Hamromaster
सुनौलो भविष्य हातमा **Hamromaster** को साथमा

Hamromaster

COMPLETE NOTES

For Hamromaster Online Classes

Whatsapp: 9840842566

Hamromaster

Hamromaster

1 Introduction to Research

[Generally two questions are asked from this chapter]

1. **What is scientific research? Discuss its characteristics. [TU 2076]**

Solution:

Research is an aggregate of activities carried out by using scientific methods in sequential order to describe an event or phenomenon or draw conclusion on the basis of available information.

A definition of research that fits to different views is: A systematic, careful inquiry or investigation done to discover new information or relationships and to expand, verify existing knowledge for some specific purpose that may be academic or applied or both.

Scientific method : In this method, truths are not ascertained by beliefs but by something upon which thinking have no effects. In this method, the ultimate conclusion of every man shall be the same.

This method deals with real things whose characters are entirely independent of our opinions about them.

- Self correction and objectivity are two main characteristics of this method that distinguish it from other methods.
- Personal beliefs, perceptions, Biases, values, attitudes and emotions have no place in this method.

Characteristics of Scientific method

Mnemonics → VGPOS
Very Good Person Obeys System

i. **Verifiability :** The conclusion drawn through a scientific method is subjected to verification at any time. In case direct observation could

not be done, other methods such as interview can be utilized for verification. For instance, a man's order of preference of various job, although incapable of being observed can still be verified through interview.

ii. **Generality :** Laws derived through scientific method are universal in their application. They are not limited to individual objects or individual groups of objects. The individual groups or objects are considered as specimen and the relationships discovered through these individual groups should be applicable to the whole groups called universe.

Due to heterogeneous nature of social phenomenon, the facts observed in social sciences are valid only under given conditions.

iii. **Predictability :** The results through scientific method can be predicted with sufficient accuracy. For example, one can say with certainty that if water is heated to 100°C, it will vaporize and if it is cooled to 0°C, it will turn to ice. Predictability is fixed on two factors i.e. fixing of relationships between the causes and the effect and the stability of causative factors.

Predictability depends on one hand upon (a) the nature of the phenomenon and

on the other hand upon (b) the knowledge of various causative factors.

However people do not acknowledge predictability in social phenomenon as a part of scientific method.

iv. **Objectivity :** The results obtained through scientific method should be free from investigator's own views, wishes of prevalent notions i.e. they must be subjected to objective observations.

The main criterion of objectivity i.e. that all persons should arrive to the some conclusion about the phenomenon.

For example, when we say coal is black, it is objective statement because coal will appear black to all people. But when we say coal is useful mineral, the statement may not be objective for every man may not agree to the statement.

Objectivity is essential for verification. It permits repetition of observations under practically identical conditions. This facilitates the verification of an observation by many observers. Apparently, objectivity seems very easy to achieve but is more difficult to achieve in social sciences.

v. **System :** In every scientific study, there is an accepted mode of investigation. The results arrived through haphazard method even true cannot be called scientific because its accuracy is purely accidental.

2. **Discuss different sources of knowledge. What are the main features of a scientific method? Give examples of these features.** **[TU 057]**

Solution:

Human nature is always inquisitive to understand causes and consequences of happening or not happening of something or event or phenomenon and to predict their occurrence and extend in future. Answers to interrogative queries like what, when, how, who, whom and how much are some of understandings that generate knowledge among human beings. Some of the understanding come in natural way while others come through complex procedure of investigation.

There are four methods of knowing or understandings

a. **Tenacity:** In this method, people know something to be true simply because a lot of people believe it to be true. The more it is so, the more valid the truth becomes

b. **Authority :** In this method if a well respected person or an authoritative source says that something is so, then it must be so.

The Geeta and The Bible are some of such sources.

c. **Intuition/Prior method/Rational Approach :** This method is based on the notion that people will reach the truth because their natural inclination will be to do so. It is based on the notion that intuitive proposition should agree with reasons and not necessarily with experiences. That's why this method is also termed as Rational approach.

Through this method, different people will come to different conclusions via different processes of reason.

d. **Scientific method :** In this method, truths are not ascertained by beliefs but by something upon which thinking have no effects. In this method, the ultimate conclusion of every man shall be the same.

This method deals with real things whose characters are entirely independent of our opinions about them.

- Self correction and objectivity are two main characteristics of this method that distinguish it from other methods.

- Personal beliefs, perceptions, Biases, values, attitudes and emotions have no place in this method.

For Features of Scientific Method, See Q.No.1

3. What do you mean by research problem? Explain how the formulation of research problem is compared to daily chores. Discuss the main criteria of a research problem & describe how a researcher can select a meaningful research problem. [TU 2074]

OR

Define problem. What are the criteria for a good problem? What are the basic guidelines to be followed in selecting a problem? [TU 059]

OR

What is research problem? Discuss basic characteristics of a good research problem with suitable examples. [TU 076]

Solution:

Statement of Problem

A problem in research generally refers to some difficulty which an investigator experiences in the context of either a theoretical or practical situation and wants to obtain solution for it. That is, the negative statements which requires a researcher to find out the best solution is called problem.

First step in a scientific study is the identification of the problem. An investigation is not carried out simply for the sake of investigation. To initiate an investigation, there should be pre-occurred ideas that generated the necessity for the investigation to be carried out. The ideas are developed while going through literature discourses with experts and continuation of activities related to the subject matter.

These idea develop into some specific topics that will be rewarding if investigated. These topics are generally called problem. For action oriented investigation, problems are presented as negatives of situations prevailing within a phenomenon.

In project works, the problems are identified by means of group participation. A group of knowledgeable persons are identified and the statements in negative sense are collected and classified into different groups. A statement which appears most representative of the group is selected. These statements are arranged in sequential order as they appear to the group of experts in the subject matter. These statements are called problems.

In academic studies, the caution is known as the pit falls in topic choosing.

Some guidelines for selecting problems

- The problem should be significant and should be allied with researches already in existent. Stray problems if selected becomes difficult to co-ordinate and do no add to the wholesale development of the theory.
- The problem selected shouldn't necessarily be new one. It may be old problem or one on which work has already been alone i.e. verification of old problem may be equally useful.
- The problem should be within manageable limits i.e. it shouldn't b too comprehensive.
- The problem should possess some direct utility. However basic researches may not have immediate utility to commercial users but the advancement of further scientific theories.
- The problem should be practically feasible i.e. in terms of time, money and other resources available in one hand and in other hand it should be such that it can be dealt through existing techniques.

Criteria of a good problem

According to Kerlinger, a good problem is defined as interrogative sentence/statement that asks what relation exists between two or more variables.

Some criteria of Good problem are

- It should express a relation between two or more variables
- It should be stated clearly and unambiguously. Also the problem should always be expressed in the form of direct question because the questions have the virtue of posing the problem directly.
- The statement of the problem should be such as to imply possibilities of empirical testing.

Note: The purpose of an investigation is not necessarily the same as the problem of the investigation. For instance in Hurlock's study, an evaluation of certain incentives used in school work, the purpose of the study was to throw light on the use of incentives in school and the problem was the question about relation between incentive and performances.

4. Define research as a scientific activity. Explain what a methodology of research mean. Also, describe in detail the different phases of research methodology. [TU 073]

OR

Define research. What are the purposes of research? Illustrate the process of a research in a diagram? [TU 057, 071]

Solution:

Research

- Research commonly refers to a search for knowledge. One can also define research as a scientific and systematic search for pertinent information on a specific topic.
- There are different views about the concept of a research. Some people considers research as cozy and personal activity that can be indulged in from time to time from the safety of armchair with access to a pile of books/ journal's literature. This type helps us to keep up to date and improve our personal stocks of knowledge.

Some other people define research as rigorous activities which are governed by the scientific methods. This type of research aims at developing new bodies of knowledge by using scientific approaches.

Research is an aggregate of activities carried out by using scientific methods in sequential order to describe an event or phenomenon or draw conclusion on the basis of available information.

The research is the process of obtaining the answers to questions, what, why, when, how, where and who.

A definition of research that fits to different views is: ***A systematic, careful inquiry or investigation done to discover new information or relationships and to expand, verify existing knowledge for some specific purpose that may be academic or applied or both.***

Purposes/Objectives of Research

Researchers are carried out for a number of very good reasons or purposes. Some of the purposes are:

i. **Generating new knowledge :** It means uncovering new facts or phenomenon or establishing new relationship of various variables.

ii. **Improving understanding :** It means helping to explain situation or shed light on misunderstood concept.

iii. **Application testing :** It tries out concepts and approaches in the real world to see if they work.

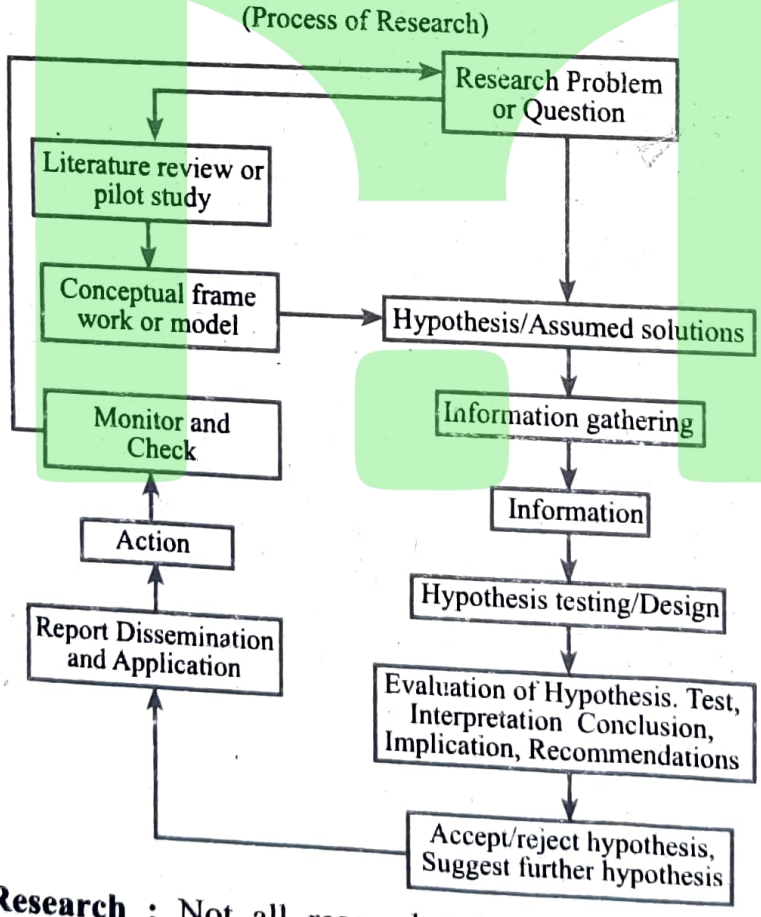
iv. **Comparing best practices :** It gathers information about successful of subject in different circumstances and looks for explanation of their successes.

v. **Helping with decision making :** It generates information, concepts, framework and approaches that help executives or planners to make better and more effective decisions.

Process of a Research : The process starts with some form of problem or a question. An exploratory study free from too much biases or pre--conceived ideas are made. On the basis of the study a hypothesis or a series or hypothesis are set up. These hypotheses can be tested against reality. Having formed hypotheses. Researcher seeks information or data which will allow him to test their validities.

The data collected would then be analyzed and subjected possibly to several statistical test to determine whether the proposed answer holds true or not and with what degree of confidence or faith it can be accepted. The result of this analysis and deliberation would be interpreted and communicated via Reports, Seminars. Planning groups or whatever to the client.

Diagrammatic presentation or the major steps in a research process is shown in diagram



Stages of Research : Not all research take place at the same stage of scientific sophistication. This is because different disciplines or areas of study have their own established requisites.

In discipline-such as physics concerned with space flight and traveling. The emphasis is placed very much on accurately predicting what will happen

and how to control events. In contrast, the research in the wild life is focused upon describing and understanding wild life events. Thus the stage of research differs from one subject to other. There are in essence, five stages of a research.

Description: This is perhaps the most basic level of research. It is concerned with describing what exists around us.

Classification: Observation research often throws up similarities and differences in what have been observed. This leads to classification of the things we are studying on the basis of known natural characteristics.

Explanation : This type of research provides answers to question like, why do difference occur ? What causes the similarity and difference? Why do certain approaches of management seem to prevail in some countries but not in other? The answers ultimately develop into a theory.

Prediction: This is the last level of the research. In this level, using established theories and models, the researcher is expected to predict Y on the basis of 'X'.

5. What do you mean by research questions? How it is related to research theme? Discuss the method of identifying and formulating meaningful research questions. [TU 2072]

Solution:

Simply research questions are the interrogative form of research objectives.

When an investigator experiences some difficulties in the context of either a theoretical or practical situation, he wants to obtain best solution for it. The negative statements which requires a research to find out the best solution is called problem. The expression of the research problem in the interrogative sentences are the research questions.

Research questions are generated from pre occurred idea that generated the necessity for the investigation to be carried out. Hence the data required to be collected and data analysis tools and methods are determined by research questions. Research questions are related to three aspects what, why and how? The research question always asks what relation exists between two or more variables.

Research questions

- Provides real starting point for the research process
- Determines the data required to be collected
- Gives way for research design.
- Decides the research method to be adopted
- Determines data analysis tools and methods and result interpretation procedures.
- Always asks what relation exists between two or more variables.

Without formulation of research question, the investigator faces many challenges in the direction of research objectives and purpose of the investigation can not be attained.

Hence research questions are related to research theme.

Some methods to identify, select and formulate research questions are:

Some guidelines for selecting problems:

- The problem should be significant and should be allied with researches already in existent. Stray problems if selected becomes difficult to co-ordinate and do no add to the wholesale development of the theory.
- The problem selected shouldn't necessarily be new one. It may be old problem or one on which work has already been alone i.e. verification of old problem may be equally useful.
- The problem should be within manageable limits i.e. it shouldn't b too comprehensive.
- The problem should possess some direct utility. However basic researches may not have immediate utility to commercial users but the advancement of further scientific theories.
- The problem should be practically feasible i.e. in terms of time, money and other resources available in one hand and in other hand it should be such that it can be dealt through existing techniques.

Criteria of a good problem

According to Kerlinger, a good problem is defined as interrogative sentence / statement that asks what relation exists between two or more variables.

Some criteria of Good problem are

- It should express a relation between two or more variables
- It should be stated clearly and unambiguously. Also the problem should always be expressed in the form of direct question because the questions have the virtue of posing the problem dirc

- The statement of the problem should be such as to imply possibilities of empirical testing.

Steps in Research Problem Identification

i) Determining the research field in which researcher is interested.
ii) Developing specialty on the area or in the field.
iii) Studying the current research conducted in the selected area.
iv) Selection of priority field of study
v) Drawing analogy
vi) Specification of the problem which is to be investigated.

Steps in Research Problem Formulation

i) Statement of general problem
ii) Understanding the nature of problem
iii) Literature survey
iv) Developing ideas through discussion
v) Rephrasing research problem

6. Discuss the different stages of evolution of scientific studies. Also discuss the technical and logical aspects of a scientific method.

[058 TU]

Solution:

Scientific studies have passed through different stage of evolutions and the methods of scientific analysis have been made more and more refined with growth of scientific studies.

Different stages of evolution of scientific studies

i. **Random observation method :** In this method, the investigator goes with the process of observations and experimentations without any concrete aim or hypothesis. The investigator discovers a new element or a thing or a relationship by chance after many days of labour. X- ray is discovered in this way.

ii. **Systematic exploration :** In this method, the investigator does not leave everything to chance but proceeds in a systematic and planned way to explore new thing or a relationship of various factors involved in a phenomenon under study. This is improvement over first method. In systematic exploration, the investigation begins the general exploration without any specific hypothesis. This lack of hypothesis makes the investigation vague and unfocussed.

iii. **Hypothesis testing :** In this method, specific hypothesis is formulated and the investigation work is confined to testing the validity of the hypothesis so formulated.

iv. **Experiment directed to systematic theory:** In scientific studies, this method is considered as the most refined method of systematic experiment. Under this method, some theory which has been tested and found correct is taken into consideration on the basis of theory, certain generalizations are made. Empirical observations are then made and necessary data are collected to verify if the generalizations are correct Newton's law of motion or Einstein's Relativity theory comes, under this type of study.

[*Mnemonics → RSHE*
Ram Says He is Expert]

Aspects of scientific method

Every scientific method of investigation is composed of two aspects.

i. Technical aspects

ii. Logical aspects.

i. **Technical Aspects :** This aspects deals with the collection of data or information and manipulation of phenomenon to allow an objective observation.

ii. **Logical Aspects :** This aspect comes at the time of generalizations or drawing of inference on the basis of collected information.

In general, a method of investigation applied to a particular branch of knowledge consists of following two basic aspects.

1. The basic rules of investigation which is common to all types of scientific investigation.

2. The technical or applied part that pertains to the particular science alone.

It is the second part of investigation that needed specialized knowledge. The accepted mode of investigation is called system or formality and rigorous of the investigation.

7. Explain what you understand by a hypothesis. What are the qualities of a workable hypothesis. Discuss the utilities of hypothesis. **[TU 056, 071]**

Solution:

Hypothesis

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

- Goodeard Hatt states hypothesis as proposition which can be put to test for determining its validity.
- Kerlinger states hypothesis as a conjectural statement of the relationship between two or more variables.
- William H. George considers theory as elaborate hypothesis as it is a generalization drawn from the theory itself and when it has been tested and found correct, it becomes a part of theory itself.

Two basic criteria used in statements of a good hypothesis are:

i. Statements about the relation between variables.

ii. Statements carrying clear implication for testing of stated relations.

These criteria imply that hypothesis statements should refer to two or more variables that are measurable or potentially measurable and that they specify how these variables are related to each other.

Qualities of a workable hypothesis

In order to be a workable hypothesis, it must have following qualities.

i. **Specific :** The hypothesis should not be too vague or general. It must be specific and only serves as workable hypothesis. But the general hypothesis may only serve as indicator of an area of study rather than serving as a hypothesis.

ii. **Conceptually clear :** It should be properly expressed and the researcher should avoid those things which are certain in his mind. To avoid this, following two considerations are to be taken.

- The definition and terms used in the hypothesis should be those which are commonly accepted terms and not researcher's own creations.
- If new terms have to be used, their definitions and meanings in terms of already existing concepts, should be made clear.

iii. **Related to available technique :** To test and verify the hypothesis formulated, it has to be stated in such a way that it is easily tested and verified by an available technique. But those hypothesis are useless hypothesis which cannot be tested by an available technique.

Iv. **Related to body of a theory :** It is desirable to formulate hypothesis that help in furtherance of an already formulated theory. If hypothesis are selected randomly they cannot be developed as a broader theory. In case of advanced sciences, the broader theory is forwarded based on ultimate consolidation of the findings of different scientists working on small correlated problems.

v. **Capable of Empirical Test :** The hypothesis should be such that it can be put to empirical test. Empirical test is necessary to achieve the objectivity. Hypothesis shouldn't be moral judgment.

vi. **Simple:** The hypothesis should be simple and to the point. Necessary causes for the phenomenon are taken into account while formulating the hypothesis.

Insight of the phenomenon is essential for simplicity.

Utilities of hypothesis

The hypothesis helps the investigator in the following ways:

1. It gives point to enquire
2. It helps in deciding direction in which to proceed.
3. It help in selection of pertinent facts
4. It helps in drawing specific conclusions.

6. Define a problem. What are the guidelines to be followed in selecting problems? Compare stating of problems with setting of objectives and goal of research with suitable examples. Give an example to show the difference in the purpose and problem of a study. **[TU 063]**

Solution:

Problem & guidelines in selecting problems, see Q.No. 5

The expected answers to research queries are the objectives of the study. If the problems have been stated in negative sentences, then their counter statements i.e. positive sentences are the objectives of the study.

For instance, if the problem is stated as, 'is A deteriorating?' Then the research objective may be stated as: 'whether A will be improved'.

The convergent point of the objective statement is the goal of the study. As such, it should be stated such as to reflect all the objectives formulated for the study.

In studies carried out for client organizations, the objectives are sometimes stated as

a. Broad objectives b. Specific objectives

a) **The broad objective** is stated in one or two paragraphs outlining the broad perspective of the study.

b) **Specific objectives** are stated to specify the specific observations to be made in the study. They are stated in numbers preferably in sequential order

Example : In a survey for media impact on Propagation of population Education in Nepal, the objectives were stated are:

The Broad Objectives : The broad objectives of the survey is to find out the proportion of population having access to population education and the proportion of those who knew about different media of population education. It is known that all media of population education are not equally accessible to population. Therefore, the objective is to identify the media which has been most effective in dissemination of knowledge about population education.

Specific objectives

The specific objectives formulated are

a. To determine the proportion of population who have the knowledge about population education in Nepal by Age, sex and Ecological regions.

b. To determine the components of population education commonly understood by Age, Sex and their Educational attainments of the respondents.

c. To identify the media that has been most effective in dissemination of population education in view of respondents by Age, Sex and their Educational attainments.

Example of difference between purpose and problem of a study.

For instance, in Hurlocks study, An evaluation of certain incentives used in school works the purpose of the study was to throw light on the use of incentives in school.

Problems of the study was the question about relation between incentive and performance.

9. Explain what you understand by Research. Describe different levels of Research and rigor of analysis needed for each level. [TU 064]

Solution:

Research

See Q. No. 4

Rigor in Research and its level

The term Rigor refers to the extent of the method employed according to the fundamental requirements of scientific method. Three levels of rigor have been identified. They are:

i. **First level :** At this level, the method offers a qualitative and narrative approach to the analysis of variables. Such method offers minimum scope for classification and enumeration of the variables.

The method would include authoritative opinion, the single case study and narrative history.

Such method can be used for indicating important variables and the hypothesis which might be tested through the use of rigorous methods.

ii. **Second Level :** At this level, the measurements particularly in more quantitative form begin to play important part in the research method.

Method at this level of rigor would include survey research. Longitudinal or time series analysis and uncontrolled experiments.

Here the emphasis is to measure and manipulate certain variables and to establish relationships. Usually such a method enables us to agree that something i related to something but seldom allows us to establish causal relationship i.e. a cause B or if A then B.

iii. **Third level :** At this level the research is carried out using notions of scientific method as used in physical sciences.

Here the research is concerned with the manipulation of the variables and establishments of causal relationships. Variables which have critical or important impacts on what is being studied are investigated and the key relationships involved are stated and tested.

If the purpose of the research is to establish - why something happened? What caused this to happen? the research at this level is necessary. This involves experimentation in some form or another, either in laboratories or in controlled field setting.

10. What is generalization? Give examples of generalization. [TU 057]

Solution:

Generalization : The way through which findings are made from a sample to a large population is called generalization. It is also known as drawing inferences. Generalization is the last step in the scientific study.

The method of generalization may be broadly classified into two groups

A. Logical method B. Statistical method

A. Logical method

There are different types of logical methods.

a. **Methods of Agreement :** In this method, when two or more cases have one and only condition in common, then that condition may be regarded as the cause of the phenomenon.

Example : Suppose A + B + C is considered as the production of X and C + D + E produces X then C is considered as the production of X. This method is positive method. The method may be negative for th example if A + B + $\overline{C}$ produces $\overline{X}$ and $\overline{C}$ + D + E produces $\overline{X}$, and then $\overline{C}$ produces $\overline{X}$ i.e. None C produces non X implying C produces X.

b. **Method of Difference :** This method is the combination of positive and negative methods. In this method, if A+B + C produce X an A + B + $\overline{C}$ produces $\overline{X}$. Then C produces X.

c. **Joint Variation :** This is a combination of the methods of agreement and difference.

Example : If A + B + C produce X. A + P + Q produce X: $\overline{A}$ + B + C produce $\overline{X}$ then A & $\overline{X}$ are said to be causally connected.

d. **Method of Residues :** In this method, if a phenomenon occurs under certain circumstances and it is known on the basis of previous knowledge that a part of the phenomenon is causally connected with some of the circumstances, then it is assumed that remaining phenomenon is also caudally connected with remaining circumstances.

Example: If ABCD produces WXYZ and BCD produces XYZ. Then A produces W.

e. **Method of concomitant variation :** This method is also known as quantitative induction. In this method, the positive correlation between two factors is considered as a basis of drawing inference that they are causally connected.

B. Statistical method

This method of drawing inference is mathematical in nature. In this method, not only the casual connection of the factors is stated but also the degree of connection is given by mathematical relationships.

Thus the casual connection between x and y is expressed as:

$y = mx + c$ ..... (i)

$y = a + bx + cx^2$ ..... (ii)

$y = ae^{bx}$ ..... (iii)

The equation (i) shows that x & y are linearly connected.

Equation (ii) shows that nature of the relationship is parabolic.

Equation (iii) shows that x & y are exponentially connected.

11. What is research design? What are the basic principles of designing a research? Also discuss the different sectors of research design. [TU 068]

Solution:

Research design

Simply a research design is understood as a conceptual structure within which research is conducted. It includes an outline of what the researcher will do from writing the hypothesis and its operational implication to the final analysis of the data.

According to F.N. Kerlinger, it is the plan, structure and strategy of investigation to obtain answers to research questions and to control variances.

The plan is overall scheme or program of the research. It includes an outline of what the investigator do from hypothesis to operational implication and final analysis.

The structure is the outline, the scheme, the paradigm (model) of the operation of variables. It is more specific than plan.

Strategy includes the methods to be used to gather and analyze. It is also more specific than the plan.

The basic principles of Research design

i. Defining the nature and scope of the problem.
ii. Specifying the related variables
iii. Excluding the variables not relevant for the study.
iv. Formulation of logical hypothesis.

Purpose of the Research Design

- To provide answers to the research questions
- To control the variance.

Sectors of Research Design

Sample Design

- Defining the population and sample units
- Fixing the desired errors
- Choosing the stages of the sampling
- Choosing the nature of sampling for each stage of sampling
- Determination of overall sample size

- Allocation of sample sizes at different stages of sampling and to different strata or segments of the population.

Sample design is mostly used in survey research.

Design of Experiments

- Defining the experimental units, treatments and their levels
- Determination of replications to be used for each treatments
- Choosing of the strategies of allocating the treatments to experimental units.

Strategies of allocating the treatments to experiments units are called experimental designs. Some of the well known designs are completely randomized block design, Randomized design, Latin square design, Factorials designs based on different levels of treatments. Of these, factorial design controls most of the undesired variations and gives the pin - pointed elaborated results. Design of experiments is used mostly in experimental researches.

12. What is research design? What considerations should be made to select appropriate research design? [TU 069]

Research design

See Q.No. 11

Considerations to be made to select appropriate research design

- Means of obtaining information
- the availability and skills of the researcher and his staff
- the objective of the problem to be studies.
- the nature of the problem to be studied
- the availability of time and money for the research work.

13. Explain the purposes of designing a research. Discuss the characteristics of a good research design and state the subjects that are included in a research design. Also, discuss the similarities and differences between research design and research method.

Ans: *For research design, see Q.No.10.*

Research design refers to the overall strategy that is chosen to integrate the different components of the study in a coherent and logical way, thereby, ensuring to effectively address the research problem constitutes the blueprint for the collection, measurement and analysis of data. Research design defines the study type, research questions, and hypothesis, variables and data collection methods. It is a plan, structure and strategy of investigation so conceived so as to obtain answers to research questions or problems.

The purposes of research design are:

(i) to provide answers to research questions
(ii) to control variance under study
(iii) to maximize variance of variable
(iv) to control extraneous variable
(v) to minimize error variance

A good research design deals mainly with aim, purposes, motives and plan within the practical constraints of location, time, money and availability of staff.

In a good research design, all the components go together with each other in a coherent way. The theoretical and conceptual framework must be coherent with the research goals & purposes.

In the same way, the data gathering must fit with the research purposes, conceptual & theoretical framework and method of data analysis.

Characteristics of a good research design

(i) Reliability: It is free from bias and it maximizes the reliability of the data.
(ii) Objectivity: The findings obtained by the research should be objective. It is possible by allowing more than one person to agree between the final scores/conclusion of the research.
(iii) It should get maximum relevant information to the research problem.
(iv) It should minimize the influences of extraneous variables that are not related to the study.
(v) Time & budget of the research project should be included.
(vi) It should have the appropriate approach to be applied for processing and analyzing the data.
(vii) It should have the good statistical design.

Research Method

A research method is a general framework guiding a research project. Different methods can be used to tackle different questions. Research design is a specific outline dealing how the chosen method will be applied to answer a particular research question.

Similarities

(i) Research methods and Research design both guide a research project. These both are thought of as a give-and-take process extending well into the study.
(ii) If a research is designed with a flaw, it affects on the choice of research methods. Research design is directly connected with the research method.
(iii) The research method and research design should be selected in such a way that one cannot violate the each other's basic

assumption. Both of these minimizes the researcher's biases and should consider the time and budget of the research project.

Differences

Research Method	Research Design
Research methods are the procedures the will be used to collect and analyze data.	Research design is the overall structure of the research.
Focuses on what type of method are more ta	Focuses on what type of study is planned and what kind of results are expected from the research.
Focuses on what type of methods are more suitable to collect and analyze the evidence needed.	Focuses on what type of study is planned and what kind of results are expected from the research.
Depends on the research design.	Based on the research questions or problem.

14. What are the various types of research design? Describe in brief the common sources of error in research design. [TU 070, 076]

Solution:

Types of Research Design

Single factor

- Complete Design :Complete Randomized Design, Randomized Block Design, Latin Square Design
- Incomplete Design: Balance Design, partially Balanced Design.

Multiple factor: Factorial designs

Other Designs

Observation Design: It is the layout of the conditions and schedules, under which the observations are to be made. For instance one may observe a process or by sampling observing the phenomenon without taking part in the process. This is usually used when observation method is used in collecting the information.

Statistical Design: It includes sample design as well as the methods to be used in gathering information and their analysis.

Operational Design: It is the layout of the producers of implementing the aforesaid design.

Errors in Research Design: These errors are better understood as weakness of measurements in research design.

i) **Hallow effect :** This is the tendency of rating an object in the constant direction of a general impression of the object. If a person is believed to be intelligent when he agrees with us, believing a man to be virtuous because we like him are some examples in our day experiences. The tendency to rate one characteristic of an individual is the hallow effect.

ii) **Hawthorne effect :** It is concerned with the causes that make subjects to change often, almost any change in the situation, any extra attention, any experimental manipulation, or even the absence of manipulation but the knowledge that a study is being done is enough to cause the subjects to change in their performances, in short, so long we pay attention to people, they will respond positively.

iii) **Source of constant errors in Ratings:** Error of severity and error of leniency are two important sources of constant error. The general tendency to rate all individuals too low on all characteristics is the error of severity and to rate high for individuals is error of leniency. In former case, the rater is a tough marker and in latter case, the rater is the good fellow who loves everybody and the love is reflected in the ratings.

15. Define hypothesis. What are the main sources of hypothesis? Explain the requisites of practicable hypothesis. [TU 068]

Answer

For Hypothesis & requisites of practicable hypothesis.

See Q. 7

Sources of hypothesis

a. **General culture :** In social studies a hypothesis may be formulated with the help of general pattern of culture. The culture has a great influence upon the thinking process of people and hypothesis may be formed to test one or more of these ideas.

b. **Scientific theory :** A theory gives the basic idea of what has been found to be correct. The knowledge of helps to form generalization or corollaries. These generalization and corollaries form part of a hypothesis.

c. **Analogies :** Sometimes, a hypothesis is formed from the analogy. A similarity between two phenomena is observed at a circumstance. A hypothesis is then formulated to test whether two phenomena are similar in other circumstances too.

d. **Personal Experiences :** Sometimes, only a right individual see facts in right perspective and formulates a hypothesis. Thus, for example, every body had seen the falling of an apple from a tree, but Isaac Newton was only the person who could strike the idea about the force of gravitation.

16. Discuss what you know about scientific method. What are the basic criteria? A man observes that in days when he hears the cry of crows, he often get letters. So he concludes that crying of crows brings the letters. Is this conclusions based on scientific method? Give reasons of your answer. **[TU 062]**

Solution:

Scientific method and its basic criteria.

See Q.No. 1

If a man gets the letters whenever he hears the cry of crows, he concludes that crying of a crow bring a letter. It is not scientific method. But it is the method of intuition because his natural inclinations and intuitive propositions and own personal experiences and feelings make him conclude that.

To become scientific method, it has to out fill some basic criteria such as verifiability, generality, predictability, objectivity and system. But above condition doesn't fulfill these criteria and therefore it is not a scientific method.

17. Discuss the meaning of research problem. How are they stated? Also discus the pitfalls of problem stating. **[TU 062]**

Research problem & way of stating

See Q.No. 3

Pitfalls of problem stating

- choosing a problem that is too large.
- choosing a topic which is too complex for research at the level at which the student is studying.
- Not giving due consideration to time factor. This factor is important because the research work is to be completed within the prescirbed time period.
- To choose the problem the material for which are not easily accessible.
- choosing the problem, which is not researchable because the source of materials are already destroyed or the methodology of investigation is not yet developed.

18. What is inference ? Discuss different methods of making statistical inference and generalization. [TU 064]

Inference

Inference is simply understood as process of drawing information to reach to certain conclusion.

There are many ways of making inferences. But basically there are four namely.

a. Testing the nature of the distribution of the data.
b. Testing the variability of the data
c. Estimation of unknown population parameter on the basis of corresponding statistical based on sample
d. Testing the hypothesis about population parameters.

a. Testing nature of the distribution of the data

i. If mean = median = mode, the distribution is symmetrical
ii. If mean > median > mode, the distribution is positive skew
iii. Mean < median < mode, the distribution is negative skew.

b. Testing the variability

To check the consistency/ variability of the data, a measure called the coefficient of variation is used.

The coefficient of variation is defined as

$$C.V. = \frac{\sigma}{\bar{X}} \times 100$$

Higher the C.V., more is the variability of the data and lesser the C.V., more is the consistency of the data.

c. Estimation

Most of the scientific studies are carried out to estimate unknown value of a parameter as regards to a characteristic of a population.

This is done by estimating the value of the corresponding parameter from the sample data drawn from the population. The corresponding value of the sample is called statistics. The estimation may be point or interval estimation.

d. Method

Usually the population mean μ, and variance σ^2 are not known therefore they are to be estimated by corresponding values from the samples. If $\bar{X}$ and s^2 be the sample mean and sample variance, then sampling distribution show that

$$E(\bar{X}) = \mu$$

And $E(s^2) \neq \sigma^2$

Where,

$\bar{X}$, s^2 and σ^2 are computed by using the usual formula.

The notation E refer to the expectation which denotes the average of the values obtained from the different possible samples of the same size drawn from the population.

Mathematically, expectation is expressed as the sum of product of values of a variable and their corresponding probabilities.

Thus,

$$\Sigma(X = X) = \sum_{i=1}^{n} p_i X_i$$

Where

p_i = probability of the variable taking the value X_i and

n = number of sample elements

19. A drug company manufactures a new crop and claims that (a) its mean effect is 6 hours (b) its effect is at least 6 hours and (c) its effect is at most 6 hours. Write down the null and alternative hypothesis verify above claim and tests criterion to be used for testing above hypothesis. **[TU 064]**

Solution:

In statistical hypothesis setting, first, a null hypothesis is stated. Then against this hypothesis, alternative hypothesis is also stated. However, in social studies hypothesis are stated directly giving the directions of relationships between two or more variables under study and therefore hypothesis formulated in social studies are usually the alternative hypothesis set in statistical hypothesis.

Null hypothesis

The null hypothesis is generally symbolized as H_0

If we are to compare method A with method B about its superiority and if we proceed on the assumption that both methods are equally good, then this assumption is termed as the null hypothesis.

It is a statement about unknown value of a parameter of a variable /attribute in a population under investigation. Parameters are the statistics characters of a variable under investigation. Most commonly used parameters are mean and standard deviation of the variables such as height, income, effect etc.

In Null hypothesis, we should always have 'equal to' sign. Null hypothesis is the specific statement about the parameter.

Some examples

Suppose we want to test the hypothesis that the population mean (μ) is equal to the hypothesized mean (μ_0) = 100. Then we would say that the Null hypothesis is that the population mean is equal to the hypothesized mean 100 and symbolically we can express as

$H_0: \mu = \mu_0 = 100$

Suppose a new brand of sleeping tablets claims its effect as 7 hrs sleep. This claim is a null hypothesis and stated as $H_0 : \mu = 7$, where μ is the mean effect of the tablet. Now suppose another brand of sleeping tablet claims its effect as 8 hrs sleeps. Then to test whether there exists any significant difference in effects of two brand, the null hypothesis is stated as

$H_0: \mu_1 - \mu_2 = 0$ i.e. there is no difference in the mean effects.

Alternative hypothesis

If our sample results do not support the null hypothesis, we should conclude that something else is true. What we conclude rejecting the null hypothesis is known as alternative hypothesis. In other words, the set of alternatives to the null hypothesis is referred to as the alternative hypothesis.

If we accept H_0, then we are rejecting H_1 and if we reject H_0, then we are accepting H_1. For $H_0: \mu = \mu_0 = 100$. We may consider three positive alternative hypothesis as follows:

$H_1: \mu \neq \mu_0$

$H_1: \mu > \mu_0$

$H_1: \mu < \mu_0$

If alternative hypothesis is stated without pointing to a definite direction of the difference, it is called two tails. If it points only are direction, it is called one tail.

For instance, suppose the claim that new brand of sleeping tablet gives mean 7 hours sleep, is rejected and then the conclusions that can be drawn are either the mean effect is greater than 7 hours or less than 7 hours. If both of above tests are included in the alternative hypothesis, it is called two tails. On the other hand, if only on of above cases is stated, it is called one tail alternative hypothesis. Thus two tail hypothesis is stated as

$H_1: \mu \neq 7$; $H_1: \mu_1 - \mu_2 \neq 0$ one tail hypothesis is stated either as $H_{+1}: \mu > 7$ or as $H_{-1}\ \mu < 7$ and so on.

Alternative hypothesis is usually the one which one wishes to prove and the null hypothesis is the one which one wishes to disprove. Thus, a null hypothesis represents the hypothesis we are trying to reject, and alternative hypothesis represents all other possibilities.

For above problem, we set the hypothesis as under

a. $H_0: \mu = 6$ hrs
b. $H_1: \mu > 6$ hrs
c. $H_1: \mu < 6$ hr

20 Distinguish between

a. General and Applied

b. Empirical and Analytical

c. Experimental and survey Research. **[TU 2065]**

Solution:

a. General and Applied Research

General Research : The basic steps or methodologies to be followed for the general research are common to all subjects.

Simply there are four levels of general research depending on intensities of investigation. They are

i) **Low level:** It is qualitative in nature. Only subjective narrations of the every phenomenon are made

ii) **Elementary level :** At his level, the narrations or descriptions are cited with numerical figures called indicators to support the fact stated.

iii) **Basis level :** At this level, basis statistical descriptions of frequency distributions of study variables as well as the associations between them are investigated and their statistical significances are tested.

iv) **Higher Level :** At this level, the research is the analytic one. In this research, theories are developed on the basis of findings of the research then generalizations and predictions are made form the theories developed.

Example : If we throw an unbiased die, a face marked 3 may or may not turn up. Here, the experiment is throwing of a die, the event is turning of face marked 3 and the happening of the event is only probable.

Applied Research : Applied research aims at finding a solution for an immediate problem.

This research may also be stated as the research done for the purpose of getting the results that have immediate utility for the population or the organization responsible for sponsoring the research. Most of the project type researches sponsored by the donor agencies fall in the category of the research.

Example : A research on tapping the water from the surrounding hills of Kathmandu valley for water supply to growing population of Kathmandu is such type of research.

b. Empirical and analytical research

Empirical Research : This type of research is mainly based on primary data generated through surveys, observations or experiments.

It relies on experience or observation alone, often without due regard for system and theory. It is data based research, coming up with conclusions which are capable of being verified by observation or experiment. We can also call it as experimental type of research. In such a research it is necessary to get facts at first hand, at their source, and actively to go about doing certain things to stimulate the production of desired information. In this type of research, the researcher must first provide himself with a working hypothesis or guess as to the probable results. He then works to get enough facts (data) to prove or disprove his hypothesis. He then sets up experimental designs which he thinks will manipulate the persons or the materials concerned so as to bring forth the desired information.

Analytical Research : In analytical research, the researcher has to use facts or information already available, and analyze these to make a critical evaluation of the materials.

It may concern with development of new theories. For this purpose, first of all some propositions on the basis of the findings of the research will be made, then these propositions are tested at similar situations. If the propositions made are confirmed after testing, theories are postulated and generalizations are made from these postulated theories. Also in this type of research, some corollary of the already established theories are derived and tested. If testing is found correct, another theory is formulated.

Generally analytic studies are mostly based on secondary data.

c. Experimental and Survey Research

Experimental Research

If variables can be manipulated and controlled, the empirical research is experimental one.

This is the classical type of research through which research in physical sciences for many years is done. The researcher expects to control or vary all variables involved in the study at will. The usual approach is to hold all variables constant except one. By varying this one and monitoring challenges in the output, the relationship between variables can be carefully studied and documented. Mathematically, the approach is to use the following relationships: $y = f(x_1, x_2, ...x_n)$

where, y = dependent variable called output

f = the function

and X's , i = 1, 2 .....n are independent variables called inputs. Then making all X_{js}, $j \neq i$ constant, x_i is made to vary and the effect of the change in x_i on y is observed and the recorded x'_i 's are called intervening variables.

Survey Research

Literal meaning of a survey is to take a look over something from a high place. However, in scientific investigations, the word survey is used as a technique of investigation by direct observation of a phenomenon or collection of information through interviews.

At present, the survey research is done in broader sense to include the observations of published documents also. The survey is used for two quite different purposes. The first is simply to describe current practices and events. As such it may be termed polls.

A polling survey is concerned mainly with the distribution of responses or answers to any particular item. It can be used to determine the extent to which certain practices are used.

The Second use of the survey research is to analyze the facts. Analytic surveys go beyond the simple description of the current state of practice. Analytic surveys may enable us to establish relationship between the variables involved, they do not demonstrate how thy are related. This is one of the weakness of a survey research. Survey is the quantitative type of research.

Questions for Practice

1. Explain what you understand by Research. Write down the process of conducting research.
2. Discuss what you understand by a hypothesis. What are the sources that help in building hypothesis. Also discuss the qualities and utilities of hypothesis.
3. What is Research? What are its levels? Describe the types of rigor analysis done in each level.
4. What is generalization? Discuss different methods of generalizations.
5. Define research. What are the purposes of research? Describe the process of research.
6. Define problem. What's the criterion for a good problem? What are the basic guidelines to be followed in selecting a problem?
7. What is generalization? Give examples of analytical method of generalization.
8. What are the basic characteristics of a scientific method? What ar its main aspects? Give some examples.
9. Research is explained by different persons in different ways. Discuss the specific nature. That fits to different views. Also describe Rigor & level of a research.
10. Define a problem. What are the basic criteria for a problem to be good? Also explain how problems are stated.
11. Define Research. Also discuss what you know about level and rigors of research levels of rigors of research works.
12. What is scientific method? What are its main characteristics?
13. What are the main sources os knowledge? Describe the main characteristics of a scientific method. Mr X finds that whenever a crow cries at this house a message from abroad arrives to his house. Therefore he concludes that the crying of a crow brings a message. Is his conclusion based on scientific method? Give reasons for your answer.
14. Research has been defined in different ways. Give the definition that fits to different views. Also write down a diagram which shows the different steps followed in research activity. Also discuss what you know about Rigor of a research.
15. Give examples of problems, hypothesis and objectives. What are the guidelines to be followed in selecting problems?
16. Define research. Explain the chief characteristics of a scientific research. Also, point out the purposes of research.

17. What does a research problem mean? What are the ways of understanding a problem of research? Explain the guidelines suggested for the selection of meaningful problem.
18. Define research hypothesis. What are the main sources of hypothesis? Explain the requisites of practicable hypothesis.
19. What do you understand by scientific research process? Explain various steps involved in the scientific research process.
20. Discuss the meaning of research problems. How are they stated? Also discuss the pitfalls of problem stating.
21. Define Research and problem. How are they stated? Discuss pitfalls of problems stating.
22. Define scientific research. What are the purposes of research? Illustrate the process of research in a diagram.
23. What is hypothesis? What problems are involved in formulating research hypothesis?
24. What is meaning of rigor of research? Explain different rigorous phase of research. Can you link the phase of research rigor the levels of research?
25. What do you mean by research problem? What are steps are to be followed in identifying a research problem.
26. Define research problem. Explain the ways of selecting a meaningful research problem. Also, describe the methods problem identification.
27. What do you mean by research questions? How it is related to research theme? Discuss the methods of identification and formulation of valuable search questions.
28. Define research objectives. Discuss its types. Discuss how the research objectives are related to the research questions?
29. Define research hypothesis. What is difference between hypothesis setting and hypothesis testing? Describe about different sources of hypothesis.
30. Define the terms hypothesis. Describe what are null and alternate hypotheses? Explain which one is the researcher hypotheses to be? Why?
31. What does a design of experiment mean? How the research design and design of experiment related? Also, explain the Basic principles of design of experiment.
32. Define research design. Describe on different types of research design.

❁ ❁ ❁

Hamromaster
सुनौलो भविष्य हातमा **Hamromaster** को साथमा

Hamromaster

COMPLETE NOTES

For Hamromaster Online Classes

Whatsapp: 9840842566

Hamromaster

Hamromaster