis of data.

8) Interpretation and generalization:- After the analysis of the data, certain conclusions can be drawn in relation to hypothesis. Whatever the conclusions are drawn, they are considered as theories. Such conclusions are applied in all the similar organizations which are regarded as generalization.

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APPROACHES TO RESEARCH

The approaches to research are broadly classified into two categories :

1) Quantitative Research
2) Qualitative Research.

1) **Quantitative Research :-** A research which is conducted based on the measurement of quantity is known as quantitative research. Quantitative technique of research can be used in the research of those issues which can be measured exactly in the quantity or amount. This research is conducted to know how and why thing happens in the society or organization.

2) **Qualitative Research :-** A research which is concerned with qualitative phenomena is known as qualitative research. The main aim of qualitati -ve research is to get depth knowledge and explain the issue or subject rather than finding the solution or coming to the conclusion. Generally, it is conducted to understand the response of the people.

DIFFERENCE BETWEEN QUANTITATIVE AND QUALITATIVE RESEARCH.

→ Both the researches have some similarities but they have some differences which are given below :-

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Bases of difference	Qualitative	Quantitative
Focus of research	Understand and analyze the issue.	Explain and predict over any issue.
Purpose of research	In depth understanding & develop theory.	Explain and predict over any subject and develop theory and its testing.
Sample size	Sample size is small.	Sample size is large.
Involvement of researcher	Researcher himself involves in the research work.	Involvement of researcher rema-ins less in quantitative research.
Data collection	Data is collected through un- structured questionnaires.	Data is collected through structured questionnaires.
Data analysis	Collected data are analyzed based on established theories	Collected data are analyzed using various statistical tools.

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PARADIGMS SHIFT OF RESEARCH

Paradigms are patterns of belief and practices that regulate inquiry within a discipline by providing frames and process through which investigation is accomplished. The major two ~~pra~~ paradigms of research are given below:-

Positivism

It is the research philosophy that is adopted from natural sciences. Its three basic principles are:-

1) The social world exists externally and is viewed objectively.
2) Research is value free.
3) The research is independent and taking the role of an objective analyst.

Positivism implies the following assumptions:-

1) Unity of scientific methods.
2) Causal relationship
3) Empiricism
4) Science and its process is value free.
5) Foundation of science is based on logic and math.

Interpretivism

Unlike positivists, interpretivists hold the view that the social world can not be understood by applying research principles adopted from the natural sciences and propose that social science requires a different research philosophy. The basic principles of interpretivism are:-

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1) The meaning of social world is given by people subjectively.
2) The researcher is part of what is observed.
3) Research is driven by interest.

Interpretivism implies the following assumptions:-

1) The social world is observed by seeing what meanings people give to it and interpreting these meanings from their viewpoints.
2) Social phenomena can only be understood by looking totality.

As a conclusion we can say that interpretivism suggests that social phenomena are to be stood in the ways how people interprets them. This requires the research to go deeper into the process of subjective interpretation, acknoledging the motivation and interest of participants. Social phenomena are highly complex and unique. Social phenomena are developed considering to the multiple circumstances. Interpretivism doesnd attach a great deal of importance to generizability of findings. The business world is constantly changing and what seems sensible five years ago may not be the same at present. Hence in an ever changing world, generalization in short period of time is questionable.

POSITIVISM	VS	INTERPRETIVISM
* As per positivism, knowledge develops by investigating the social reality through observing the facts.		* As per interpretivism, social world cannot be understood by applying research principles adopted.
* Social world exists externally and is viewed objectively.		* Social world is viewed subjectively.
* Research is value free		* Research is driven by interest.

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MANAGEMENT RESEARCH

→ Management research refers to the act of study of various dimensions of organizational problems and findings out the managerial tools and techniques so that problems can be solved with the use of such ideas.

Nature of Management Research

1) Transdisciplinary :- Management research draws knowledge combining the information of various subjects. It means management research should consider varied nature of informat -ion and data from large area of subjects like strategy, structure, environment etc.

2) Commercial advantages :- Management research is conducted to solve particular problems of individual organization. Thus, manage ment research focuses in commercial advantages of business organization.

3) Practical :- The findings found from the management research must respond to the issue or problem of the business organiza -tions. Thus, it must be practically applicable.

4) Double hurdle :- Management research has problem of theory and practice. Knowledge creation is made by academia and research is governed by the world of practice. Thus, there is always hurdle of balancing them.

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VALUE OF MANAGEMENT RESEARCH IN BUSINESS DECISION MAKING

→ Researcher drives every aspect of major decision making. The prime managerial value of business research is that it reduces uncerta-inity by providing information that improves the decision making process. Research provides supports in the following dimensions of decision making:-

1) Identify problems
2) Diagnosing and assessing problems and opportunities.
3) Selecting course of action
4) Implementing a course of action
5) Evaluating the course of action.

DIFFICULTIES IN APPLYING SCIENTIFIC METHODS TO SOCIAL SCIENCE RESEARCH

1) Complexity of subject-matter
2) Difficult to obtain accurate measurement
3) Misconceived impression of society
4) Subjectivity of social events
5) Emotional tendencies
6) Vested interest of the researcher
7) Qualitativeness of social events
8) Lack of universality of social events

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ETHICAL ISSUES IN MANAGEMENT RESEARCH

→ Ethics refers to those assumptions which a person decide anything as right or wrong. To be ethical, a researcher should not do the following works:

1) Put pressure to participants for getting information.
2) Deception of participants: give freedom to participants on their answer.
3) Fabricating the data
4) Dishonesty
5) Not objective.
6) Illegal
7) Discrimination
8) Respect of intellectual property
9) Respect to social and culture, norms and values
10) Protection of participants rights.

The issue of ethics raises more in qualitative research. But the question of ethics is important in all sorts of research. Unethical work reduces the value of research results and sponsoring organization. Researcher should inform about the consequences of unethical works and provisions of rules and regulations so that he/she can understand the value of ethics and improve in the unethical activities. Ethical behaviour makes research work acceptable to all the concerned parties.

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CHAPTER-2

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LITERATURE SEARCHING AND THEORETICAL FRAMEWORK

Concept of Literature Review:-

Going through previous studies and books with the purpose of knowing the research issue in detail and find out appropriate methodology is known as literature review. The purpose of a literature review is to convey what knowledge and ideas have been established on a topic in the past and what are their strengths and weakness.

According to Walliman, "A literature review is a summary and analysis of current knowledge about a particular topic or areas of enquiry."

Purpose and function of Literature Review

1) To know the research conducted in the chosen field.
2) To identify the gap.
3) To develop theoretical framework.
4) To develop research design
5) To update on current issues.
6) To know the method of data analysis.
7) To know the research design
8) To assess the success of various research designs.

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Phases / steps in the Review

1) Identifying the relevant sources
2) Obtaining literatures
3) Reading
4) Extracting the relevant information
5) Evaluating the contents of the literatures..

Research Problem

→ Research problem is any situation where a gap exists before and the actual and the desired ideal state.

Theoretical framework

→ A theoretical framework is a conceptual model that shows the relationships among the several factors that have been identified as important to the problems.

Steps in Problem Formulation

1) Identifying broad problem area
2) Divide the subject area into sub-areas.
3) Decide about an area
4) Defining problem
5) Decide about the objectives.

Research questions

→ Research questions is a statement designed / developed in the research that identifies the factors to be studied. Research question helps you to do the work in the trend as you intend.

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Types of Research questions

① Descriptive question:- The questions that are designed to describe what is going on or the existing position of events, objects or issues then such questions are known as descriptive questions. For example:- What is the level of stress of employees in the Nepalese private banks?

② Observational / Relational questions:- The questions that are designed to know the relation between two or more variables under study are known as observational or relational questions. For example:- What is the relationship between job security and organaational performance in Nepal?

③ Causal or cause and effect questions: The questions that are designed to determine the effect of one or more causes to one or more outcome variables For example:- Do the performance of employees increases after the increment in salary and other perks?

Approaches of Research

ⓐ Deductive reasoning:- It is an approach where previous theories are to be deducted to hypothesis and tested scientifically with the objective of developing theories or improving the existing theories.

ⓑ Inductive approach:- A process where the researcher starts with specific observations / descriptions followed by analysis that produces explanation of the observation is known as inductive approach.

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HYPOTHESIS

Concept:-

A logically estimated relationship between two or more variables expressed in the form of tested statement is known as hypothesis. A good hypothesis shows the direction of research and the relationship between the variables and helps to find out the solution of the problem.

Functions of Hypothesis

1) Shows the area of emphasis
2) Provides guideline for collecting data.
3) Informs about area of subjective priority
4) Basis of research
5) Helps to test empirically

Features or characteristics of Good Hypothesis

1) Power of prediction
2) Simplicity
3) Carity
4) Testability
5) Relevant to problem
6) Specific
7) Relevant to available technology
8) Consistency and harmony

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Formulation of Hypothesis:-

Generally, hypotheses are formulated in two ways. One way is the observation of social events or conditions. Such events or conditions are linked with various logics and a researcher can develop hypothesis. Second way of developing hypothesis is through literature review. A researcher can develop hypothesis if he/she has in-depth knowledge in the area of research. Hypothesis is formulated from the statement of the problem. Generally, a researcher formulates hypothesis using following approaches:-

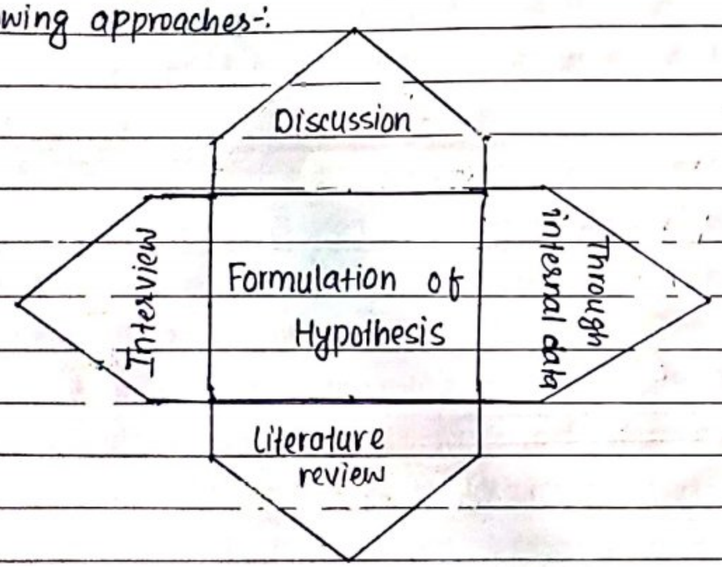

Fig:- formulation of hypothesis

1) Discussion:- Having discussion with the experts of same field about the development of problem and their objectives.

2) Through internal data:- Checking records and data that provide tentative feature, direction and other important facts

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3) Literature review:- Reviewing the literatures related to the similar issues/ problems shows the gap in the study. Based on such gap hypotheses can be developed.

4) Interview:- Taking interview with the concerned person or parties to know the practical aspect of the problem.

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RESEARCH DESIGN

Concept of Research Design-:

Research design is an overall plan of completing the research work. It presents works of research serially from the beginning to the ends in a logical way.

According to C.R. Kothari, "Research design is the conceptual structure within which research is conducted. It constitutes the blue print for the collection, measurement and qualities of data."

TYPES OF RESEARCH DESIGN

① Descriptive Research Design-: A research design that is developed with the aim of studying the subject of research in detail and explains the facts and characteristics related to research problem is known as descriptive research design. Eventhough it is descriptive method, it uses the scientific method of collecting, classifying and analyzing related data, facts and figures. It classifies the variables related to the research problem and analyses and establiches the relationship. Research related to prediction, explanation of facts and individual group or situation is descriptive research. Following works are to be performed while using descriptive research design-:

1. Determination of study objective
2. Collection of sample
3. Preparing procedures for collecting data
4. Collection of data
5. Processing and analyzing data.
6. Preparing report incorporating facts.

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Descriptive study can be undertaken using following methods:-

i) Case study:- Case study involves a detail and intensive analysis of any single event or case. Qualitative method is used to collect information and data in case study. For example data are collected through interview, observation, records etc. The results of case study cannot be generalized because results drawn from it comes from the analysis of individual event, but it can be used to compare with others.

Following steps should be followed while implementing case study:-

1) Determine the objectives.
2) Preparing and improving questions concentrating in few events.
3) Preparing case study design incorporating method of selecting single unit, sources of data and methods of collecting data.
4) Collection of data from various sources
5) Arranging evidence and analysis of events for explaining in details.
6) Preparing report, summarizing the facts and providing suggestions.

ii) Developmental research design:- A research design used to predict the future trend considering to the changes in events and human social and cultural activities is known as developmental research design. It helps to the managers to formulate plan, take decision and implement them.

Following steps are to be followed while using developmental research design:-

1) Defining research problem

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2) Determining objectives
3) Revqewing literature to get basic information: Selection of method of data collection and research methodology.
4) Preparing research design
5) Collecting data
6) Evaluation and analysis of data
7) Presenting results based on the analysis of data.

(2) Causal Comparative Research Design:-

A research design that is used to show the cause of the problems is known as causal comparative research design. This study analyses the performance of an organization after and before any events. The main aim of this research is to assess the cause of difference in two groups. Generally, there is a group of control or comparison. This study can be conducted in three ways. In first condition, only the explanation of effect is made, in second condition, explanation of causes only and in third condition, impacts of events is explained. Following steps should be followed while using this research design:-

i) Defining research problem.
ii) Reviewing concerned literatures
iii) Formulating hypothesis
iv) Preparing list of assumptions of hypothesis and research process.
v) Preparing conceptual design.
vi) Proving the authenticity and reliability of data collection method.
vii) Analyzing and interpreting the result concisely and precisely.

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(3) (e) Experimental Research:-

The researcher controls all other variables and conducts research considering to a few variables through obseswation or experiement is known as experiemental research. In this research, variables under study are free and all other variables are controlled. The main aim of this research is to see the relationship between variables and formulating hypothesis. It can be used in laboratory and work field. Appropriate control group is essential to use experiemental design. Following steps should be adopted during this design-:

i) Review of literature related to the research problem.
ii) Identifying problem and defining them.
iii) Developing problem and formulating hypotheses and defining terms & variables used in the research or theoretical framework.
iv) Formulating practical plan.
v) Formulating null hypothesis.
vi) Reduction of data and information to draw expected results.
vii) Proving the results drawn from the experiement using appropriate method.

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Qualitative Research:-

Qualitative research is a research which is conducted to interpret, analyse and obtain in-depth knowledge of an issue/subject and trends of having any activity. It provides detail of the events or incidents which were not expected.

Features of Qualitative Research:-

1) Interpretive:- Qualitative research is related with human behaviour, understanding, motivation and similar types of hidden qualities of people. It analyses and interprets the events, functions or problems and tries to find out the reasons of occuring event or problems.

2) Based on qualitative facts:- Qualitative research uses subjective information rather than objective or quantitative information. It analyses subjective information and explain the situation to explore the real cause and procedures of occuring the events.

3) Purposive Sampling:- Researcher doesnot consider to the representation of population. He/she only selects as sample to those units which can give meaningful response/answer to the researcher regarding any event or issue.

4) Change in research design:- Research design can be changed when and where essential. If researcher thinks that the research design creates hinderance then he/she can change any/whole parts of the research design.

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5) Self collection of data:- It is better to collect the data by the researcher himself because he/she gets the opportunity to get information from the gesture of respondents. Sometimes, symbols speak louder than words. When researcher collects the data, he/she can get in-depth knowledge putting more questions.

6) Holistic assumption:- Qualitative research assumes that there is no single (ie multiple) facts for the occurence of events. Perception of people over such facts changes with the pace of time and change in other factors like age, experience etc.

Assumptions of Qualitative Research

Assumptions are the fundamental facts. It helps to carry out the activities. Qualitative research has some fundamental assumptions which are given below:-

1) Research keeps holistic approach:- Qualitative research explains to any events or issues considering to all the causes of occurance, process and other activities and relationship between or among the variables. It considers to every related facts while explaining the events/issues. Thus, it keeps holistic approach.

2) Research incorporates emergent design:- Qualitative research can apply new research design while collecting data, if it is essential. Researcher can change design where necessary.

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3) Research is descriptive:- The main aim of qualitative research is to achieve in depth information regarding events and problems or issues. Thus, it is subjective in nature and explains the events in macro level. So, qualitative research is descriptive in Nature.

4) Primarily concerned with process rather than outcomes:- Qualitative research emphasizes more to the process or methods that are used in the research. It explains the complex procedures. Thus it considers more process than the results of the research.

5) Research involves field work:- Qualitative research assumes that the researcher collects data and information himself contacting to the respondents personally so that researcher can get in-dept knowledge about the event putting further questions as well as understand the symbolic language and materializes to those information in research.

6) The process of research is inductive:- Qualitative research doesnot formulate and test any hypothesis. It finds out the features of events and causes of occurence of such events.

7) Research is subjective:- Qualitative researcher measures any events/issue on the basis of researcher's intuition. So, it is more subjective in nature.

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CHAPTER 4

MEASUREMENT, SCALING AND SAMPLING

VARIABLES AND THEIR MEASUREMENT :-

Variables can be defined as anything that can take on differing or varying values.
According to F.N. Kerlinger. "A variable is a symbol to which numerals or values are assigned."

Types of variables.

① Independent variables :-

A variable which influences the dependent variable in positive or negative way is known as independent variable. If independent variable is changed by one unit then dependent variable will be changed in some degree. For example the relationship between employee satisfaction and job performance.

② Dependent variables :-

Variables, that are affected by the change in independent variables, are known as dependent variable. For example new product development increases sales. Here sale is dependent variable because sale is influenced by the new product development.

③ Moderating variables :-

The variable that has strong contigent

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effect on relationship between dependent and independent variables are known as independent variables. Example:- Gender and age are often moderating variables because stress absorbing capacity depends on age and gender of the people.

④ Intervening variables:-

An intervening variable is one that surfaces between the time the independent variable operate to influence the dependent variable and their impact on the dependent variable. For example, effective training increases employee's commitment. But the impact is not similar in all employees. Studies showed that employees with more job tenure have more commitment. Thus tenure of job is intervening variable.

CONCEPT OF MEASUREMENT

Assigning numbers or others symbols to any product or event or issue or characteristics as per the certain pre-specified rule is known as measurement. In other words, measurement is the method of turning the series of qualitative facts into a quantitative series.

Nature of Good measurement:

Measurement should be able to measure the things which a researcher intends. The tools, which are used, should be simple and able to increase the efficiency of a researcher. The main criteria for testing the goodness of measurement are as follows:-

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(i) Validity :-

It is related with the rationality of measuring tools. Validity refers to the ability of a measuring tool to measure what it intends to measure.
According to Goode and Hatt "A scale processes its validity when it actually measures what it claims to measures."

Validity can be classified under three categories which are listed below :-

a) Content validity :-

It refers to the adequate coverage of the concept, also known as face validity. Content validity ensures that the measuring tools include an adequate and representative set of items that would tap the concept.

b) criterion-related validity :-

Criterion-related validity refers the success of measurement used for prediction or estimation. This validity should possess the following qualities :-

i) Relevance
ii) Freedom from biasness
iii) Reliability
iv) Availability

c) Construct validity :-

It refers to finding out the difference in

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measures, segregating the ideas that are measured and observed how appropriately the measure represents.

(ii) Reliability :-

Reliability is related to results of the research. Reliability refers to the act of generating the stable and consistent results when the instruments are used in different sample and situation. Highly reliable data provides more accurate results.

Measurement should have following qualities to be reliable :-

a) Stability :-

If the stable and consistent result is obtained with the use of same instrument in the same sample is known as stability. Consistent result is considered as a reliable result.

b) Equivalence :-

It is concerned with variations at one point of time among observer and samples. If the results are more equivalent then the measuring instrument is more reliable.

c) Internal consistency :-

If the similar instruments are used and the responses are highly correlated then such measuring instruments are considered as internally consistent instruments.

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iii) **Practicability:-**

Measuring instruments that are developed to measure the attitude of the people must be applicable in practice. It should be defined clearly so that it can be operationalized into action. Practicability should have following qualities:-

i) **Economy:-**

The instrument should be less expensive. More items give more reliability but for shortening the interview orobserwation time, we need to reduce the measurement questions. For example rather than having personal interview, a researcher use telephonic survey to reduce the cost.

ii) **Convenience:-**

A questionnaire with a detail and clear instruction is easier to complete correctly than the questionnaire that doesnot have clear instructions. We can make it convienient giving attention on design and layout of the questionnaire.

iii) **Interpretability:-**

When other persons than the questionnaire designer requires interpreting the results then a designer should provide detail information for the interpretation of the results.

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ATTITUDE MEASUREMENT

A reaction made by a person over any event, product or other thing that is known as attitude. Social science researcher have developed various scales for the measurement of attitude of the people. Such measurement is known as attitude measurement.

SCALE CONSTRUCTION FOR ATTITUDE MEASUREMENT

Attitude is a qualitative subject. So, numbers or symbols are provided for the measurement of such qualitative subject. Attitude of person remains different from one individual to another individual. Thus, various scales can be used for the measurement of attitude of human beings. Some of the important methods of attitude scale are given below:-

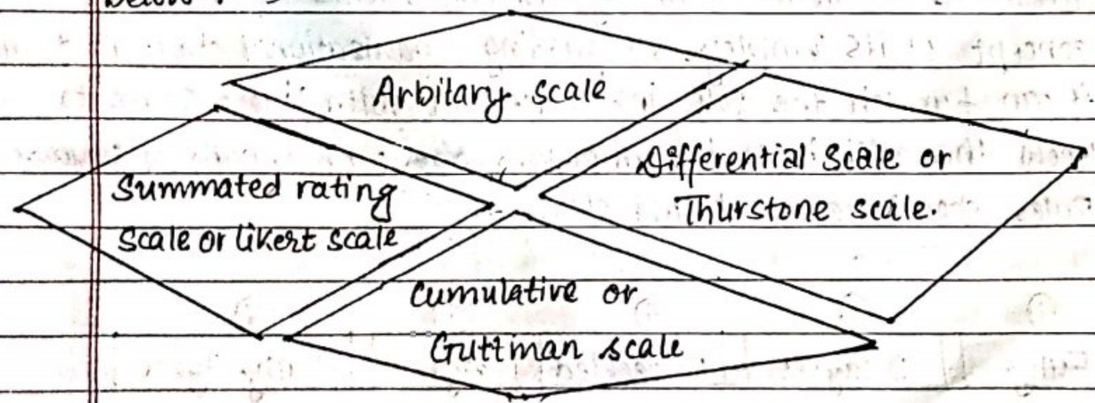

Fig:- Scale construction for Attitude measurement

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① Arbitary scale:-

Sometimes researcher develops new rational and appropriate method if he/she feels that the subject of study is absolutely new and new method or technique is essential for the measurement of attitude then such scale is known as arbitary scale. A researcher should be able to show the reliability and validity of such scale. Thus, this scale is popular in the field of social science research.

② Summated rating scale or likert scale:-

This scale was developed by Rensis likert. This scale presents various statements to measure the attitude of the respondents. Researcher asked to show their agreement or disagreement over the statements presented to them. If an organization wants to know the concept of its employees regarding organizational structure then it can furnish the following statement with Likert scale to know the attitude of the employees about organizational structure. Rules should be strict and clear.

①	②	③	④	⑤
Fully	Disagree	Undecided	Agree	Fully Agree

Note: Likert scale can be 5, 7 and 9 points. But 5 point Likert Scale is given here

All the employees are asked to give their view within 5 options. All the views of the respondents are summated and average of it is calculated. If the average value is less than three then employees

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Like the participated approach and if the average value is more than three then employees like to do the work in autocratic system. Thus a researcher uses Likert scale to know the view of the people regarding any subject, event or any problem.

③ Differential Scale or Thurstone scale :-

Under this approach, the selection of items is made by a panel of judges who evaluates the items in terms of relevancy to the topic area and unambiguous in implication.

For example :-

Following statement and median values are set by the panel of judges to measure the employee's attitude toward organization.

Statements	Scale value
I am satisfied with this organization for the time being	8.2
If I leave this organization, I face problem	7.5
Working environment of this organization is good	4.0
Rules and regulation of this organization are clear	6.3

Respondents select the statement in which they can give their response. Such selected statements have predetermined mean or median value that presents the agreement or disagreement of respondents. If a respondent selects second and fourth statements then score is calculated as follows :-

The average value of second and fourth statement is calculated as :-

$$\text{Average value} = \frac{7.5 + 6.3}{2} = 6.9$$

Repeating the same process, a researcher develops rank-order so as to draw the conclusion of the research.

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4) Cumulative or Guttman scale:-

In this scale, researcher gathers the series of statements on which respondents express his/her agreement or disagreement. Under this technique, the respondents are asked to indicate in each item whether they agree or disagree with it, the response pattern will be as follows:-

Item number					
5	4	3	2	1	Total score of respondents
X	X	X	X	X	5
–	X	X	X	X	4
–	–	X	X	X	3
–	–	–	X	X	2
–	–	–	–	X	1
–	–	–	–	–	0

A score of 5 means that the respondent is in agreement with all the statements which indicates the most favourable altitude. But a score of 4 would mean that the respondent is not agreeable to item 5 but he/she agrees with all others.

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SCALES COMMONLY USED IN BUSINESS RESEARCH / SOCIAL SCIENCE RESEARCH

Various scales are developed by the experts to measure the attitude of the individuals or group. Business research has its own distinct nature and objectives. So, Business research uses different scale while conducting research. some of the commonly used scales in business research are given below:-

① Likert Scale:-

It is a most wide used scale in business research to measure the attitude, norms, values and behaviour of individual or groups. It shows the agreement and disagreement as well as degree of agreement and disagreement on the statement provided in the questionnaire.

For example:-

.Employees are committed towards the organization-:

1) Strongly disagree 2) Disagree 3) Undecided 4) Agree 5) Strongly Agree

Respondents are asked to select any one alternative that represent their opinion, which is analyzed using statistical / Mathematical tools and researcher finds out whether they are committed towards organization or not.

2) Graphic rating scale:-

In this scale respondents are asked to indicate the response to a particular question by placing a mark at the appropriate point to express their opinions. It can be made clear from the following example:-

On Scale 0 to 10 how do you rate your departmental head?

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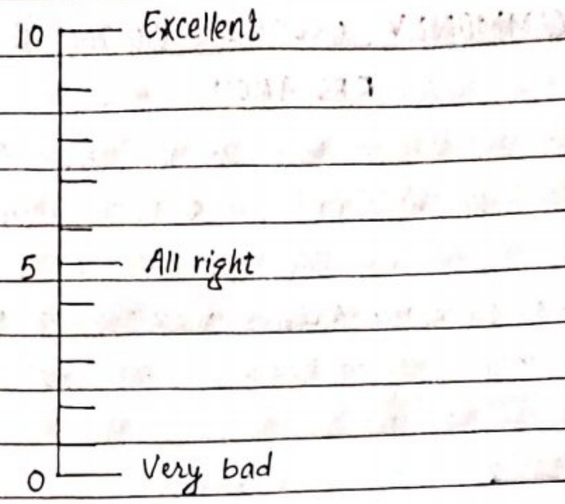

Ask the respondent to mark at one point ranging from 0 to 10. Such selection presents the opinion of respondent. On the basis of the opinion of employees, a researcher finds out whether employees take positively or negatively to his/her department head.

2) **Itemized rating scale :-**

In this scale, researcher provides a category of responses out of which the respondent selects one that is most relevant for answering the questions under study. It is popular in business research because of its adaptability in many situations where variables are to be measured.

For example :-

i) How do you rate your interest in changing organizational policies?
Extremely poor Not at all Some what well Very well

ii) How well is the new distribution channel working?
Not at all Somewhat interested Very much interested.
Respondents are asked to select most relevant option to know the opinion of the respondents

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4) Rank order rating scale:-

In this scale, researcher provides a category of responses out of which the respondent ~~select one that~~ are asked to rank the given items or product on the basis of their priority. They arrange them ranging from top most priority to lowest priority. It is a comparative method For example, a researcher asked to the customers to identify the rank on the basis of priority of the following noodles:-

Noodles	Rank
Mayos	—
Wai Wai	—
Golmol	—
RARA	—
Ruchi	—

Respondents provide 1-5 marks on the basis of priority to the different noodles. On the basis of rank provided by the respondents, a researcher finds out the priority of the customers.

5) Semantic differential scale:-

The semantic differential is a seven point rating scale with endpoint associated with bipolar levels that have implied meanings. The semantic differential scale is based on the assumption that an object can have several dimensions of implied meaning. In an application respondents rate objects or issues on one of two bipolar objectives, such as 'Beautiful' and 'Ugly'.

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6) Other simple scales:-

a) Simple category questions :- It is also known as dichotomous scale. It provides two mutually exclusive choices such as yes or No, important or unimportant and agree or disagree.

Example:-

i) Do you perform the works as per company policy?

a. Yes b. No.

b) Multiple choice questions:- A scale where multiple choices is given to the respondents but asked the respondents to select one or few alternatives.

Following scale can be developed to know the most liked biscuit:-

i) Nebico Glucose

ii) Hulash Glucose

iii) Parle G Glucose

iv) Other Glucose.

c) Open-ended questions :- In this scale, respondents are asked to give their own opinion in subjective form. No options are provided to them. Generally such opinion help to take right decision.

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Sources OF Measurement Problems.

Measurement should be precise and unambiguous in a research study. However, this objective is not oftenly met. As such, the researcher must be aware about the sources of errors in measurement. Following are the possible sources of errors in measurement:-

1) Related to respondent:-

At times the respondent may be reluctant to express negative feelings or it is just possible that he may have very little knowledge but may not admit his ignorance.

2) Related to situation:-

Situational factors may also come in the way of correct measurement. Any condition that places a strain or interview can have serious effects on the interviewer-respondents rapport. If the respondent feels that secracy is not assured, he may be reluctant to express certain feelings.

3) Related to measurer:-

The interviewer can distort the value of responses by rewarding or reordering questions. Errors may also take place because of incorrect coding, faculty tabulation and/or statistical calculations, particularly in the data analysis stage.

4) Related to Instrument:-

Error may arise because of the defective measuring instrument. The use of complex words beyond the comprehension of the

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respondent, ambiguous meanings, excessive length, erratic sequence of questions etc. are a few things that make the measuring instrument defective and may result measurement effort.

Hence, researcher must know the correct measurement depends on successfully meeting of all of the issues mentioned above. He must, as far as possible, try to eliminate, neutralize or otherwise deal with all possible sources of errors so that the final result may not be erratic.

SAMPLING

→ Sampling is some elements of population which helps to drawn conclusions about the entire population.

THE SAMPLING PROCESS

Sampling is an important function of research. Right sampling helps to draw right conclusions and such conclusions can only be applied in practice. Thus, sample should not be selected in hunches but it should be selected following certain process. Generally, the following procedures are pursued while selecting sample:-

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1) Define the population:-

The population is the collection of whole units that researcher are interested in knowing about them. Definition of population depends on the subject and nature of research and availability of resources and time for research. Finding of the research should be implemented in the population; therefore, it is to be defined clearly and precisely. Population should be defined in terms of elements sampling units and time.

2) Specify the sampling frame:-

Sampling frame is the list of elements from which the sample is drawn. A sampling frame can be telephone directory and employee roaster, voter list or list of all students attending a college. Thus, a perfect sampling frame is one in which every elements of the population is represented.

3) Specify sampling unit:-

A decision should be taken by the researcher concerning a sampling unit before selecting sample. The sampling unit is the unit that represents every characters of population. Sampling unit may be geographical one such as stage, district or a social unit as family, club, school etc. or an individual.

4) Determination of sample size:-

Sample size refers to the number of items which are to be selected as sample from the population. Populations have qualitative and quantitative elements. Sample size should be deter

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mined in such a way so that it can capture all elements of population and able to attain the goal of the research.

5) Preparation of plan for sampling:-

The researcher should formulate plan to make the work of sampling appropriate and well managed. Sampling plan determines the decisions which are to be taken while selecting sample and its use.

6) Select the sample:-

It is a final step of sampling work. Selection of sample requires substantial amount of office and field work. Selected sample should represent to the population and useful to attain the goal of research.

TYPES OF SAMPLING

Proper sample selection is very important work in research. Appropriateness of sampling depends on the nature, goal, subject and availability of resources and time. Thus, various sampling techniques are developed which are described below:-

1) Probability sampling:-

A sampling technique where every element in the population has equal chance of being selected as sample unit is known as probability sampling. Selection

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of elements depends on incident. In this method, researcher also cannot estimate which element will be selected and can use his/her opinion in sampling. It is used when there is necessity of generalizing findings of the research in large population.

Following are the types of probability Sampling:-

a) Simple random sampling:-

Sampling where every element in the population has equal chance of being selecting as a sample is known as simple random sampling. For example, if a required researcher wants to know the satisfaction level of banking employees in Nepal then he/she considers the employees of banking sector as population and selects the number of sample using computerized lottery system.

b) Systematic sampling:-

Systematic sampling involves the random selection of the first item systematically ordered population and then the selection of a sample items at every K^{th} interval. Under this sampling we need to calculate Sampling interval Where,

$$\text{Sampling interval (k)} = \frac{\text{Size of population (N)}}{\text{Size of sample (n)}}$$

This is a simplest and most widely used method of drawing a sample. The interval (k) is fixed by dividing the population by sample size.

c) Stratified sampling:-

A sampling method which represents the samples in proportionate rate from the different group of population is known as stratified

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sampling. If we want to represent different section of the population in the study such as male and female, educated and uneducated or employed and unemployed, this method of sampling is suitable.

(d) Cluster sampling :-

Sampling where a group is selected as sample having all elements of the population, is known as cluster sampling. This method is usually convenient for collection of data as a cluster is a mini population and has all the features of the population. It is suitable in the absence of suitable sampling frame.

(2) Non-Probability Sampling :-

Sampling where there is no equal chance of selecting sample to each unit and sampling is made based on pre-pla is known as non-probability sampling. This sampling is considered appropria -te if researcher needs to collect data with low cost and time and generalization of findings is not essential.

Following are the types of Non-Probability Sampling

a) Purposive or judgemental sample :-

A sampling method where samples are selected by the researcher based on his/her judgement is known as judgemental sampling. Researcher should know every unit of popula -tion and their features for applying this sampling method. Thus this sampling is generally used by the expert.

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(b) Quota sampling:-

A sampling method where population is divided into different groups based on their nature, features, qualities etc. and sample is selected from each group in a certain rate is known as quota sampling. It is non-probability sampling so its findings cannot be generalized. To know the buying behaviour of different group of people, to know the attitude of the group of employees regarding the culture of their organization, this sampling method is considered as appropriate method.

c) Convenience sampling:-

Researcher selects the units as sample on the basis of his/her convenience is considered as convenience sampling. The researcher selects those units that are available, nearby and willing to participate or has relationship. Generally, this method is used when there is high limitation of time and resources. A researcher can collect data quickly and at low cost and time using convenience sampling method.

d) Self-selecting sample:-

If the researcher gives information through media to the respondents and respondents provide information on the basis of information received through media then such sampling is known as self-selecting sample. Generally it is used to know the goodwill and evaluate the service provided by the organization.

e) Snowball sampling:-

If the population is infinite or not fixed, then researcher selects one or few sample whose profit is fit to get the information and on the

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basis of reference of those sample people, other sample are selected. Such sampling is known as snowball sampling. It is usualy used by police to find out criminals and to study over the group activities culture and relationship of society etc.

SAMPLING ERRORS

The error that arises as a result of taking a sample from a population rather than using the whole population is known as sampling error.

The sampling error commonly taken place are:-

1) **Population specification error:-**

This errors occurs when the researcher doesnot understand who should be surveyed.

2) **Sample frame error:-**

A sample frame error occurs when the wrong sub-population is used to select a sample.

3) **Selection error:-**

This occurs when respondents self select their participation in the study - only those that are interested to respond.

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4) Non response:-

Non-response errors occur when respondents are different that those who donot respond.

5) Error in taking sample:-

These errors occur because of variation in the number of representatives of the sample that responds

Methods of Minimizing sampling Errors:-

① Increase sample size
② Cross check
③ Unbiased sampling
④ Appropriate sampling design
⑤ Clear questionnaire.

Non-Sampling Errors

Errors which are incurred from other sources than selection of sample are known as non-sampling errors. Following errors are major non-sampling errors:-

1) Errors of poor sampling design:-

If the researcher fails to identify appropriate respondent and proper planning for selecting sample, then results of the research cannot present the actual output

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2) Over and under coverage:-

Sometimes, researcher may select more elements while selecting sample or may leave the essential elements of population. Such study cannot give appropriate result.

3) Misinterpretation of questions:-

If researcher uses difficult and ambiguous words, respondents may interpret the questions differently so that their responses donot represent the concept.

4) Processing errors:-

There may be errors in coding, decoding, editing and analyzing the data and interpreting the results of the research.

5) Respondent related errors:-

When respondent donot give response or give bias response or not able to give response or researcher not able to record the response properly then the result of the research will be wrong.

6) Errors of researcher:-

There might be errors in the research result due to weak definition of variables, selection of wrong method and preparation of weak questionnaire and weak administration of questionnaire by the researcher.

7) Measuring errors:-

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Methods of minimizing Non-sampling Errors

1. Checking the sampling process
2. Preparation of questionnaire
3. Pilot survey
4. Fix procedures
5. Use of competent manpower
6. Provide information
7. Provide training
8. Use of experts
9. Checking data processing and analysis.

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CHARTER 5

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DATA COLLECTION AND ANALYSIS

The information or facts collected through record, observation and measurement is known as data. The first work of research is data collection.

Classification / Types of Data:

Mainly data are classified as primary and secondary and quantitative and qualitative. Those classification are described below:-

(1) Primary and secondary data:-

Data that has been collected by the researcher himself/herself as per the objective of the research is known as primary data.

If the researcher uses the data developed by others in the past for their own purpose is known as secondary data.

(2) Qualitative and quantitative data:-

When data is collected based on quality or characteristic but not on quantity is known as qualitative data.

Information and facts that are collected in the form of numbers is known as quantitative data.

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Primary sources of data

1) Interview:-

The data collection method where data are collected by asking questions orally to the respondents is known as interview.

2) Questionnaire:-

A questionnaire is a list of questions developed systematically to gather response from respondents on a given topic, issue or event.

3) Observation:-

A method of collecting data where researcher observes, analyses and interprets the events or works personally is known as observation.

Secondary Sources of Data

① Published Sources:-

Various agencies like government, non-government and private and individuals collect primary data for their research and publish such data for the knowledge of stakeholders. The researchers obtain such data from the following forms:-

ⓐ Government reports and publications:-

Reports from ministries, departments Nepal Rastra Bank, Central Bureau of Statistics, Planning Commission etc are used by the researchers in their research activities.

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b) Publication of semi-government organizations:-

Various semi-government organizations like industrial service centre, Trade Promotion Centre Nepal Airlines Corporation, Nepal Food Corporation etc. publish books and reports time and again. Other researcher can collect data for their research from these books and reports.

(c) Reports and publication of International organizations:-

International Organizations like World Bank, International Monetary Fund, World Health Organization, UN Mission and Agencies, Asian Development Bank, International Labour Organization and Commercial Organizations publish progress report and Conduct research time and again. As well they publish bulletins and books for the knowledge of public. Other organizations and individuals use such data to conduct further research in the same field.

(d) Private Publications:-

Various individuals and business houses establish organizations like FNCCI, Chamber of Commerce, Confederation of industry etc. publish reports for the knowledge of public. The research reports and progress reports of NGO's and INGO's are also the prime source of secondary data.

(2) Unpublished sources:-

Some data and information are not published after the completion of the work. Such sources of data are known as

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unpublished sources of data. Reports of private offices and organizations, record, some secret information of government and non-government Organizations, records of hospitals, schools and dissertations of students are some unpublished sources of data. It is also a major source of secondary data.

(3) Computerized database:-

Computerized database consist of information that has been made available in computer for electronic distribution. Computerized database may be classified as online, internet or off-line. Online database consists of a central data bank which is accessed with the computer through telecommunication networks. Internet database can be accessed, searched and analyzed on the internet and off-line databases that make the information available on diskettes or CD-ROM disks.

Advantages of Secondary data

→ Secondary data is readymade data. They are proven data. So, uses of secondary data has plenty of advantages. Some of them are:-

1) Easy to generalize (सामान्यीकृत)
2) Economy
3) Quick
4) Helps to cross check
5) Reliability (विश्वसनीयता)

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Disadvantages of Secondary Data

From the collection and use of secondary data, following disadvantages may be faced:-

1) Determination of reliability of secondary data is very difficult.
2) Chances of manipulation
3) Inherent limitation
4) Donot match the need of situation
5) Difficult to find rationality (तर्कसंगतता)

Sources of Primary Data.

1) Interview:-

The data collection method where data are collected by asking questions orally to the respondents is known as interview.

Following are the types of Research Interview:-

(a) Personal or Face to Face interview:-

Interview where interviewer talks to the respondents or asks the questions to the respondents directly is known as personal or face to face interview. In this method, interviewer and respondents interacts each other so that the interviewer can obtain depth and reliable information.

(b) Telephone interview:-

When a researcher takes the interview from the

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Widely spread respondents using telephone, such interview is known as telephone interview. This method of interview is suitable when many respondents are to be interviewed over a wide geographical area and time available for interview is very short.

(c) Computer assisted interview (CAI):-

Interview that is conducted using computer especially laptop rather than using paper questionnaire is known as computer assisted interview. Rather than using a paper questionnaire, interviewers carry laptops from which questions are read out and responses to the survey questions are entered. CAI was first used in UK in 1990 on the labour force survey and by 1995, all of the social surveys carried out by the Office for National Statistics used this method.

(2) Questionnaire -:

A questionnaire is a formal list of questions designed to gather response from respondents on a given topic, issue or event.

PRINCIPLES OF QUESTIONNAIRE WRITING

1) Clear and Precise
2) Use of Natural and familiar language
3) Unbias
4) Avoid double-barreled questions
5) State explicit alternatives :- Clear alternatives should be expressed
6) Reliable and valid.
7) Length of the questionnaire

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8) Match the objectives
9) Consider to participants :- Question should be according to level of participant
10) Pilot study and improving the questionnaire :- First implement in a small sample group.

CONTENTS / COMPONENTS OF QUESTIONNAIRE

Generally, questionnaire divides subjects into three groups. Such groups should be arrange serially. Parts of the questionnaire are arranged in the following ways while preparing questionnaire:-

1) Part incorporating explanatory information :-

In this part, researcher provides information about the need of information, objective of collection of information and reasons of filling the questionnaires. As well researcher provides guidelines for filling up the questionnaire. It helps to remove the confusions of the respondents. Thus, researcher can collect quality information

2) Main part :-

It is a part which consists of number of questions and probable answers of those questions. In this part, researcher enlists the questions for the collection of data with the purpose of solving the research problem. Questions can be long or short as per the necessity of the research. This part of the questionnaire covers all necessary subjects under study.

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(3) Part incorporating personal information:-

This part usually covers socio-demographic variables. It facilitates to group the answer of the respondents and study the pattern. These questions usually appear at the end of a survey questionnaire. This part incorporates age, gender, education, marital status, family income, occupation, religion etc.

QUESTIONNAIRE DESIGN

→ Questionnaire is prepared to obtain the information for attaining the goal of the research. Success of questionnaire depends on the collection of necessary information. Although each questionnaire must be designed with specific research objectives but there is sequence of logical steps that every researcher should follow to develop a good questions. Those steps are given below:-

1) Plan what to measure

→ Revisit the research objective

→ Decide issue of research problem.

→ Get additional information on the research issue from literature review.

→ Decide the issues to be asked.

2) Formulate questions to obtain the needed information

→ Determine the content of each questions

→ Decide the format of the questions.

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3) Decide on the order and working of questions and its layout

→ Determine the words for questions

→ Evaluate each research questions on the basis of Comprehensibility knowledge and ability.

→ Evaluate inclination of respondents to answer the questions.

→ Group all the questions in sub-topic to develop a complete questionnaire.

4) Use a small sample test, the questionnaire to check omissions and ~~ab~~ ambiguity.

→ Read thoroughly the whole questionnaire to check the sense and validity

→ Check the questionnaire to find out errors that are in the questionnaire

→ Check the physical appearance of the questionnaire.

→ Pretest the questionnaire.

5) Correct the questionnaire and finalize the questionnaire.

OBSERVATION

→ Concept:-

A method of collecting data where researcher personally observes, analyses and interprets the events ore works is known as observation. Researcher doesnot ask the questions but observes the events and keeps the record of important information and facts. This method is particularly suitable in studies which deal with those people who are not capable of giving verbal reports or their feelings due to any reasons

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METHODS OR TYPES OF OBSERVATION

1) **Structured and Unstructured observation:-**

When observation is made by characterizing style of recording the observed information, standardized conditions of observation, definition of the units to be observed and selection of pertinent data of observation then it is structured observation.

When observation is done without any thought before observation then it is known as unstructured observation.

2) **Participant and non-participant observation:-**

When the observer is member of the group which he is observing then it is participant observation.

When observer is observing people without giving any information to them then is known as non-participant observation

3) **Controlled and uncontrolled observation:-**

When the observation takes place according to definite pre-arranged plan and with experimental procedures then it is known as controlled observation.

When observation takes place in natural condition then that is considered as uncontrolled observation. It is done to get spontaneous picture of life and persons.

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DATA ANALYSIS

→ Data analysis is the process of gathering, arranging, classifying modeling and analyzing the data with the purpose of generating useful information.

ORGANIZING AND PREPARING DATA

→ Data should be processed using specific techniques to draw the conclusion. Processing technique is used to make data valid Simple and reliable. Data processing procedures are given below:-

1) Editing :-

The process that detects errors in the raw data and rectifies and simplifies to the act of coding is known as editing. Especially the data obtained from interview, observation and questionnaire should be edited. It ensures the quality of data. Editing of data is made in field and in office. They are known as field auditing and central editing respectively.

Editors should follow the following rules while editing data:-

a) Be familier with instructions given to interviewer and interviewees.
b) Donot destroy and erase the original entry.
c) Make all edited entries on an instrument in some distinctive colour and in a standard form.
d) Place initial signature and date of editing on each instrument completed.

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(2) Coding:-

The act of assigning numbers or other symbols to the responses of respondents so that the responses can be grouped into a limited number of categories is known as coding. Single code should be provided to similar information or data. Nowadays, computer is used for coding of data. Instead of entering the word male or female in response to a question that asks for the identification of one's gender, we would use numeric codes (For example, 0 for male and 1 for female). Such process of providing 0, and 1 to male and female is known as coding.

Following rules are to be followed while coding:-

a) Coding should avoid unclarity and duality so that codes can be used consistently.
b) All the codes used are to be defined
c) Codes should be appropriate to the research problem and purpose
d) It should be mutually exclusive
e) It should be derived from one of the classification principles

3) Classification:-

Classification means separating items according to similar characteristics and grouping them into various classes. First of all, data should be collected as per the research objective. Such data are not ready for comparison and analysis until and unless they are systematically arranged and even they cannot be understood. Classification of data can be made on the following bases:-

a) Geographical classification
b) Chronological classification
c) Qualitative classification
d) Quantitative classification.

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A) Tabulation :-

Tabulation is the process of arranging data in a systematic manner into rows and columns. Rows are horizontal arrangement and columns are vertical arrangement. It is the final step in collection and compilation of data. It is made to simplify the presentation of data. It facilitates comparison between related information and facts.

Rules for Tabulation of Data :-

1) The table should suit the size of the paper with proper rows and column.
2) Table should be clear, correct and attractive so that it can be easily read and understood.
3) Table is to be drawn based on the objective of the research.
4) Table should be precise and easy to understand.
5) Table shouldnot be overloaded.

5) Summarising of Data :-

Researcher, first of all, collects the raw data. Such raw data are edited, coded and classified into different groups. After all these works, researcher presents the data in precise form so as to make easier for describing, analysing and interpreting the data is known as summarizing of data. Summary of data may be presented in the form of table, chart or in other form.

Thus data can be summarised in the following ways :-

A) Presenting Data in Tables
B) Graphs and Charts

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STATISTICAL TECHNIQUES

→ The first work of research is data collection. Second work is to arrange and present the data in a logical order. After managing the data in workable design, data are analyzed using statistical tools to draw the conclusions which are known as statistical analysis. Analysis of data is generally classified into following two groups:-

1) **Descriptive statistics:-**

Those statistical tools which are used to explain the activities or fundamental characteristics or behaviour of a group or data is known as descriptive statistics.

Descriptive statistical tools are given below:-

a) **Frequency:-**

Frequency refers to the number of repetition of variables or events or subject. This technique is used when data is collected in nominal scale like female and male, Hindu, Buddhist, Muslim etc. Generally, frequency can be obtained from the nominal data like genders, departmental units, types of organizations etc.

b) **Measurement of central tendency and dispersion:-**

The value of the data that represents the average value of it is known as central value. Most popular techniques of measuring central tendency are given below:-

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1) **Mean:-**

Mean is a measure of central tendency that offers a general picture of data calculating average of series of data. The mean can be derived by adding the value together and dividing by the number of items. It is often used in the study of social and economic sector where quantitative measurement is possible.

Mean are also of different types:-

i) Simple arithmetic mean $(\bar{x}) = \frac{\Sigma x}{n}$

ii) Weighted arithmetic mean $(\bar{x}_w) = \frac{Wn\bar{x}n}{Wn}$

iii) Geometric mean (GM) $= \sqrt[n]{xn}$

(2) **Median :-**

Median is the size of the middle item when the items are arranged in their order of magnitude. Median is that value which divides the series of values in two equal parts. It is used to divide ordinal data into two equal parts.

Example:-

Median of following income of Ram & co. is calculated as follows:-

5, 6, 7, 8, 9, 10

Median is calculated taking the average of 3rd and 4th item

$$\text{Median} = \frac{7+8}{2} = 7.5$$

Thus, 7.5 is the median for this set of data.

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(3) Measures of dispersion:-

Dispersion shows the scatteredness of data It means how much the data are scattered from the mean value. The statistical measures which are used to measure the scatteredness of data is known as measures of dispersion. The main aim of measures of dispersion is to measure the reliability of measurement of control tendency and comparison of consistency of two or more set of data.

Important method of measuring dispersion is given below:-

a) Range:- Range refers to the difference between the size of the largest and smallest items.

Range = Largest value - Smallest value.

b) Quartile deviation:- Quartile deviation is one-half the distance from the third quartile (Q_3) and first quartile (Q_1). Quartile divides the distribution into four equal parts.

c) Mean deviation:- Average of difference between data and mean value of the same data is known as mean deviation. It can be expressed as follows:-

Mean deviation from mean = $\frac{\Sigma |x_i - \bar{x}|}{n}$

Mean deviation from median = $\frac{\Sigma |x_i - M_d|}{n}$

Mean deviation from mode = $\frac{\Sigma |x_i - M_o|}{n}$

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d) Standard deviation:-

Standard deviation is the positive square root of the arithmetic mean of the squares of the deviations of the given observation from their arithmetic mean. It is denoted by Greek letter 'σ'. Standard deviation is calculated as follows:-

$$\sigma = \sqrt{\frac{1}{n}\Sigma(x-\bar{x})^2} \quad \text{(in individual series)}$$

$$\sigma = \sqrt{\frac{1}{n}\Sigma f(x-\bar{x})^2} \quad \text{(in discrete and continuous series)}$$

(2) INFERENTIAL STATISTICS

→ The statistical method that helps to estimate the population from the analysis of sample data is known as Inferential Statistic. It helps to see the relationship between independent and dependent variables and helps to decide the same relationship in the population also. Inferential statistic is divided into two groups as follows:-

a) Estimation statistics:-

A statistic that is used to estimate the population parameter from the analysis of sample is known as estimation statistic. Estimation is made using following two methods in statistics:

i) Confidence interval or estimate:- It helps to establish difference between

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two points: It helps to estimate the value or characteristics of population analyzing to the sample.

ii) Parameter estimation:-

It is a statistical method that helps to estimate the relationship of variables that are in the population is known as parameter estimation. Linear regression, mode, correlation are some examples of parameter estimation.

b) Hypothesis testing:-

When population is large and it may not be possible to enumerate all the sampling units belonging to the population. In doing so, one has to take the help of certain assumptions about the characteristics of population which are known as hypothesis. Hypothesis is tested on the basis of sample. Such hypothesis are tested using various statistical tools based on the analysis of sample. It helps to estimate the population parameter from the analysis of sample. Generaly, hypothesis is tested based on probability value (p-value). P-value measures the significance of the test

Procedures for Testing Hypothesis-:

a) State the null and alternative hypothesis
b) Establish the level of significance
c) Choosing a suitable test statistics
d) Obtain the critical value
e) Conclusion.

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STATISTICAL TESTING OF HYPOTHESIS

Different non-parametric tests are used on the basis of condition of samples. Some of the non-parametric tests are discussed below-;

(A) **Chi-Square Test-;**

Chi-square test is rigorously used as non-parametric test in the research. Generally, chi-square test is used to check the dependency of two or more than two groups. Chi-square is used when-;

i) the data is collected in nominal scale
ii) the sample size is more than 50
iii) expected frequency is not less than 5 or if it so then frequency is made more than 5 adding existing frequencies.
iv) the individuals or events are divided into two or more than two nominal groups.

(B) **Correlation-;**

A pearson correlation matrix indicates the direction, strength and significance of relationship between two variables among the variables in the study.

The correlation is derived by assessing the variations in one variable to another variable. Correlation can be seen using various methods. They are explained below-;

1) Product-moment correlations 2) Rank order correlation
3) Partial correlation 4) Multiple correlation.

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C) Regression analysis:-

A statistical technique that is used to see the degree of relationship between dependent and independent variable is known as regression analysis. It estimates the changes in the dependent variables due to change in independent variables. For example, following regression equation is developed to see the changes in government revenue due to change in tax rate:-

$$y = \alpha + \beta x$$

(D) Time series Analysis:-

A statistical technique that is used to study the variation in the variables on the basis of time is known as time series analysis. Generally, this technique is rigorously used in the business research. For example time series analysis is used to study the change in production, sales etc. due to pace of time. Time series is calculated using following formula:

$$x = f(t)$$

where, x = variables and t = time value

Time series helps to predict the future trend based on past activities.

E) Multivariate Analysis:-

It is concerned with statistical methods designed to elicit information from these kinds of data sets because the data include simultaneous measurement on many variables. This body of methodology is called multivariate analysis.

Important techniques of multivariate analysis are:-

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i) Multiple regressions
ii) Multiple discriminate analysis
iii) ANOVA technique
iv) Factor analysis
v) Cluster analysis etc.

METHODS OF COLLECTING QUALITATIVE DATA

→ Qualitative data can be collected using different methods that are given below:-

1) Depth Interview:-

Depth interview are designed to find out underlying motives and desires. Depth interviews are taken to explore needs, desires and feelings of respondents. Depth interview requires great skill on the part of the interviewer and at the same time involve considerable time. Generally, following steps are to be followed while conducting depth interview:-

a) Formulating plan to conduct depth interview
b) Determining the respondents based on their experience
c) Preparing guidelines to take interviews of all types of respondents
d) Providing introduction ownself
e) Taking interviews and recording them
f) Analyzing the data
g) Preparing report

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2) Focus Group Interview:-

A group that is selected to hold a discussion in the subject of research on the basis of their experience so as to collect information for the research is known as focus group discussion. When the focus group is organized, the interviewer provides a brief general comment on the purpose of the meeting and suggests a topic for discussion. It can be conducted using different methods. Those methods are given below-:

a) Telephone focus group
b) Online focus group discussion
c) Video-conferencing focus group discussion.

ANALYSIS OF QUALITATIVE DATA

Data, which is expressed in subjective way or in language but not in numbers and collected through observation, is known as qualitative data. Analysis of such data so as to known the trends or activities or events or get in-dept knowledge.

1) Content analysis-:

Content analysis is a research technique for the systematic, objective and quantative descriptions of the content of data collected through interviews, questionnaires, schedules and other expressions in written or verbal form.

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2) Narrative analysis:-

A technique of recording and analyzing the information and subject based on the story of the respondents or people related to an event or subject matter is known as narrative analysis.

3) Thematic analysis:-

A technique of qualitative data analyse that is used to identify the major points of data, analyse them and prepare report is known as thematic analysis.

SCALES OF MEASUREMENT

- Measurement is central and essential to the process of obtaining data.
- Measurement is the assignment of numbers to objects according to specific rules, to characterize the quantity of an attributes.
- There are four levels of Measurements.

1) Nominal Measurement:-

It involves the assignment of numbers to objects to represent categories. It consists of categories that are not more or less than each other but are different from one another in some way. It assigns numbers to objects where different numbers indicate different objects. Nominal measurement has no quantitative value.

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Example:-

1) Gender.

1 = male , 2 = female

2) Baseball uniform number.

(The number provides no insight into the player's position).

(2) Ordinal level measurement:-

It assigns number to objects like nominal but here the numbers also have meaningful order.

Example:-

In race :- 1st, 2nd, 3rd

In election:- 1st, 2nd, 3rd, 4th etc.

Here number indicates placement of order. 1st is better than 2nd and so on.

3) Interval-level measurement:-

Here, numbers have order just like ordinal level measurement i.e. assign number to objects and numbers also have meaningful order or categories but there are also equal interval between adjacent categories.

Example:- Temperature in Degree fahrenheit.

The difference between 78°F and 79°F (ie 1 degree) is the same as 45°F and 46°F.

There is more or less, equal numerical distance between intervals and no absolute zero points.

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Ratio-level measurement:-

It is the highest level of measurement and has all three attributes i.e.

- magnitude
- Equal interval
- Absolute zero point (Absence of property).

Example:-

- Biophysical parameters
- Weight in pounds

10 lbs is twice as much as 5 lbs.

Ratio are meaningful: $\frac{10}{5} = 2$ and zero pound means no weight or absence of weight (true zero point)

The End

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