RESEARCH METHODS IN BEHAVIORAL SCIENCES

e-Content

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PREFACE

Research methodology is the important tool using in research fields for development of agricultural, rural development and allied fields. Postgraduate student of M.Sc. (Ag.) agriculture extension education do not have present an e-text manual for the course 'Research Methodology in Behavioral Sciences'. Therefore, author has taken an attempt to meet this need. I, sure that the e-text manual will help the students and faculties etc. The e-manual has nineteen chapters and covered partial total syllabus (total pages 110). The content stated in the syllabus has been drawn from different books and journals from fields of agricultural extension education, rural development and social sciences.

I assured that the e-content will be considerable assistance to the students of undergraduate and postgraduate degree programes, teachers, researchers, planners, workers in providing knowledge of the research methods at the application level and enable them to better accomplish the most difficult task of research.

Year: 2023

Author

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FORWARD

Teachers and students consult various literatures like books, journals, internet, YouTube, newspaper etc. for covering course content during teaching and learning process. It has been observed by various teachers on several times that in the absence of a standard e-text manual on the courses, there has been a lot of variation in delivery of content in the classes. Therefore, teachers and students spend lot of their valuable time in search of content given in the syllabus. I am happy that Dr. Arun Kumar, Assistant Professor, Agriculture Extension Education and Dr. Jitendra Verma, Agriculture Extension Education, have taken initiatives to prepare an e-text manual entitled 'Research Methodology in Behavioral Sciences' course offered to M.Sc. (Ag.) Agriculture Extension Education's student. I am sure that this e-manual will be immense use to the students and faculty members.

I would like to congratulate the authors for coming out with this useful and informative e-content.

Year: 2023

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Research Methods in Behavioral Sciences

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CAPTER-1
RESEARCH METHODOLOGY- AN INTRODUCTION

Scientific Research:

Scientific research is systematic, controlled, empirical and critical investigation of hypothetical propositions about the presumed relations among natural phenomena.

(1) Scientific research is systematic and controlled.
(2) Scientific investigation is empirical.

Research Process /Steps in Scientific Research Procedure -

1. Selection of the problem area
2. Defining the problem
3. Choosing the appropriate concepts, constructs and variables
4. Making scientific analysis of the problem
5. Formulation of the hypothesis(s)
6. Delineating the objective s of the study
7. Developing a design of research
8. Selecting and finalizing research design
9. Planning and using of appropriate measurement techniques
10. Selection of sources of data collection- primary and secondary
11. Selecting proper tools & techniques of data
12. Editing the collected data
13. Classification and tabulation of data
14. Using statistical techniques
15. Preparing and executing an analysis plan and interpretation of data
16. Presentation of data
17. Developing format of report
18. Incorporating literature, references, bibliography, appendices etc.

Characteristics of Research-

From these definitions it is clear that research is a process of collecting, analyzing and interpreting information to answer questions but to qualify as research, the process must have certain characteristics: It must, as far as possible, be controlled, rigorous, systematic, valid, verifiable, empirical and critical

Let us briefly examine these characteristics for proper understanding.

1. Controlled-

There are many factors that affect an outcome. In a study of cause and effect relationships is important to be able to link the effect(s) with the cause (s) and vice versa. The concept of control implies that, in exploring causality in relation to two variables, you set up your study in a way that minimizes the effects of other factors affecting the relationship. This is possible in physical sciences, where as in social sciences such controls are impossible; therefore attempts are made to quantify their impact.

2. Rigorous-

You must be scrupulous in ensuring that the procedures followed to find answers to questions are relevant; appropriate and justified. Again, the degree of rigour varies between the physical and the social sciences.

3. Systematic-

This implies that the procedures adopted to undertake an investigation follow a certain logical sequence. The different steps cannot be taken in a haphazard way. Some procedures must follow others.

4. Valid and Verifiable-

This concept implies that whatever you conclude on the basis of your findings is correct and can be verified by you and others.

5. Empirical-

This means that any conclusions drawn are based upon hard evidence gathered from information collected from real life experiences or observations.

6. Critical-

Critical scrutiny of the procedures used and the methods employed is crucial to a research inquiry. The process of investigation must be foolproof and free from drawbacks. The process adopted and the procedures used must be able to withstand critical scrutiny.

Objectives of Research-

The research is being conducted with a purpose of discovering answer to the question by making an application of scientific procedures. The main object of the research work is so taking out the hidden facts yet to be discovered. Every research study has its own purpose to be attended; therefore objectives of research can be broadly classified as academic and utility one.

A. **Academic Objective-**

It relates to developments of new concept and addition to old concept. It means that urge for knowledge is main factor in this type of objectives of research.

B. Utility Objectives-

It relates to utility of research work, as research is accepted for more use to the society. It has to provide the base for policy formation in the society.

This type of research must be in a position to provide for achievements in attending organizational objectives.

As explained above the research provide base for investigation by which relationship between two variables can be established. It is only in systematic research where induction and deduction are possible.

Observation is main element in the research study by which decision making ability can be increased. Collection of primary and secondary data is involved in the research process and now with these requirements objectives of research can be further classified into following:

1. Decision Making Objectives

2. Environmental Objectives

3. Market Objectives

4. Profit and Promotional Objectives

1. Decision Making Objectives-

Decision making in now influenced by research. The project identification and implementation are based on the research conducted. There cannot be any business policy which is not affected by research findings. Controlling, which is the main function in the management, care effectively be organized through research study.

2. Environmental Objectives-

All the decisions in the business are taken in relation to the environment in which business operates. All the factors affecting business like State, Investor, worker, customer and the competition requires systematic investigation before any decision is to be taken.

3. Market Objectives-

The market objectives of research are defined as market research. This includes the market share of products, profit margin of the organization and total sales volume of

the company. On this basis of the careful investigation of the available market information, relevant market strategies can be drawn regarding new product development, product selling approach and product modification.

4. Customer Objectives-

The need of the customer is assessed, well in advance even before product is planned. The utilities of product are decided on the basis of the quality of the product, in relation to the requirements of the customers. It is in this respect that the inquiry is conducted to find out the level of satisfaction of customers.

5. Profit and Promotion Objectives-

In most of the company's profit maximization is the main objective to be attended by them. This requires investigation and consultations to be conducted. surveys are also conducted to work out the variables in support of the promotional activities. the research provide strong base for these activities. The development of business entity is based on corporate image which is outcome of the relationship between internal and external factors of the companies.

Nature of Research-

Research is process in which in-depth study of the problem is carried out. This requires investigation to be conducted based on collection and compilation of data along with its interpretation and presentation.

Research, if properly conducted is helpful in decision making process. There can not be any research exercise which will not yield any additional inputs to knowledge. As such research involves critical examination of facts which leads to formatin of new concepts or modification of old concepts.

The research activities will help us in testing of hypothesis and establishing relationship between variables; by this we can identify the methods for solution of the research problems.

The research is a fact-finding process, which influences the decision to be taken. This also provides an opportunity to check the effectiveness of the decision taken. The research is a scientific process and it is required to be conducted in proper sequences, which includes activities right from identification of research problem, formulation of hypothesis, testing of hypothesis, observation and relationship of variables and drawing of conclusions.

Importance of Research-

All development and progress in the society is an outcome of a research work. The development of logical thinking is promoted by conducting the research activities.

Research provides base for the policies formation of the Government related to agriculture, industries and infra-structural services in the region.

In this context investigation in the structure of economy is conducted through compilation of data and analysis of facts. Research provides for predicting of future prospects to the region.

Research has special importance in relation to solving various problems of business and industries. Market research, Operation research and Motivation research are conducted in the business for various requirements.

The importance of research can also be ascertaining through its application in socio-political sector in order to find out solution to social and political problem of the society.

Relevance of Research-

Through research is extensively used everywhere in business for planning, forecasting and decision making but it may lose its relevance of business competition in the society.

Therefore in under developed countries normally having no competition it may considered as luxury and for this very reason it may be neglected in the society. In the existing stage of business competition, where problems are becoming more complex, research is becoming more relevant than before. Usefulness of research can very well be seen in the managerial functions.

Research establishes the relationship between variable and functional areas. It is an effective tool for forecasting. It also provides necessary help for the optimum utilization of the available resources. The formulation and implementation of policies and strategies will be more effective, when they are based on the research studies.

Research is main source of decision making as it helps the process of thinking, analyzing and interpretation of the business situations. It provides base for innovations product development and product modifications.

Restrictions in Research-

The research suffered with certain restrictions in spite of its relevance and usefulness. The social research is subject to changes in the society. As the social structure

changes, the decisions taken can not be implemented as it is. There are several other factors which influence the decisions. Unless these factors are properly analyzed decision may be biased.

Sometimes the authorities are also not serious about the implementation of the decision taken. If business activities are carried on the basis of custom and traditions than in such cases research study becomes irrelevant.

The research activities are very expensive; therefore it may not be viable for small and medium scale unit to take advantages of the facilities.

Classification of Research-

The research activities are conducted with sole object of finding solutions to unsolved problems, so that the services to the society can be provided. There are various approaches for conducting research activities and this research can be divided in to 3 different classifications. The classifications are shown below in the following-

Classification of Research

On the Basis of Intent	***On the Basis of Nature of Data***	***On the Basis of Methods of Study***
1. Pure Research	1.Quantitative Research	1.Analytical Research
2. Applies Research	2.Qualitative Research	2.Empirical Research
3. Descriptive Research		3.Formalized research
4. Exploratory Research		4.Survey Research
5. Diagnostic Research		5.Case Study
6. Conceptual Research		6.Field Investigation
7. Action Research		7.Library Research
8. Evolutionary Research		

Difference between Research Method and Research Process-

Research Method	Research Process
1. Formulation, Analysis of information need	1. Chose broad topic. Get overview of topic, narrow down the topic
2. Identification and Appraisal of the likely resources	2. Formulate question to guide research plan for research
3. Tracing and locating individual resources	3. Find analyse and evaluate the resources
4. Examining and selecting individual resources.	4. Evaluate, evidence take notes, compile the bibliography.
5. Recording and storing of information	5. Established conclusions and organized

	information.
6. Interpretation and analysis	6. Interpretation and analysis
7. Shape presentation and communication of information	7. Create and present final project
8. Evaluation of assignment	8. Reflection-satisfactory presentation

Formulation of the Research Problem-

The research problem relates to statement of problem and relationship between two variables under study. Research has to identify the problem first and later on its required to single out the problem.

This will give scope to researcher to decide general area of interest or subject matter of the research study. It means researchers will have to narrow down scope of the study by formulating general topic of research study in to specific problem under study.

Therefore, in relation to the formulation of research problem two steps are involved basic understanding of the research problem and rephrasing the research problem in to meaningful terms.

Review of the Existing Literature-

Research can not be conducted without reviewing of existing literature which is available. The existing literature may be conceptual or empirical in nature. Conceptual literature is concerned with concept or theories. Empirical literature is concerned with earlier studies of similar nature already conducted. This review of existing studies provides base to understand how to plan for the study.

The review of the existing literature will help researcher to define his research problem in general nature into analytical terms or onto operational terms.

If the problem is properly defined on the basis of the review of the literature this will help the researcher to discriminate the relevant data from collection of irrelevant data and confusion at this level can be avoided.

Formalation and Development of Working Hypothesis-

After the formation of the research problem and reviewing of the available existing literature now hypothesis is required to be explained by the researcher. The normal assumptions which are the base of the study, which may be tentative in nature, are considered as hypothesis.

These assumptions are drawn to test its logical sequence.

The researcher should try to avoid vagueness in these assumptions. Therefore hypothesis should be as clear as possible, it should be very specific.

Hypothesis is a guiding force of the researchers, it is helpful in sharpening his thinking process and by this he will be in a position to focus his attention on the important facts of the research.

It is an outcome of researcher's deep thinking about the subject matter of the research, that he is able to settle on formation and development of hypothesis.

Preparation of Research Design-

The research design is prepared by the researcher after the formulation of research, reviewing of literature and developing of hypothesis. It is an outline or a conceptual Structure within its limit research work is supposed to be carried on.

The research design is prepared with an object of collecting relevant data with the minimum efforts and with minimum of expenditure, just to control wistful expenditure.

There are several methods for preparation of the research design. The important amongst them are experimental and non-experimental one. Experimental design can further be classified into formal or informal one.

It is left to the researcher to work out for selecting a proper design for research. Depending upon the utility and requirement a specific design should be selected.

The research design has to take in to consideration the purpose of the research study, which may be exploration, description, diagnosis and experimentation. The research has to make careful choice in selecting research design.

The research design requires certain facts to be considered like ability of the researcher along with his staff to be employed for research work. Time and cost available for research work is another factor to be considered. Data collection is the most important factor, in which methods for data collection and organization of collection is to be specified.

The research can be conducted for all the items under investigation, which constitute universe. The census of population conducted by the Government of India is an example of such studies. This type of the study is very time consuming and has

been very costly also. Therefore in place of the study of the whole universe sample study can be conducted for the purpose of the research.

Criteria for Selecting Research Problem-

Researcher should take utmost care in selecting research problem. It should be his own independent thinking in relation to the problem. The necessary guidance can be sought to work out the problem and following facts must be given due consideration while selecting research problem.

1. The subjects which are overdone and on which sufficient work has already been conducted in particular area should be normally avoided by the researcher. It will be very difficult to throw new light on such type of the topics.
2. There are certain topics which are controversial in nature and in spite of our all efforts no purposeful conclusions can be drawn.
3. While selecting research problem, the problem which is very narrow or very vague should be avoided for the purpose of the study.
4. Whatever subject is selected for the study must have the resources available, which should be within the reach of the researcher.
5. Selection of research problem require due consideration for time, training and cost involved in the research project.
6. No research problem should be selected without having primary study of the subject.

Identification of the Problem-

The desire to solve research problem or to know more about the facts is the main motivation for which the research study is conducted. Therefore it is necessary for researchers to identify the research problem.

The identification of research problem can be classified as under-

A. Conceptual Problem-

This type of problem can be solved by creative thinking for the problem.

B. Empirical Problem-

This type of problems can e solved by inductive reasoning, which should be based on the observation mode.

C. Logical Problem-

These problems can be solved by deductive methods.

Now it is very clear from the above expiation of the facts that identification of the research problem means clear and accurate assessment of the research problem in order to solve the research problem.

Selection of the Research Problem:

The problem which is selected on specific rational helps us to complete the project in stipulated time period and within the prescribed financial outlay. In order to boost up the moral of the researcher proper selection of the problem is essential.

The factors which requires due consideration for selecting research problems are stated as below:

1. **Interest of the Researcher-**
   The interest of the researcher is the main factor while selecting problem. It is the attitude, spirit and dedication of the researcher towards his research study that will generate the interest in the research study. Therefore the personal interest of the researcher is very much essential in any of the research study.

2. **Importance of the Topic of the Study-**
   Topic selected for the study should not only be socially relevant but it must be useful for the society. It should be having the reference to the practical field. The results of this type of social relevant study will be used by the concerned individual or group of the individuals.

3. **Avoid the Selection of the Monotonous Problem-**
   The researcher should avoid using monotonous problem for the purpose of the research study. Such topic for the research may not be able to generate solution for utility of the subject matter. Therefore, there should be novelty of ideas in the subject so as to have the proper utility of the research study.

4. **Resources for the Research-**
   The availability of the resources is very important factor in the research study. These resources are related to financial and technical assistance to the researcher along with his prescribes time period. The efforts in this direction should be made for having proper application of the resources within specific time period.

5. **Data Availability -**

The data required for the study should be easily accessible. In case if researcher decides to make use of the primary data then it is necessary to ascertain the response of the respondent. If secondary data is to be used the then authenticity of the data is to be tested before it is put to an application. Proper care should be taken to collect sensitive data which is required for the purpose of the study.

Steps in Selecting Research Problem:

1. **Statement of Problem-**
   Researcher is required to explain his problem under the study. The explanation to his problem is known as statement of the problem. First problem should be explained in the general manner. This will provide the clarity of understanding of the problem and then only researcher will be able to state his problem properly.

   Even before deciding the problem for the study, pilot study can be conducted. When researcher makes general description of his subject there may be lot many ambiguities in the beginning, which requires rethinking of the subject. So the problem stated should be suitable for necessary changes or if needed it can be redesigned.

2. **Nature of Research Problem-**
   After defining the research problem and making proper statement of the problem, it is necessary to understand the origin of the problem for its clarity. In order to make topic of the research further clearer researcher can undergo in discussion on this topic with the persons having good knowledge of the similar problem. With the help of this discussion problem can be properly assessed.

3. **Review of the Available Literature-**
   Whatever literature is available in relation to the proposed study, it must be carefully examined before selecting problem. This exercise will be very useful which can provide many suggestions and later on required additions can be made in the research problem.

4. **Discussion to Enrich the Subject Matter-**
   The research topic should always be open to the discussion with experts. It is through these discussions only new ideas can be developed. This is known as experience surey. The discussion should be healthy one which must lead to general approach to the problem. This should also lead to enrichment in the subject matter of the study.

5. **Re-designing of the Research Problem-**
   Research study requires the ability of the researcher to put his research ideas on the right track then only he will be able to convert his ideas in to working hypothesis. This

will make his research problem operationally viable. This will create the base for finding out working hypothesis for the research study.

6. **Utility of Research-**

Research studies are conducted not only for academic satisfaction of the researcher, but it is also conducted for utility of the society. The findings of the research study should reach to the concerned section of the society. Therefore research study with social relevance and utility should normally be selected for the study.

In order to provide the benefit of the research to the society, it's findings should be made public by way of publishing the results of the research.

7. **Practicability of the Research Study-**

The factor of the practicability should be considered well before the research problem is selected for the study. Unless the feasibility of the study is properly tested research problem can not be selected. Personal whims and unrequited imagination of the researcher will spoil the practicability of the study. There should be rationality and manageability in the research study.

Normally research study is tested and judged by the contributions of the researcher, observations made by him in relation to the study conducted and his analytical approach for the study.

Qualitative Research and **Quantitative Research:-**

Differentiating between Qualitative research and Quantitative research-

S.N	Qualitative Research	Quantitative Research
1	Main aim qualitative inquiries to explore diversity	qualitative inquiries
2	Sample size and sampling strategy do not play a significant role in selection of sample.	play a significant role
3.	Diversity can be extensively and accurately described on the basis of information obtained **even from one** individual.	from more individual
4.	All non-probability sampling designs (techniques) can also be used.	All probability sampling designs (techniques)
5.	You are guided by your judgment as to who is likely to provide you with the best information.	You are guided by your desire to select a random sample.
6.	You do not have a sample size in mind-instead you collect data until you feel you have reached the *saturation point. or Data is usually collected to a point where you are	You collect information from predetermined number of people (sample).

	not getting new information or it is negligible- the data is saturation point.	

Note-When no information is emerging (from sample-individual) then it is assumed that you have reached the saturation point*.

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CAPTER-2

Defining Research Problem

Basic Concepts of Social Research:

"There is no short cut to truth: No way to gain knowledge of the universe except through the gateway of scientific method."

- **Karl Pearson**

Science:

Meaning and Nature of Science-

A science is a body of systematic knowledge. A system consists of a number of things, which are related together in a particular way to serve a particular purpose. The finding out of inter connections of facts is the first significant step towards the development of systematic knowledge which science represents. There are two types of sciences.

a. Formal or deductive (Form general to specific)
b. Empirical or inductive (Form specific to general)

Research Problem-

A researcher must find the problem and formulate it so that it becomes susceptible to research.

A research problem, in general, it refers to some difficulty which a researcher experiences in the context of either a theoretical or practical situation or wants to obtain solution for the same.

Broadly speaking, any question that you want answered and any assumption or assertion that you want to challenge or investigate can become a research problem or a research topic for your study. However, it is important to remember that *not all research questions can be transferred into research problem.*

Research Question or Research Problem-

The terms "research question" and "research problem" are often used interchangeably but not it is totally. Source: https://www.qualtrics.com/blog/research-problem.

Selecting Research Problem

Research problem is one which requires a researcher to find out the best solution for the given problem, i.e., to find out by which course of action the objective can be attained optimally in the context of a given environment. There are several factors which may result in making the problem complicated. For instance, the environment may

change affecting the efficiencies of the courses of action or the values of the outcomes; the number of alternative courses of action may be very large; persons not involved in making the decision may be affected by it and react to it favourably or unfavourably, and similar other factors. All such elements (or at least the important ones) may be thought of in context of a research problem.

1. Subject which is overdone should not be normally chosen, for it will be a difficult task to throw any new light in such a case.
2. Controversial subject should not become the choice of an average researcher.
3. Too narrow or too vague problems should be avoided.
4. The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach
5. The qualifications and the training of a researcher, the costs involved, the time factor are few other criteria
6. The selection of a problem must be preceded by a preliminary study

Quite often we all hear that a problem clearly stated is a problem half solved. This statement signifies the need for defining a research problem. The problem to be investigated must be defined unambiguously for that will help to discriminate relevant data from the irrelevant ones. A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles. Questions like:

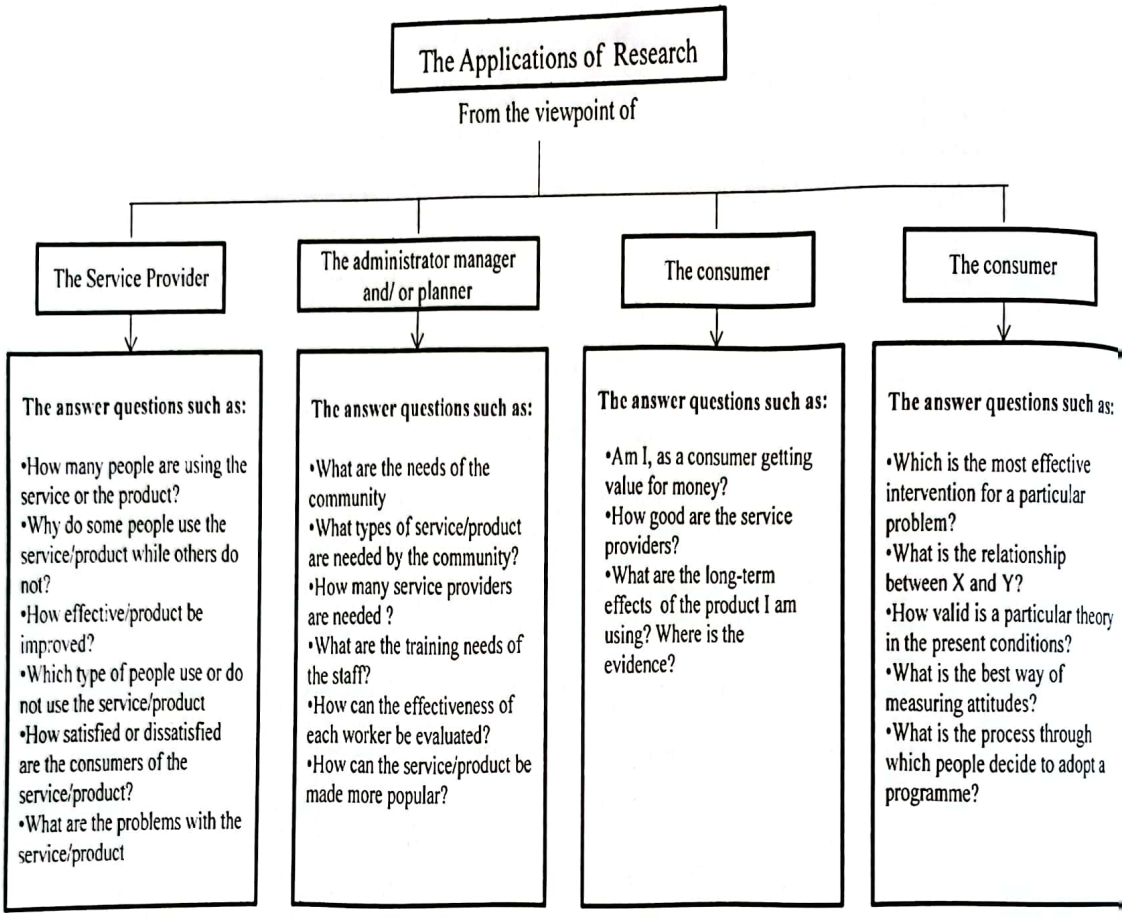

Fig:. The Application of Research

Techniques for developing Research Problem (Techniques of defining problem)-

1. Statements of the problem in general way.
2. Understanding the nature of the problem.
3. Surveying the available literature.
4. Developing the ideas through discussion.
5. Rephrasing the research problem.

What is a Research Question:-

Your research question is the primary question your project sets out to answer. Or to put it another way, the problem you are trying to solve.

Defining your research question is therefore the first step - and one of the most important - in any piece of research. It's also a task that will come up again and again, because any business research process is cyclical. New questions arise as you iterate (perform again) and progress through discovering, refining, and improving your products and processes.

Research Question or Research Problem-

The terms "research question" and "research problem" are often used interchangeably. Some researchers think in terms of a single research problem and a number of research questions that arise from it. The questions are lines of enquiry to explore in trying to solve the overarching research problem.

It may be useful to think of problems as coming out of your business data – that's the O-data (otherwise known as operational data) like sales figures and website metrics. For example, why do sales peak at certain times of the day, or why are customers abandoning their online carts at the point of sale. Research questions are a tool you use to solve those business problems.

Why are Research Questions Important:

A research question has two essential roles in setting your research project on a course for success.

1. It sets the Scope-

The research question defines what problem or opportunity you're looking at and what your research goals are. It stops you from getting side-tracked or allowing the scope of research to creep off-course.

Without a good research question, your team could end up spending resources unnecessarily, or coming up with results that aren't actionable - or worse harmful to your business - because the field of study is too broad.

2. It ties your Work to Business Goals and Actions-

Defining your research in terms of business decisions means you always have clarity on what's needed to make those decisions. You can show the effects of what you've studied using real outcomes.

Focusing your work through a research question tied to business objectives helps reduce the risk of research being un-actionable or inaccurate.

Steps to Defining your Research Question-

1. Observe and Identify the Influencing Factors-

Businesses today have so much data that it can be difficult to know which questions to address first. Researchers also have business stakeholders who come to them with problems they would like to have explored. A researcher's job is to sift through

these inputs and discover the higher-level trends that are worth the investment of resources.

This often means asking questions and doing some initial investigation to decide which avenues are worth pursuing further. That could mean talking to cross-functional teams across your business, or going outside your organization for additional expertise and contextual information from the wider industry.

Sometimes, a small-scale preliminary study might be worth doing to help get a better understanding of the business context and needs, and to make sure your research question addresses the most critical problems. This could take the form of a few in-depth interviews, an environmental scan, or a literature review.

2. Review the Key Influencing Factors Involved-

As a marketing researcher, you must work closely with your team of researchers to define and test the influencing factors and the wider context involved in your study. These might include demographic and economic trends or the business environment affecting the question at hand.

To do this you have to identify the factors that will affect the research project and begin formulating different methods to control for them.

You also need to consider the relationships between factors and the degree of control you have over them. For example, you may be able to control the loading speed of your website but you can't control the fluctuations of the stock market.

Doing this will help you determine whether the findings of your project will produce enough information to be worth the cost.

You need to determine:

a. Which factors affect the solution to the research problem.

b. Which ones can be controlled and used for the purposes of the company, and to what extent.

c. The functional relationships between the factors

d. Which ones are critical to the solution of the research problem.

3. Prioritize the Key Influencing Factors Involved-

Once you and your research team have a few observations with promise, prioritize them based on their business impact and importance. It may be that you can answer more

than one question with a single study, but don't do it at the risk of losing focus on your overarching research question.

Questions to ask:

Who? Who are the people with the problem? Are they end-users, stakeholders, teams within your business? Have you validated the information to see what the scale of the problem is?

What? What is its nature and what is the supporting evidence?

Why? What is the business case for solving the problem? How will it help?

Where? How does the problem manifest and where is it observed?

To help you understand all dimensions, you might want to consider focus groups or preliminary interviews with external (including consumers and existing customers) and internal (salespeople, managers and other stakeholders) parties to provide what is sometimes much-needed insight into a particular set of questions or problems..

4. Align of Priorities-

Get feedback from the key teams within your business to make sure everyone is aligned and has the same understanding of the research question and the actions you hope to take based on the results. Now is also a good time to demonstrate the ROI of your research and lay out its potential benefits to your stakeholders.

Different groups may have different goals and perspectives on the issue. This step is vital for getting the necessary buy-in and pushing the project forward.

Source: https://www.qualtrics.com/blog/research-problem/

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CAPTER-3
RESEARCH DESIGN

Research Design:-

A research design is a plan, structure and strategy of investigation so convinced as to obtain answers to research questions or problems. The plan is complete scheme or programme of the research. It includes an outline of what the investigator will do from writing the hypothesis and their operational implications to the final analysis of data. (Acc. to Thayer-1993).

A research design is road map that you decide to fallow during your research journey to find answer to your research questions as validity, objectively, accurately and economically as possible. It is procedural-cum-operational plan that details what and how different methods and procedures to be applied during the research process. (Acc. To Kerlinger, 1989).

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.

In fact, the research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and the analysis of data.

Meaning:

The research design is the detailed plan of the investigation. In fact, it is the blueprint of the detailed procedures of testing the hypotheses and analyzing the obtained data. The research design, thus, may be defined as the sequence of those steps taken ahead of time to ensure that the relevant data will be collected in a way that permits objective analysis of the different hypothesis formulated with respect to the research problems. Thus, the research design helps the researcher in testing the hypothesis by reaching valid and objective conclusions regarding the relationship between independent and dependent variables.

CONCEPTS -

1. Dependent and independent variables
2. Extraneous variable
3. Control
4. Confounded relationship
5. Research hypothesis

6. Experimental and non-experimental hypothesis-testing research
7. Experimental and control groups
8. Treatments
9. Experiment
10. Experimental unit(s)

Types of Research Designs:

a. **Formulatory or Exploratory Studies:** When the purpose of the research is to gain familiarity with the phenomenon or to formulate a problem. For more precise investigation or to develop hypothesis or in clarifying concepts or in establishing priorities for further research, then the research design followed is an exploratory one. It is necessary to be familiar with the subject to determine the scope and limit of research to classify the concepts and to formulate hypostases.

Methods of exploratory research-

1. Review of pertinent literature
2. experience survey
3. Case study

b. **Descriptive Studies:** The purpose of descriptive design is to describe the social and or human phenomenon specially the behavioural aspects. Therefore, the Ist step in the descriptive studies is to define the objectives at various levels with sufficient precision to ensure that the data collected is relevant to purpose of the study.

c. **Analytical or Diagnostic Design:** When the aim of research is to ascertain causality (find out) i.e. why it happens when two or more factors results in a given effects or in other words when one wants to ascertain the meaningful of and predictable relationship between two or more variables, we have to employ little more sophisticated design that is called as analytical studies.

d. **Experimental Design:** Experimental design generally denotes a lab or field situation. It also implies taking observations under controlled conditions for observing the relationship between different variables in a most scientific and systematic manner. Now a day's most of the studies in behavioral services are of the experiment nature. Because of controlled phenomenon, the results are more reliable, valid and predictable one. In this design an investigator has direct control over at least one independent variable which he manipulates.

Depending on the degree of control we may classify the experimental designs in the following five categories:

1. Trial and error Experiment: This is earliest form of experimental design, in which the researcher does not prepare a structured plan of studies but prepares a hypothesis and tries to test it in actual social conditions. Thus, based upon his experiences he changes the methods and techniques of the study. This design is said to be a poor design.

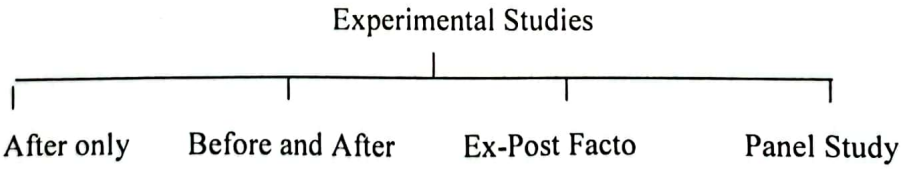
2. Controlled Observations Studies: As the title indicates this design, the researcher observes the phenomenon under controlling conditions. The researcher introduces new stimulus or new elements in the treatment group and does not allow control group to participate in that situation or with new element.

3. Natural Experiment: The designs which are planned for the study in the natural setting are known as natural experiment. This is one of the most commonly used designs in the field of psychology, sociology and extension education. The limitation of this design is that the situation can be influenced by growth factors, publicity, propaganda and other variables operating upon the situation.

4. Ex-post-facto techniques: When the study moves from present to future basing the interpretation of past happenings or the facts that have already occurred, the design employed is known as ex-post facto design. The literal meaning of ex-post facto is 'from what is done after ward 'or some things, occurring after an event with a retrospective effect on the event.

5. Laboratory Experimental Designs: Laboratory experiment connotes a controlled, Scientific, Investigation under a lab situation in which an investigator manipulated and controls one or more independent variables and observes the dependent variable(s) for variation concomitant to the manipulation of the independent variables. Unlike laboratory studies in physical sciences, the concept of laboratories in behavioral sciences may include test library, testing equipments and testing tools for measuring the behavioral components, interviewing rooms, drawing and other types of tables, research library, separate halls for conferences, seminars, workshops and panel discussions.

The other Type Classification of Experimental Designs:



Three Pre-Experimental Designs:

1. **The one shot case study**

- Absence of control
- Single group or individual is studied only ones.

2. **The one group pre-test and post-test design:**

- Used in educational research.
- Absence of control
- If the pretest and the post test are made of different days then the events in between may have caused the difference.

3. **The static group comparison:** In which a group has experienced (exposure of a group to an experimental variable or event) is compared with one which has not for establishing the effect of X.

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CAPTER-4
DEVELOPING OF LITERATURE REVIEW

Literature review is a continuous process and it starts even before finalizing research problem. The literature review conveys to your reader the existing knowledge and ideas on your research topic, and the strengths and weaknesses of these texts/experiments/studies. You should clearly organise literature review in line with the focus of your research (your objectives, research question or argument). You should understand that it is not a mere descriptive list or set of summaries, but an evaluation of the research already conducted that provides a context to your writing.

Literature Review:

The selection of available documents (Both published and unpublished) on the topic which contain information ideas, data and evidence written from a particular standpoint to fulfill certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed.

By Chris Hart

Please do not confuse literature review with the reviewing or critical evaluation of political, social or economical conditions that is found in popular newspapers such as 'The Times of India' The Hindu or Deccan Chronicle. Even if little has been written about your specific topic of research, the literature review establishes how and why the gap you are filling may exist and the comparability of other studies.

What is the Purpose of Literature Review:

The purpose of literature review can be enlisted as follows. As you can see, these are self explanatory but for better understanding we will discuss each point in brief.

1. Distinguishing what has been done from what needs to be done: As you know that the research is an ongoing process, the present researchers need to take into account the work already done in the field of his/her interest. You cannot afford to rediscover what has already been discovered. Do not reinvent wheel. However, if you have a counterview then you may go on to disapprove established theories or laws.

2. Discovering important variables relevant to the topic: This is one of the important purposes for any researcher. Identifying variables relevant to your topic by simply visualizing is not a cup of tea for every researcher. You can get a list of variables as well as tools to measure them. Then you may go on to choose those variables, which may be relevant to your research.

3. Synthesizing and gaining a new perspective: While you conduct the literature review, you will come across different views on your topic. After a systematic study of the available literature, you can synthesize it and gain an all together new perspective which earlier researchers might not have reported.

4 .Identifying relationships between ideas and practice: As a young researcher you may have ideas regarding research problem, methods, analysis and so on but what is the norm or what is the general practice by earlier researchers is of almost importance. You need to relate ideas with practice.

5. Establishing the context of the topic or problem: No research problem exists in isolation, it exists in some or the other context. As a researcher you need to establish the context in which it exists. This will also help you while generalizing the results.

6. Rationalizing the significance of the problem: A good literature review will provide enough information to rationalize the significance of your problem. This will give answer to why should you take up a particular problem.

7. Enhancing and acquiring the subject vocabulary: Like any other subject, Research has its own vocabulary and usages of phrases. You need to learn this for your report writing.

8. Understanding the structure of the subject: The area of research you may be interested have its own concepts, its interrelationship and structure, which you need to understand before conducting research in that area.

9. Relating ideas and theory to applications: In real life situation, there is a triangulation of idea, theory and practice/application and shown in the figure below. Literature review will help you identify specific triangulation as related to your subject.

10. Identifying the main methodologies and research techniques that have been used.

11. Placing the research in a historical context to show familiarity with state- of- art developments.

What a Literature Review can demonstrate:

The literature review places the topic of your research in a historical prospective. Thus, portraying when and how previous researches were undertaken by earlier researchers in past. What methodologies were followed to arrive at the results in a particular area? How the previous researches have helped in understanding the research problem in a better way? You should understand that research is an ongoing process and historical perspective provides a base or foundation to your current research problem.

You will also come across key landmark studies through selection of key sources and authors and understand the change in the course after these landmark studies. These studies will help you examine your own wisdom in selecting research problem and the proposed methodology you are going to employ.

Review of literature establishes context for your interest. It introduces and provides examples of the range of techniques and tools that can be used in analyzing your research idea. You can understand the nature and use of argument in research that others have used and develop your own skills in explaining and discussing the research idea.

Literature review is important for you to acquire an understanding of the topic. You can make out what has already been done to identify reasons for your own work. These amounts to showing that have understood the main work in the area, its application and shortfalls. The literature review is part of your journey in becoming an expert in the field of study.

The Place of the Literature Review in Research:

It has value even before the first step; that is, when you are merely thinking about a research question that you may want to find answers to through your research journey. In the initial stages of research it helps you to establish the theoretical roots of your study clarify your ideas and develop your research methodology. it helps you to integrate your findings with the existing body of knowledge. Since an important responsibility in research is to compare your findings with those of others. During the write-up of your report it helps you to integrate your findings with existing knowledge – that is, to either support or contradict earlier research. The higher the academic level of your research, the more important a thorough integration of your findings with existing literature becomes in summary.

What are the Key Features of Literatures of a Literature Review-

Undertaking a review of the body of literature is often seen as something obvious and easy to perform. In practice, many students do produce review of literature but of poor quality. These are nothing more than compilation of thinly annotated bibliography. We need to conduct a quality literature review. The key features of a quality literature review are:

a. Breadth and Depth
b. Rigour and Consistency
c. Clarity and Brevity
d. Effective analysis and Effective Synthesis

A literature review with these quality can help answer following questions.

1. What are the key sources?
2. What are the key concepts, theories and ideas?
3. What are the epistemological and ontological grounds for the discipline?
4. What are the main questions and problems that have been addressed to date?
5. How is knowledge on the topic structured and organized?
6. What are the origins and definitions of the topic?
7. What are the political standpoints?
8. What are the major issues and debates about the topic?

Deference between Literature Review and Summary of the Literature:

A summary of the literature is a description of the significant findings of each relevant piece of work that you have gone through as a part of your literature search. The summary basically entails (at end) listing, under each pertinent sources, the major findings of relevance to your study.

A summary of the literature is a summary of the main findings from each relevant reference you selected.

Whereas, in a literature review the main findings are organized around main theme that emerge from your literature search.

In a literature review you describe each theme that emerge during the literature search, citing its origin, comparing it with others and integrating it in a logical manner with rest.

What Strategies should you follow for working bibliography to literature review?

As you focus on your topic, you can develop a 'working bibliography': an on-going list of sources you consult. By including some additional information with your bibliographic records, this can help you write your literature review:

- How did I find this source? (Was it discussed or referenced in another source? Did my tutor/supervisor recommend it to me?)
- Summarize what was in it- approx. 5 keywords/themes.
- Was it useful? What were its key/best features (A good glossary of terms, illustrations, case studies, historical context)? What were its limitations (Out of date, limited practical examples or case studies, bias, narrows focus/too broad)?

How to Organize your Literature Review:

There are two ways of presenting Literature review, one knowledge based and another argumentation. The key elements of these two approaches are presented below.

Knowledge Based Elements:

1. A description of previous work on the topic, identifying leading concepts, definitions and theories.
2. Consideration of the ways in Which definitions were developed and operationalised as solutions to problems seen in previous work
3. Identification and description of matter other researchers have considered important.

Argumentational elements:

1. A description of what you find wrong in previous work on the topic.
2. A proposal for action that might solve the problem- your research.
3. An explanation of the benefits that might result from adopting the proposal.
4. A refutation of possible objections to the proposal

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CHAPTER-5
DESIGN OF SAMPLE SURVEY

Sampling Design-

A definite plan for obtaining sample from a given population. It refers to the techniques or the procedure the researcher would adopt in selecting items for the sample. Researcher must select/prepare a sample design which should be reliable and appropriate for his research study. Or

A sample design is a definite plan for obtaining a sample from the sampling frame. It refers to the technique or the procedure the researcher would adopt in selecting some sampling units from which inferences from the population are drawn. Sampling design is determined before any data is collected.

Steps in Sample Design- (Steps to be considered for the selection of sampling design also known as sampling procedure also known as sampling techniques)-

1. Objectives
2. Types of Population/universe.(variability of characteristics in the population).
3. Sampling Unit and frame.
4. Size of sample.
5. Parameters of interest.
6. Data collection
7. Non-respondents
8. Selection of proper sampling design
9. Organization of field work
10. Pilot survey
11. Budgetary constraints.

Characteristics of a Good Sample Design-

(a) Able to select representative sample.

(b) Able to produce minimum sampling error.

(c) Adequate and economical sample size based on available fund.

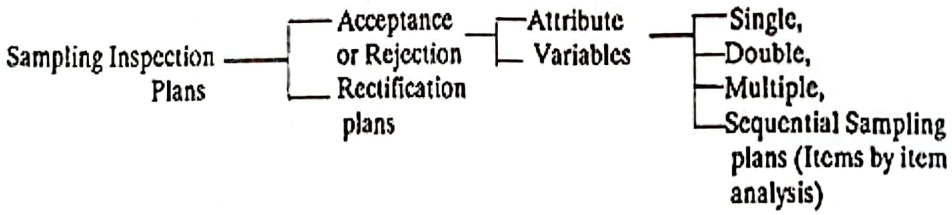
(d) Able to control systematic error (bias).

(e) Results of the sample study can be applied, in general, for the universe with a reasonable level of confidence.

Sequential Sampling: (Classification of Sampling Plans for Industries):-

This sampling design is somewhat complex sample design. The ultimate size of the sample under this technique is not fixed in advance, but is determined according to mathematical decision rules on the basis of information yielded as survey progresses. This is usually adopted in case of acceptance sampling plan in context of statistical quality control. When a particular lot is to be accepted or rejected on the basis of a single sample, it is known as single sampling; when the decision is to be taken on the basis of two samples, it is known as double sampling and in case the decision rests on the basis of more than two samples but the number of samples is certain and decided in advance, the sampling is known as multiple sampling. But when the number of samples is more than two but it is neither certain nor decided in advance, this type of system is often referred to as sequential sampling. Thus, in brief, we can say that in sequential sampling, one can go on taking samples one after another as long as one desires to do so. Sampling plans may be classified as follows:

1. Single Sampling Plans 2. Double Sampling Plans 3. Multiple Sampling Plans 4. Sequential Sampling Plan.



Inverse Sampling-

In inverse sampling (sometimes called standard inverse sampling), you continue to choose items **until an event has occurred a specified number of times.** It is often used when you don't know the exact size of the sample you want to take. For example, let's say you were conducting a wildlife management survey and wanted to capture 20 banded birds. You capture birds at random until you have collected 20 banded birds (and an unknown number of unbanded birds). The resulting sample size could be 100 birds, or it could be 88 birds or 203 birds and so on.

In other way defining as Definition: A method of sampling which requires that drawings at random shall be continued until certain specified conditions dependent on the results of those drawings have been fulfilled, e.g. until a given number of individuals of specified type have emerged.

Applications-

Inverse Sampling is Often Performed when a Certain Characteristic is Rare. For example, it is a good method for detecting differences between two different treatments for a rare disease; It avoids the problem of sparse data due to a disease's rarity. According to Lavkras, Play-the-winner sampling is preferred for clinical trials because the sample with the poorer population will always be smaller than the sample with the "better" population.

Advantages and Disadvantages-

In general, inverse sampling will give you more precise estimates than direct sampling (Scheaffer *et. al*, 2011), as long as the sample size *n* required to obtain *n* individuals is small compared the the population size N. However, as the sample size is unknown and could theoretically be infinite (in some cases), this technique can be costly, labor intensive, and time consuming. Compared to random sampling estimated variances are usually much larger.

Probability Proportion to Size Sampling (PPS)-

PPS is a sampling procedure under which the probability of a unit being selected is proportional to the size of the ultimate unit, giving larger clusters a greater probability of selection and smaller clusters a lower probability. In order to ensure that all units (ex. individuals) in the population have the same probability of selection irrespective of the size of their cluster, each of the hierarchical levels prior to the ultimate level has to be sampled according to the size of ultimate units it contains, but the same number of units has to be sampled from each cluster at the last hierarchical level. This method also facilitates planning for field work because a pre-determined number of individuals is interviewed in each unit selected, and staff can be allocated accordingly or

Sampling with Probability Proportional to Size (PPS):

In case the cluster sampling units do not have the same number or approximately the same number of elements, it is considered appropriate to use a random selection process where the probability of each cluster being included in the sample is proportional to the size of the cluster. For this purpose, we have to list the number of elements in each cluster irrespective of the method of ordering the cluster. Then we must sample systematically the appropriate number of elements from the cumulative totals. The actual

numbers selected in this way do not refer to individual elements, but indicate which clusters and how many from the cluster are to be selected by simple random sampling or by systematic sampling. The results of this type of sampling are equivalent to those of a simple random sample and the method is less cumbersome and is also relatively less expensive. We can illustrate this with the help of an example.

Equation illustration of PPS-

The following are the number of departmental stores in 15 cities: 35, 17, 10, 32, 70, 28, 26, 19, 26, 66, 37, 44, 33, 29 and 28. If we want to select a sample of 10 stores, using cities as clusters and selecting within clusters proportional to size, how many stores from each city should be chosen?(Use a starting point of 10).

Solution: Let us put the information as under (Table 5.1):

Since in the given problem, we have 500 departmental stores from which we have to select a sample of 10 stores, the appropriate sampling interval is 50. As we have to use the starting point of 10*, so we add successively increments of 50 till 10 numbers have been selected. The numbers, thus, obtained are: 10, 60, 110, 160, 210, 260, 310, 360, 410 and 460 which have been shown in the last column of the table (Table 4.1) against the concerning cumulative totals. From this we can say that two stores should be selected randomly from city number five and one each from city number 1, 3, 7,9, 10, 11, 12, and 14. This sample of 10 stores is the sample with probability proportional to size. Note: *If the starting point is not mentioned, then the same can randomly be selected.

Table:

City Number	No. of dependent store	Cumulative total	sample	
1.	35	35	10	
2.	17	52		
3.	10	62	60	
4.	32	94		
5.	70	164	110	160
6.	28	192		
7.	26	218	210	
8.	19	237		
9.	26	263	260	
10.	66	329	310	
11.	37	366	360	
12.	44	410	410	
13.	33	443		
14.	29	472	460	
15.	28	500		

Probability Sampling (Finite Population)-or Sampling from Infinite Population:-

Suppose we visit a small town with four houses (denoted houses I, II, III, and IV), and the number of TV's in the houses are: 1, 3, 4, and 4, respectively. This is a simple example of a finite population (the four houses), with a single measurement (the number of TV's). Suppose we consider all possible samples of size n=2 from this population of size N=4: (I, II), (I, III), (I, IV), (II, III), (II, IV), and (III, IV). In probability sampling, we assign a probability of drawing each possible sample. If we assign a probability of 1/6 of drawing each of the six samples above, then this is an example of a simple random sample without replacement. Many other types of sampling designs exist, and occasionally people draw samples with replacement, to mimic the process of sampling from an infinite population. Given a sampling design such as that above, we can draw a sample, and calculate the sample mean as an estimator of the (unknown) population mean.

Equation illustration for Selection of Random Numbers:-

Even this relatively easy method of obtaining a random sample can be simplified in actual practice by the use of random number tables. Various statisticians like Tippett, Yates, and Fisher have prepared tables of random numbers which can be used for selecting a random sample. Generally, Tippett's random number tables are used for the purpose. Tippett gave10400 four figure numbers. He selected 41600 digits from the census reports and combined them into fours to give his random numbers which may be used to obtain a random sample.

We can illustrate the procedure by an example. First of all we reproduce the first thirty sets of Tippett's numbers.

2952	6641	3992	9792	7979	5911
3170	5624	4167	9525	1545	1396
7203	5356	1300	2693	2370	7483
3408	2769	3563	6107	6913	7691
0560	5246	1112	9025	6008	8126

Suppose we are interested in taking a sample of 10 units from a population of 5000 units, bearing numbers from 3001 to 8000. We shall select 10 such figures from the above random numbers which are not less than 3001 and not greater than 8000. If we randomly decide to read the table numbers from left to right, starting from the first row itself, we obtain the following numbers: 6641, 3992, 7979, 5911, 3170, 5624, 4167, 7203, 5356, and 7483.

The units bearing the above serial numbers would then constitute our required random sample. One may note that it is easy to draw random samples from finite populations with the aid of random number tables only when lists are available and items are readily numbered. But in some situations it is often impossible to proceed in the way we have narrated above. For example, if we want to estimate the mean height of trees in a forest, it would not be possible to number the trees, and choose random numbers to select a random sample. In such situations what we should do is to select some trees for the sample haphazardly without aim or purpose, and should treat the sample as a random sample for study purposes.

Difference between census/population/universe (complete enumeration) and Sample Surveys-

SN	Parameter	Census/Population/Universe	Sample Surveys
1.	Definition	A statistical method that studies all the units or members of a population.	A statistical method that studies all the units or members of a population.
2.	Calculation	Total/Complete	Total/Complete
3.	Time involved	It is a time-consuming process.	It is a time-consuming process.
4.	Cost involved	It is a costly method.	It is a costly method.
5.	Accuracy	The results obtained are accurate as each member is surveyed. So, there is a negligible error.	The results obtained are accurate as each member is surveyed. So, there is a negligible error.
6.	Reliability	Highly reliable	Highly reliable
7.	Error	Not present	Not present
8.	Relevance	This method is suited for heterogeneous data.	This method is suited for heterogeneous data.

Planning of sample survey

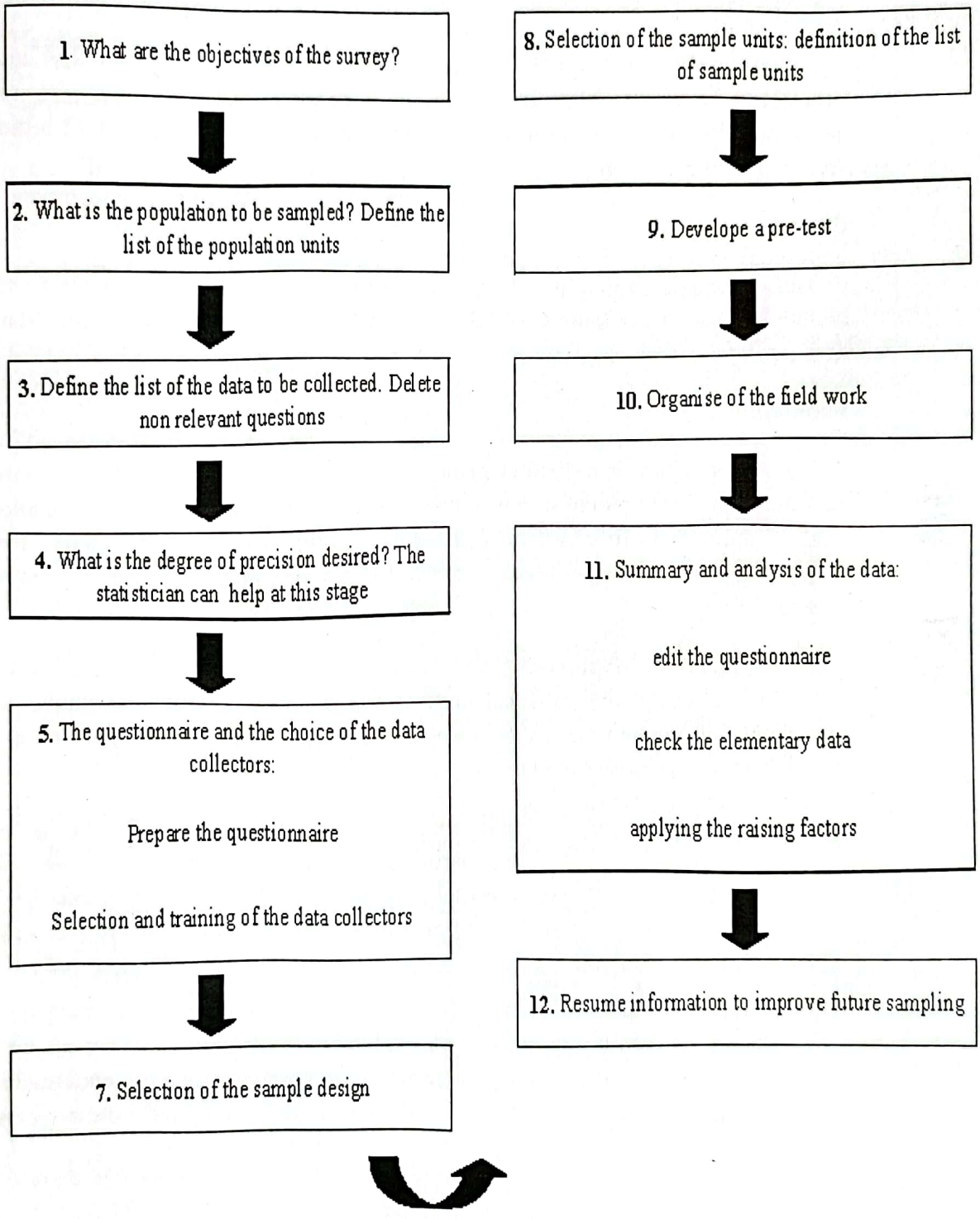


Figure: The principal steps in a sample survey

Universe:

The universe is everything. It includes all of space, and all the matter and energy that space contains. It even includes time itself and, of course, it includes you.

All existing matter and space considered as a whole; the cosmos. The universe is believed to be at least 10 billion light years in diameter and contains a vast number of galaxies; it has been expanding since its creation in the Big Bang about 13 billion years ago

Census:

Census, an enumeration of people, houses, firms, or other important items in a country or region at a particular time. an official enumeration of the population, with details as to age, sex, occupation, etc.

Population-

A population is a **distinct group** of individuals, whether that group comprises a nation or a group of people with a common characteristic. In statistics, a population is the pool of individuals from which a statistical sample is drawn for a study. Thus, any selection of individuals grouped together by a common feature can be said to be a population.

In sociology, **population** refers to a collection of humans. Demography is a social science which entails the statistical study of populations. Population, in simpler terms, is the number of people in a city or town, region, country or world; population is usually determined by a process called census

In biology, a **population** is a number of all the organisms of the same group or species who live in a particular geographical area and are capable of interbreeding. The area of a sexual population is the area where inter-breeding is possible between any pair within the area and more probable than cross-breeding with individuals from other areas.

Sample:

A sample is defined as a smaller set of data that a researcher chooses or selects from a larger population by using a pre-defined selection method. These elements are known as sample points, sampling units, or observations.

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CAPTER-6
MEASUREMENT AND SCALING

Measurement

Definition:

Measurement refers to the process of assigning numerals to events, objects etc. according to certain rules.

Tyler (1963) defines measurement as assignment of numerals according to rules.

A still more elaborate and wider definition has been given by Nunally (1979)- measurement consists of rules for assigning numbers to objects in such a way as to represent quantities of attributes.

Properties of Measurement

1. In the process of measurement, numbers are assigned according to some rules. A number is a kind of numeral, which is assigned some quantitative meaning. In the process of measurement, the investigator assigns numbers, not of his own choice, but according to certain fixed and explicit rules.
2. Measurement is always concerned with certain attributes or features of the object It is these attributes or feature of the object which are measured and not the objects itself. For example, one would measure the aptitude, intelligence, attitude, etc. of a person and not the person himself.
3. In the process of measurement, numerals are used to represent quantities of the attribute. In other words, measurement involves the process of quantification.

Measurements are different from its so-called synonym 'evaluation.' By evaluation is meant appraisal or assessment with respect to some standard. Tuckman (1975) defines evaluation as a process wherein the parts, processes, or outcomes of a programme are examined to see whether they are satisfactory, particularly with reference to the programme's stated objectives, our own expectations, or our won standards of excellence. Thus, evaluation involves a process of appraisal of an object or event with reference to some standard.

Levels of Measurements (or Measurement Scales)

These are briefly summarized under the following three general headings.

1. Postulates relating to equalities or identities.
2. Postulates relating to additively.
3. Postulates relating to additively.

The three variations in postulates relating to identities or equalities are as follows:

The three variations in postulates relating to identities or equalities are as follows:

1. Either a=b or a ≠ b. This Means number are either equal (a=b) or they are not equal (a ≠ b) but not both. This postulate is more essential or classification.
2. If a > b and b , a > c. This is transitivity postulate and indicated a definite order in the ranking. It is important postulate upon which most measurement in psychology, sociology and education are dependent.
3. a+b= b+a. This postulate denotes that in process of addition, the order of the numbers is not important because if a=4, b=2, then 4+2 is equal to 6 and 2+4 is also equal to 6.

Types of Measurement-

a. Nominal or Classificatory Measurement:

Nominal measurement (or scale) is the lowest level of measurement. in nominal measurement numbers are used to name, identify or classify person, objects, groups, etc. For example, a sample of persons being studied may be classified as (a) Hindu, (b) Muslim and (c) Sikh or, the same sample may be classified based on sex, rural-urban variable, political party affiliation etc.

b. Ordinal Measurement:

In ordinal measurement, numbers denote the rank order of the objects or the individuals. Here numbers are arranged from highest to lowest or from lowest to highest. Ordinal measures reflect which person or object is larger or smaller, heavier or lighter, brighter or duller, harder or softer etc. than others. Persons may be grouped according to physical or psychological traits to convey a relationship like 'greater than' or 'lesser than'. Socioeconomic status is a good example of ordinal measurement because every member of the upper class is higher in social prestige than every member of the middle and lower class.

The drawback of ordinal measurement is that ordinal measures are not absolute quantities, not do they convey that the distance between the different rank values is equal.

c. Interval or Equal-Interval Measurement:

This is the third level of measurement and includes all the characteristics of nominal and ordinal scale of measurement. The Salient feature of interval measurement is that numerically equal distances on the scale indicate equal distances in the properties of the objects being measured. In other words, here the unit of measurement is constant and equal. This is the reason why interval measurement is also referred to as equal-interval measurement. Since the numbers are often equal intervals, they can legitimately be added and subtracted from each other. For example, suppose four objects A, B, C and D have been measured and given the score of 20, 16, 8 4 respectively on an interval measurement. Here the difference between A-C= 20-8= 12 is equal to B-D= 16-4= 12. Interpreting the same in still another way, it can be said that the interval between A and B= 20-16= 4 and the interval between C and D= 8-4= 4. These intervals can be added together (20-16)+(8-4)= 4+4= 8. Thus, on an interval measurement the intervals or distances (not the quantities or amounts) can be added.

d. Ratio Measurement:

It is the highest level of measurement and has all the properties of nominal, ordinal and interval scales plus an absolute or trues zero point. The salient feature of the ratio is that the ratio of any two numbers is independent of the unit of measurement and therefore, it can meaningfully be equated. For example the ratio 16:28 is equal to 4:7. In ratio measurement all the postulates of measurement can be applied. Also all statistical operations including the coefficient of variation can be utilized. The common examples of ratio scale are the measures of weight, width, length, loudness and so on.

Function of Measurement:

The primary functions of measurement are as follows:

Selection: The function of measurement tools in selection is to predict the ability of the individual. Hence, measurement plays an important role by providing data on the basis of which suitable disciplinary action can be recommended against such personnel.

Classification:

Measurement also helps in various types of classification, which sometimes becomes very necessary for a programme to be carried out effectively. for instance, there may be some problem with children in class and their class teacher may wish to separate them in order that the other children into the following categories: retarded, average and

gifted. Likewise, a psychiatrist or a clinical psychologist may wish to classify his patients into different categories of mental illness and here again, the tools of measurement help him. In industry, also measurement helps personal to be classified according to the indices of job satisfaction, accident proneness, absenteeism etc.

Comparison:

The pioneering work of Galton and Darwin has revealed that no two individuals are alike. In other words, there always exist individual differences in traits, mental process, habits, tendencies, educational achievements, abilities, etc., between any two individuals. Whenever, two persons are to be compared on any of the above factors or so, measurement comes into use. With the help of appropriate measurement, it is possible to conclude that A is better than B.

Guidance and Counseling:

Counseling is a sort of specialized guidance programme and refers to the advice given to an individual so that he can arrive at a workable solution to various adjustment problems in life. Measurement can help an individual to know his strengths and weakness. It can help to make accurate predictions regarding problems of adjustment likely to come up in the future and also diagnose mental disabilities, aberrations, deficiencies, etc.

Research:

Measurements help in research activities too. In fact measurements are the fundamental basis of all psychological and educational research as the investigation undertaken to discover new facts about a problem in psychological and educational researches, usually the effect of one variable on another variables. In doing so a variety of measurements is resorted to confirm that the design, statistical calculation, results, etc. are in accordance with the principles of measurement or else research becomes meaningless.

Improving Classroom Instruction:

A teacher teaches all the students in the classroom in a similar manner. However, the results are different for the various students. Obviously, for some students the instruction is at par with their mental ability but for others it may be either below or above their mental ability. In both the case, there is a need for modification in the instruction can be made.

General Problems of Measurement: Some of these problems are enumerated below:

Indirectness of Measurement:

Most psychological and educational measurements are indirect. This is because most psychological and educational variables cannot be observed and studied directly. For example, suppose a teacher wants to measure the intelligence of students of a particular class. As intelligence cannot be directly seen, touched, or experienced, the teacher has to depend upon measure which includes a sample of behavior representative of an intelligent act.

Incompleteness of measurement: Psychological and educational measures are generally incomplete, and therefore, the measurement of any psychological or educational variable is also complete.

Relativity of Measurement:

Psychological and educational measurements are relative. This is also true of sociological measurement.

Errors in Measurement:

Measurement in the physical sciences as well as in the behavioral sciences is most of the time not pure. It contains some uncontrolled factors, which produce gross errors.

Source s of Error in Measurement:

1. Respondents
2. Situation
3. Measurer
4. Instruments

Test of Measurement: Three Test are-

1. Test reliability
2. Test of validity
3. Test of practically

SCALING TECHNIQUES

Meaning of Scaling-

Scaling describes the procedures of assigning numbers to various degrees of opinion, attitude and other concepts. Or Scaling has been defined as a "procedure for the

assignment of numbers (or other symbols) to a property of objects in order to impart some of the characteristics of numbers to the properties in question. This can be done in two ways viz.,

(i) Making a judgment about some characteristic of an individual and then placing him directly on a scale that has been defined in terms of that characteristic and

(ii) Constructing questionnaires in such a way that the score of individual's responses assigns him a place on a scale. It may be stated here that a scale is a continuum, consisting of the highest point (in terms of some characteristic e.g., preference, favorableness, etc.) and the lowest point along with several intermediate points between these two extreme points.

A. Rating Scale:-

The rating scale involves qualitative description of a limited number of aspects of a thing or of traits of a person.

A rating scale is a method that requires the respondent to assign a value, sometimes numeric, to the rated object.

Rating scale is defined as a close-ended survey question used to represent respondent feedback in a comparative form for specific particular features/products/services. It is one of the most established question types for online and offline surveys where survey respondents are expected to rate an attribute or feature. Rating scale is a variant of the popular multiple-choice question which is widely used to gather information that provides relative information about a specific topic. Generally, this scale is used to evaluate the performance of a product or service, employee skills, customer service performances, processes followed for a particular goal etc.

There is no specific rule whether to use a two-point scale, three-point scale or scale with still more points. In practice, three to seven points' scales are generally used for the simple reason that more points on a scale provide an opportunity for greater sensitivity of measurement.

Rating scale may be either a graphic rating scale or an itemized rating scale.

(i) The graphic rating scale is quite simple and is commonly used in practice. Under it the various points are usually put along the line to form a continuum

(ii) The itemized rating scale (also known as numerical scale) presents a series of statements from which a respondent selects one as best reflecting his evaluation. These statements are ordered progressively in terms of more or less of some property

B. Ranking Scales:

Under ranking scales (or comparative scales) we make relative judgments against other similar objects. The respondents under this method directly compare two or more objects and make choices among them. There are two generally used approaches of ranking scales viz.

(i). Ordinal Scale-

An ordinal scale is a scale the depicts the answer options in an ordered manner This method is easier and faster than the method of paired comparisons.. The difference between the two answer options may not be calculable but the answer options will always be in a certain innate order.

Example-

1. Parameters such as attitude or feedback can be presented using an ordinal scale.

2. To secure a simple ranking of all items involved we simply total rank values received by each item and then we laced in ascending or descending rank order.

(ii) Interval Scale –

An interval scale is a scale where not only is the order of the answer variables established but the magnitude of difference between each answer variable is also calculable. Absolute or true zero value is not present in an interval scale. Temperature in Celsius or Fahrenheit is the most popular example of an interval scale. Net Promoter Score, Likert Scale, Bipolar Matrix Table are some of the most effective types of interval scale.

There are four primary types of rating scales which can be suitably used in an online survey:

I. Graphic Rating Scale (Ex. Can use of stars as * ** *** **** ***** etc.)

II. Numerical Rating Scale (ex. Can use of stars as 1 2 3 4 5 etc.)

III. Descriptive Rating Scale (Ex. strongly agree, somewhat agree, Undecided, Disagree, Strongly disagree etc.)

IV. Comparative Rating Scale (Ex. company brand value 1 2 3 4 and company product value 1 2 3 4 etc.)

Uses of Rating Scale:

A. Gain relative information about a particular subject

B. Compare and analyze data:

C. Measure one important product/service element:

Conditions of a good rating scale:

1. It should be easy to interpret the meaning of each scale point.
2. The meaning scale points should be interpreted identically by all respondents.
3. The scale should include enough points to differentiate respondents from one another as much as validly possible.
4. Responses to the scale should be reliable, meaning that if we asked the same question again, each respondent should provide the same answer.
5. The scale's points should map as closely as possible to the underlying idea (construct) of the scale.

Advantages of Rating Scale:

1. Rating scale questions are easy to understand and implement.
2. Offers a comparative analysis of quantitative data within the target sample for researchers to make well-informed decisions.
3. Using graphic rating scales, it is easy for researchers to create surveys as they consume the least time to configure.
4. Abundant information can be collected and analyzed using a rating scale.
5. The analysis of answer received for rating scale questions is quick and less time-consuming.
6. Rating scale is often considered to a standard for collecting qualitative and quantitative information for research.

Common Rating Scales-

One of the most frequent mistakes when reviewing questionnaires are poorly written scales. Novice survey authors often create their own scale rather than using the appropriate common scale. It's hard to write a good scale; instead by better off rewording question slightly use one of the following.

- **Acceptability** Not at all acceptable, Slightly acceptable, Moderately acceptable, Very acceptable, Completely acceptable
- **Agreement** Completely disagree, Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Agree, Completely agree
- **Appropriateness** Absolutely inappropriate, Inappropriate, Slightly inappropriate, Neutral, Slightly appropriate, Appropriate, Absolutely appropriate
- **Awareness** Not at all aware, Slightly aware, Moderately aware, Very aware, Extremely aware
- **Beliefs** Not at all true of what I believe, Slightly true of what I believe, Moderately true of what I believe, Very true of what I believe, Completely true of what I believe
- **Concern** Not at all concerned, Slightly concerned, Moderately concerned, Very concerned, Extremely concerned
- **Familiarity** Not at all familiar, Slightly familiar, Moderately familiar, Very familiar, Extremely familiar
- **Frequency** Never, Rarely, Sometimes, Often, Always
- **Importance** Not at all important, Slightly important, Moderately important, Very important, Extremely important
- **Influence** Not at all influential, Slightly influential, Moderately influential, Very influential, Extremely influential
- **Likelihood** Not at all likely, Slightly likely, Moderately likely, Very likely, Completely likely
- **Priority** Not a priority, Low priority, Medium priority, High priority, Essential
- **Probability** Not at all probable, Slightly probable, Moderately probable, Very probable, Completely probable
- **Quality** Very poor, Poor, Fair, Good, Excellent
- **Reflect Me** Not at all true of me, Slightly true of me, Moderately true of me, Very true of me, Completely true of me

- **Satisfaction (bipolar)** Completely dissatisfied, Mostly dissatisfied, Somewhat dissatisfied, Neither satisfied or dissatisfied, Somewhat satisfied, Mostly satisfied, Completely satisfied
- **Satisfaction (unipolar)** Not at all satisfied, Slightly satisfied, Moderately satisfied, Very satisfied, Completely satisfied

Note-This list follows Krosnick's advice to use 5-point unipolar scales and 7-point bipolar scales.)

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CAPTER-7
QUESTIONNAIRE DESIGN

How to Develop a Questionnaire for Research-

A step-by-step approach to questionnaire development, you can come up with an effective means to collect data that will answer your unique research question-

Designing Questionnaire (A Complete Process):

Part-1- Writing Questionnaire:

1.1. Identify the goal of your questionnaire. What kind of information do you want to gather with your questionnaire? What is your main objective? Is a questionnaire the best way to go about collecting this information?

a. Come up with a research question. It can be one question or several, but this should be the focal point of your questionnaire.

b. Develop one or several hypotheses that you want to test. The questions that you include on your questionnaire should be aimed at systematically testing these hypotheses.

1.2. Determine your sample – different sampling methods are covered elsewhere ("*Methods of sampling from a population*"). However, there are two principal components to choosing a sample:

a. Who are you target population?

b. How many people will you interview? This may involve a trade-off between the benefits of a large sample versus the costs of interviewing a large number of people

2. Choose your question type or types. Depending on the information, you wish to gather, there are several possible types of questions to include on your questionnaire, each with unique pros and cons. Here are the types of commonly used questions on a questionnaire:

a. Dichotomous question: This question will generally be a "yes/no" question, but may also be an "agree/disagree" question. It is the quickest and simplest question to analyze, but is not a highly sensitive measure.

b. Open-ended questions: these questions allow the respondent to respond in their own words. They can be useful for gaining insight into the feelings of the respondent, but can be a challenge when it comes to analysis of data. It is recommended to use open-ended questions to address the issue of "why."

c. Multiple choice questions: these questions consist of three or more mutually-exclusive categories and ask for a single answer or several answers. Multiple choice questions allow for easy analysis of results, but may not give the respondent the answer they want.

d. Rank-order (or ordinal) scale questions: this type of question asks your respondent to rank items or choose items in a particular order from a set. For example, it might ask your respondents to order five things from least to most important. These types of questions forces discrimination among alternatives, but does not address the issue of why the respondent made these discriminations.

e. Rating scale questions: these questions allow the respondent to assess a particular issue based on a given dimension. You can provide a scale that gives an equal number of positive and negative choices, for example, ranging from "strongly agree" to "strongly disagree." These questions are very flexible, but also do not answer the question "why."

3. Develop questions for your questionnaire- The question that you developed for your questionnaire should be clear, concise, and direct. This will ensure that you get the best possible answer from your respondents.

a. Write questions that are succinct and simple. You should not be writing complex statements or using technical jargon, as it will only confuse your respondents and lead to incorrect responses.

b. Ask only one question at a time. This will help avoid confusion

c. Beware of asking for private or "sensitive" information. This can be something as simple as age or weight, or something as complex as past sexual history. Asking questions such as these usually require you to anonymize or encrypt the demographic data you collect.

d. Determine if you will include an answer such as "I don't know" or "Not applicable to me." While these can give your respondents a way of not answering certain questions, providing these options can also lead to missing data, which can be problematic during data analysis.

e. Put the most important questions at the beginning of your questionnaire. This can help you gather important data even if you sense that your respondents may be becoming distracted by the end of the questionnaire.

f. Use simple language. , limit the possible choices, arrange it in a logical order and keep it short.

g. Using a clear and simple layout.

4. Restrict the length of your questionnaire. Keep your questionnaire as short as possible. More people will be likely to answer a shorter questionnaire, so make sure you keep it as concise as possible while still collecting the necessary information. If you can make a questionnaire that only requires 5 questions, do it.

a. Only include questions that are directly useful to your research question. A questionnaire is not an opportunity to collect all kinds of information about your respondents.

b. Avoid asking redundant questions. This will frustrate those who are taking your questionnaire.

5. Identify your target demographic. Is there a certain group of people who you want to target with your questionnaire? If so, it is best to determine this before you begin to distribute your questionnaire.

a. Consider if you want your questionnaire to collect information from both men and women. Some studies will only survey one sex.

b. Determine whether you want your survey to collect information from both children and adults. Many surveys only target certain age ranges for which the questions are applicable.

c. Consider including a range of ages in your target demographic. For example, you can consider young adult to be 18-29 years old, adults to be 30-54 years old, and mature adults to be 55+. Providing the age range will help you get more respondents than limiting yourself to a specific age.

d. Consider what else would make a person a target for your questionnaire. Do they need to drive a car? Do they need to have health insurance? Do they need to have a child under 3? Make sure you are very clear about this before you distribute your questionnaire.

6. Ensure you can protect privacy. Make your plan to protect respondents' privacy before you begin writing your survey. This is a very important part of many research projects.

a. Consider an anonymous questionnaire. You may not want to ask for names on your questionnaire. This is one step you can take to prevent privacy; however it is often possible to figure out a respondent's identity using other demographic information (such as age, physical features, or zipcode).

b. Consider de-identifying the identity of your respondents. Give each questionnaire (and thus, each respondent) a unique number or word, and only refer to them using that new identifier. Shared any personal information that can be used to determine identity.

c. Remember that you do not need to collect much demographic information to be able to identify someone. People may be wary to provide this information, so you may get more respondents by asking less demographic questions (if it is possible for your questionnaire).

d. Make sure you destroy all identifying information after your study is complete.

Part-2- Writing Your Questionnaire:

1. Introduce yourself. Your introduction should explain who you are, and what your credentials are. You should clarify if you are working alone or as a part of a team. Include the name of the academic institution or company for whom you are collecting data. Here are some examples:

a. My name is Jack Smith and I am one of the creators of this questionnaire. I am part of the Department of Psychology at the University of Michigan, where I am focusing in developing cognition in infants.

b. I'm Kelly Smith, a 3rd year undergraduate student at the University of New Mexico. This questionnaire is part of my final exam in statistics.

c. My name is Steve Johnson, and I'm a marketing analyst for The Best Company. I've been working on questionnaire development to determine attitudes surrounding drug use in Canada for several years.

2. Explain the purpose of the questionnaire. Many people will not answer a questionnaire without understanding what the goal of the questionnaire is. No long explanation is needed; instead, a few concise sentences will do the trick. Here are some examples:

a. I am collecting data regarding the attitudes surrounding gun control. This information is being collected for my Anthropology 101 class at the University of Maryland.

b. This questionnaire will ask you 15 questions about your eating and exercise habits. We are attempting to make a correlation between healthy eating, frequency of exercise, and incidence of cancer in mature adults.

c. This questionnaire will ask you about your recent experiences with international air travel. There will be three sections of questions that will ask you to recount your recent trips and your feelings surrounding these trips, as well as your travel plans for the future. We are looking to understand how a person's feelings surrounding air travel impact their future plans.

3. Reveal what will happen with the data you collect. Are you collecting these data for a class project, or for a publication? Are these data to be used for market research? Depending on what you intend to do with the data you collect from your questionnaire, there may be different requirements that you need to pay attention to before distributing your survey.

a. Beware that if you are collecting information for a university or for publication, you may need to check in with your institution's Institutional Review Board (IRB) for permission before beginning. Most research universities have a dedicated IRB staff, and their information can usually be found on the school's website.

b. Remember that transparency is best. It is important to be honest about what will happen with the data you collect.

c. Include an informed consent for if necessary. Note that you cannot guarantee confidentiality, but you will make all reasonable attempts to ensure that you protect their information.

4. Estimate how long the questionnaire will take. Before someone sits down to take your questionnaire, it may be helpful for them to know whether the questionnaire will take them 10 minutes or 2 hours. Providing this information at the onset of your questionnaire is more likely to get you more complete questionnaires in the end.

a. Time yourself taking the survey. Then consider that it will take some people longer than you and some people less time than you.

b. Provide a time range instead of a specific time. For example, it's better to say that a survey will take between 15 and 30 minutes than to say it will take 15 minutes and have some respondents quit halfway through.

c. Use this as a reason to keep your survey concise! You will feel much better asking people to take a 20 minute survey than you will ask them to take a 3 hour one.

5. Describe any incentives that may be involved. An incentive is anything that you can offer as a reward at the end of the questionnaire. Incentives can be many types of things: they can be monetary, desired prizes, gift certificates, candy, etc. There are both pros and cons to offering incentives.

a. Incentives can attract the wrong kind of respondent. You don't want to incorporate responses from people who rush through your questionnaire just to get the reward at the end. This is a danger of offering an incentive.

b. Incentives can encourage people to respond to your survey who might not have responded without a reward. This is a situation in which incentives can help you reach your target number of respondents.

c. Consider the strategy used by Survey Monkey. Instead of directly paying respondents to take their surveys, they offer 50 cents to the charity of their choice when a respondent fills out a survey. They feel that this lessens the chances that a respondent will fill out a questionnaire out of pure self-interest.

d. Consider entering each respondent in to a drawing for a prize if they complete the questionnaire. You can offer a 25$ gift card to a restaurant, or a new iPod, or a ticket to a movie. This makes it less tempting just to respond to your questionnaire for the incentive alone, but still offers the chance of a pleasant reward.

6. Make sure your questionnaire looks professional. Because you want people to have confidence in you as a data collector, your questionnaire must have a professional look.

a. Always proof read. Check for spelling, grammar, and punctuation errors.

b. Include a title. This is a good way for your respondents to understand the focus of the survey as quickly as possible.

c. Thank your respondents. Thank them for taking the time and effort to complete your survey.

Part 3-:- Writing your questionnaire

1. Do a pilot study- Ask some people you know to take your questionnaire (they will not be included in any results stemming from this questionnaire), and be prepared to revise it

if necessary. Plan to include 5-10 people in the pilot testing of your questionnaire. Get their feedback on your questionnaire by asking the following questions:

i. Was the questionnaire easy to understand? Were there any questions that confused you?

ii. Was the questionnaire easy to access? (Especially important if your questionnaire is online).

iii. Do you feel the questionnaire was worth your time?

iv. Were you comfortable answering the questions asked?

v. Are there any improvements you would make to the questionnaire?

2. Disseminate your questionnaire. You need to determine what the best way to disseminate your questionnaire is. There are several common ways to distribute questionnaires:

a. Use an online site, such as SurveyMonkey.com. This site allows you to write your own questionnaire with their survey builder, and provides additional options such as the option to buy a target audience and use their analytics to analyze your data.

b. Consider using the mail. If you mail your survey, always make sure you include a self-addressed stamped envelope so that the respondent can easily mail their responses back. Make sure that your questionnaire will fit inside a standard business envelope.

c. Conduct face-to-face interviews. This can be a good way to ensure that you are reaching your target demographic and can reduce missing information in your questionnaires, as it is more difficult for a respondent to avoid answering a question when you ask it directly.

d. Try using the telephone. While this can be a more time-effective way to collect your data, it can be difficult to get people to respond to telephone questionnaires.

3. Maximizing response rates-

In order to produce results that are representative, it is important to aim for the highest response rate possible.

a. Excess mental demands – for example, difficulty understanding the question, difficulty in recalling moods and events over time

b. Notifying participants in advance with a letter of introduction outlining the purpose of the study

c. Using clear and concise questions which avoid the use of technical jargon, and long, leading or negative questions

d. Ensuring anonymity where possible, especially if the questionnaire includes sensitive items

e. Follow-up of non-responders by telephone or letter

f. Ask the same question in different ways-

4. Include a deadline. Ask your respondents to have the questionnaire completed and returned to you by a certain date to ensure that you have enough time to analyze the results.

a. Make your deadline reasonable. Giving respondents up to 2 weeks to answer should be more than sufficient. Anything longer and you risk your respondents forgetting about your questionnaire.

b. Consider providing a reminder. A week before the deadline is a good time to provide a gentle reminder about returning the questionnaire. Include a replacement of the questionnaire in case it has been misplaced by your respondent.

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CAPTER-8
METHODS OF DATA COLLECTION

Meaning of Data:

The term data refers to facts from which other facts may be deduced.

Concept of Data:

About data, Bertrand Russell remarks, "The question of data has been mistakenly, as I think mixed up with the question of certainty. The essential characteristic of a datum is that it is not inferred."

Data are the information as wanted by the researcher for specific issues.

Types of Data:

a. Primary Data: Primary data are those which are collected a fresh and for the first time and thus happen to be original in character.

b. Secondary Data: Secondary data are those which have already been collected by someone else and which have already been passed through the statistical process.

Methods of Data Collection:

A- **For Primary Data:** There are several methods of collecting primary data, particularly in survey and description researches, important ones are:

1. Observation Method.
2. Interview method.
3. Questionnaire method.
4. Schedule method.
5. Case study method
6. Socio metric method
7. Projective techniques
8. Q-techniques

1. Observation Method: Under the observation method, the information is sought by investigator's own direct observation without asking from the respondents. While using

this method, the researcher should keep in mind things like. What should be observed? How the observations should be recorded or how the accuracy of observation can be ensured?

Types of Observations:

1. Systematic
2. Unsystematic

or

1. Participant
2. Non- Participant

2. Interview Method:

(a) Personal interview: This method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person or persons. In fact, interviewing is an art governed by certain scientific principles. Every effort should be made to create friendly atmosphere of trust and confidence, so that respondents may feel at ease while talking to and discussing with the interviewer.

(b) Telephone interview: This method of collecting information consists in contacting respondents on telephone itself. It is not a very widely used method but plays important part in industrial surveys, particularly in developed regions.

3. Questionnaire Method: This method of data collection is quite popular, particularly in case of big enquiries. In this method a questionnaire is sent (usually by post) to the persons concerned with a request to answer the questions and return the questionnaire. A questionnaire consists of a number of questions printed or typed in a definite order on a form or set of forms. The questionnaire is mailed to respondents who are expected to read and understand the questions and write down the reply in the space meant for the purpose in the questionnaire itself. The respondents have to answer the questions in their own.

Types of Questions:

a. Open ended

b. Close ended- multiple choices, true or false, yes or no etc..

4. Schedule Method:

This method of data collection is very much like the collection of data through questionnaires, with little difference which lies in the fact that schedule (proforma

containing a set of questions) are filled in by the enumerators who are specially appointed for the purpose.

These enumerators along with schedules go to respondents, put to them the questions from the proforma in the order the questions are listed and record the replied in the space meant for the same in the proforma.

Difference between Questionnaire and Schedule

Questionnaire	Schedule
It is mailed to the respondents from far distance	It is held with the researcher to be administered among the respondents
It is filled by the respondents	It is filled by the researcher.
There is no face to face interaction between researcher and respondents	Face to face interaction is there between researcher and respondents
Can be administered among only literate persons.	Can be administered among literate as well as illiterate persons.
It requires less time	It requires more time
It is comparatively less expensive	It is more expensive
Chances of non responses are more	Chances of non response are almost nil
Collected data is less reliable	Comparatively more reliable

5. Case study Method:

The case study method is a very popular form of qualitative analysis and involves a careful and complete observation of a social unit, be that unit a person, a family, an institution , a cultural group or even the entire community. It is a method of study in-depth rather than breath. The case study places more emphasis on the full analysis of a limited number of events or conditions and their inter-relations. The case study deals with the processes that take place and their interrelationship. Thus, case study is essentially an intensive investigation of the particular unit under consideration. The object of the case study method is to locate the factors that account for the behaviour patterns of the given unit as an integrated totality.

6. Socio Metric Methods:

Sociometry is a broad term indicating a number of methods of gathering and analyzing data on the choice, communication and interaction patterns of individuals in groups. One might say that socio metry is the study and measurement of social choice. It has also been called a means of studying the attractions and repulsions of members of groups.

A person is asked to choose one or more other persons according to one or more criteria supplied by the researcher with whom would you like to work? with whom would you like to play? He then makes one, two, three or more choices among the members of his own groups (usually) or other groups. What could be simpler and more natural?

7. Projective Techniques:

Values, attitudes, needs and wishes as well as impulses and motives are projected upon objects and behaviour outside the individual e.g. a hungry man may invest inedible objects with food properties.

8. Q-techniques:

Q-technique is a set of procedures used to implement Q methodology. It centers particularly in sorting decks of cards called Q sorts and in the correlations among the responses of different individuals to the Q sorts. Q techniques are mainly a sophisticated way of rank- ordering objects (Items, stimuli, etc.) and then assigning numerals to subsets of the objects for statistical purposes.

B- For Secondary Data:

Secondary data means data that are already available i.e. they refer to the data which have already been collected and analyzed by someone else. When the researcher utilizes secondary data, then he has to look into various sources from where he can obtain them. In this case he is certainly not confronted with the problem that is usually associated with the collection of original data. Secondary data may either be published data or unpublished data, usually published data are available in:

a. Various publications of the central, state and local Government.

b. Various publications of foreign Government or of inter-national bodies and their subsidiary organizations.

c. Technical and trade journals.

d. Books, magazines and newspaper

e. Reports and publications of various associations connected with business and industry, banks and stock exchange etc.

f. Reports prepared by research scholars, universities, economists etc. in different fields and,

g. Public records and statistics, historical documents and other sources of unpublished information.

The source of unpublished data are many, they may be found in diaries, letters, unpublished biographic and autobiographic and also may be available with scholars/research workers, trade associations, labour bureaus as well as other public and private individuals and organizations.

Some other Methods of Data Collection:

Let us consider some other methods of data collection, particularly used in big business cases in modern times:

1. **Warranty Cards:**

   Warranty cards are usually postal sized cards which are used by dealers of consumer to collect information regarding their products. The information sought is printed in the form of questions on the warranty cards, which is placed inside the package along with the product with a request to the consumer to fill in the card and post it back to the dealer.

2. **Pantry Audits:**

   Pantry audits technique is used to estimate consumption of the basket of the goods at the consumer level. In this type of audit, the investigator collects an inventory of types, quantities and prices of commodities consumed. Thus in pantry audit data are recorded from the examination of consumer's pantry.

3. **Consumer Panels:**

   An extension of the pantry audit approach on a require basis is known as " consumer panel" where a set of consumers are arranged to come to an understanding to maintaining detailed daily records of their consumption and the same is made available to investigator on demands. In other words, a consumer panel is essentially a sample of consumers who are interviewed repeatedly over a period.

4. **Content Analysis:**

   Content analysis is a method of studying and analyzing communications in a systematic, objective and quantitative manner to measure variable. Most content analysis has not been done to measure variables, as such. Rather, It has been used to determine the relative emphasis or frequency of various communication, propaganda, trends, styles, changes in content readability. In fact, it is a method of analysis as well as observations.

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CHAPTER-9
SAMPLING AND SAMPLING ERROR

Sample Size and its determination/ steps/stages in sample size determination:-

In sampling analysis the most ticklish question is: What should be the size of the sample or how large or small should be 'n '? If the sample size ('n') is too small, it may not serve to achieve the objectives and if it is too large, we may incur huge cost and waste resources. As a general rule, one can say that the sample must be of an optimum size. Size of the sample should be determined by a researcher keeping in view the following points :

1. **Nature of Universe:**

For homogenous, a small sample and for heterogeneous, a large sample required. Technically, this can be termed as the dispersion factor.

2. Number of Classes Proposed:

If many class-groups (groups and sub-groups) are to be formed, a large sample would be required.

3. Nature of Study:

For intensively and continuously studied, the sample should be small. For a general survey the size of the sample should be large, but a small sample is considered appropriate in technical surveys.

4. Type of Sampling:

Need to selection of appropriate sampling techniques.

5. Standard of Accuracy and Acceptable Confidence Level:

If the standard of accuracy or the level of precision is to be kept high, we shall require relatively larger sample. For doubling the accuracy for a fixed significance level, the sample size has to be increased fourfold.

6. Availability of Finance:

7. Other Considerations:

Nature of units, size of the population, size of questionnaire, availability of trained investigators, the conditions under which the sample is being conducted.

SAMPLING METHODS

Population of Universe:

The well-specified and identifiable group is known as population or universe. A population may be:

a. Finite-All the members can easily by count.

b. Infinite-Size is unlimited and can't be counted.

Sample:

A sample is any number of persons selected to represent the population according to some rules or plan. Sample is a smaller representation of the population.

Most sampling methods can be categorized into two randomness: We say events are random if we cannot predict their outcomes.

Type of Sampling Methods:

A. Probability sampling methods- These can be classified as:-

a. Simple random sampling

b. Stratified random sampling: two types-

I. Proportionate Stratified random sampling
II. Dis-proportionate Stratified random sampling

c. Area or cluster sampling

(a) Simple Random Sampling (Unrestricted random sample):

In which each and every individual of the population has an equal chance of being included in the sample and no way dependent upon the selection of other person.

(1) Sampling with replacement

(2) Sampling without replacement.

Methods of drawing random sampling.

(1) Fish bowl draw method-like lottery

(2) Using table of random numbers- through random table.

(3) Method of computer determined randomness- when the size of the problem is long.

(b) Stratified Random Sampling:

In this method, the population is divided into two or more strata on some basis e.g. male of female or sex and graduation.

(c) Area or Cluster Sampling:

In this method, generally geographical division of territory, community, neighborhood, cities, status etc and mode on a map and a number of them is drawn at random.

B. Non-probability Sampling Methods

These may be classified as below:

a. Quota sampling
b. Accidental sampling
c. Purposive or judgment sampling
d. Systematic sampling
e. Snowball sampling
f. Saturation sampling/Dense sampling

(a) Quota Sampling

Quota sampling is one of the important types of non-probability sampling methods which are apparently similar to stratified random sampling. In quota sampling the investigator recognizes the different strata of population and from each stratum he selects the number of individuals arbitrarily.

(b) Accidental Sampling:

Accidental sampling, also known as incidental sampling is another popular method of non-probability sampling plan. It refers to sampling procedure in which the investigator selects the units according to his convenience. Here he does not care about including the units with some specific or designated trait; rather he is mainly guided by convenience and economy. This is a crude method of sampling, and the investigator knows that little can be generalized from the sample thus drawn.

(c) Purposive Sample:

Purposive sampling a kind of non-probability is one, which is based on the typicality of the cases to be included in the sample. The investigator has some belief that the sample being handpicked is typical of the population or is a very good representative of the population. A purposive sample is also known as a judgmental sample because the

investigator on the basis of his impression makes a judgment regarding the concerned cases, which are thought to be typical of the population. For studying attitudes towards any national issue, a sample of journalists, teachers and legislators may be taken as an example of purposive sample.

(d) Systematic Sampling:

Systematic sampling may be defined as drawing or selecting every n^{th} person from a predetermined list of elements or individuals. Selecting every 5^{th} roll number in a class of 60 students will constitute systematic sampling. Likewise, drawing every 8^{th} name from a telephone directory is an example of systematic sampling. If we pay attention to systematic sampling plan, it become obvious that such a plan possess certain characteristics of randomness (first elements selected is a random one) and at the same time, possesses some non-probability traits such as excluding all persons between every n^{th} element chosen.

(e) Snowball Sampling:

Snowball sampling, non-probability sampling method is basically socio metric. It is defined as having all the persons in a group or organization identified their friends who in turn identify their friends and associates until the researcher observes

(f) Saturation Sampling/Dense Sampling:

Coleman (1959) has emphasized these two types of sampling techniques, which are used less frequently as compared to other techniques of sampling. Saturation sampling is defined as drawing all elements or individuals having characteristics of interest to the investigator. Drawing all physicians having at least the age of 45 (From a small community), would be called saturation sampling. Dense sampling is a method of sampling which lies selects 50 percent or more from the population and takes a majority of individuals having specified traits or characteristics which are of interest to him, it is called dense sampling.

***Factors influencing decision to sample*:**

(a) Size of population

(b) Cost involved in obtaining the elements.

(c) Convenience and accessibility of the elements.

Sampling And Non-Sampling Error

Total Error/Error-

Total error can be defined as the variation between the mean value of population parameter and the observed mean value obtained in the research. Or

In survey research, error can be defined as any difference between the average values that were obtained through a study and the true average values of the population being targeted. or

Error describes how much the results of a study missed the mark.

The total error can be classified into two categories, i.e. sampling error and non-sampling error.

Sampling Error also known as Systematic Error or systematic bias or statistical error.

Sampling Error Definition-

Sampling error is one which occurs due to non-representativeness of the sample & inadequacy of sample selected for observation.

When researcher draws various sampling units from the same population but, the units may have individual variances. Moreover, they can also arise out of defective sample design, faulty demarcation of units, wrong choice of statistic, substitution of sampling unit done by the enumerator for their convenience. Therefore, it is considered as the deviation between true mean value for the original sample and the population.

Total Error=Sampling Error (Measurement Error) + Non sampling Error
Sampling Error=Frame Error+ Chance Error+ Response Error

Concept-

- When sample selected does not perfectly represent the population of interest.
- Sampling error completely related to the sampling design
- When sample selected does not contain the true characteristics/qualities of the whole population.
- Sampling error may be random or non-random error occurs when sample selected.

Control Measure-

- Sampling error decreases with increases in sampling size & vice versa.
- If more homogeneous the population then smaller the sampling error
- Sampling error can be minimized by avoiding systematic biases.
- Sampling error can be decreases by meticulous technique

Non-Sampling Error Definition-

Non-Sampling Error is an umbrella term which comprises of all the errors, other than the sampling error. They arise due to a number of reasons, i.e. error in problem identification, questionnaire design, approach, coverage, information provided by respondents, data preparation, collection, tabulation, and analysis etc. or

Concept-

1. Non-sampling error arises in both sampling and complete enumeration (Sample survey and population survey).
2. Non-sampling error is not related to the sample size.

Control Measure-

Non-sampling error is a basket that covers all the errors other than the sampling error and so, it unavoidable by nature as it is not possible to completely remove it.

There are two types of Non-sampling error-

a) Response Error-

Error arising due to inaccurate answers was given by respondents, or their answer is misinterpreted or recorded wrongly. It consists of researcher error, interviewer error, respondent error, poorly designed schedule error and measurement error and many others as surrogate error, data analysis error, inability error, unwillingness error, recording error and cheating error etc.

b) Non-Response Error:

Error arising due to some respondents who are a part of the sample, do not respond. This error is difficult to measure.

Systematic Biases-

Systematic biases- this is result from error in sampling procedure, and can not reduce or eliminated by increase in sampling size. Systematic bias (error) is part of sampling error. Systematic biases is result of one or more of followings-

1. Inappropriate sampling frame
2. Defective measuring device (schedule)
3. Indeterminacy principle: Sometimes we find that individuals act differently when kept under observation than what they do when kept in non-observed situations.

4. Natural bias in the reporting of data: There is usually a downward bias in the income data collected by government taxation department, whereas we find an upward bias in the income data collected by some social organization. People in general understate mate their incomes if asked about it for tax purposes but they overstate the same if asked for social status or their affluence

Control Measure

- Control measure- systematic biases can be identified and correct these only.

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CAPTER-10
CONSTRUCTION of HYPOTHESIS

Meaning of Hypothesis:

A hypothesis is a conjectural statement of the relation between two or more variables. Any scientific investigation starts with the statement of a solvable problem. When the problem has been stated, a tentative solution in the form of a testable proposition is offered by the investigator. This preposition is called a hypothesis.

"A hypothesis can be defined as a tentative explanation of the research problem, a possible outcome of the research, or an educated guess about the research outcome". Goode and Hatt have defined it as "a proposition which can be put to test to determine its validity". "Hypotheses are single tentative guesses, good hunches – assumed for use in devising theory or planning experiments intended to be given a direct experimental test when possible". A

Ä conjectural statement of the relation between two or more variables. Hypothesis are always in declarative sentence form, and they relate, either generally or specifically variables to variables.

-Kerlinger

Black and Champion (1976). Define a hypothesis as 'a tentative statement about something, the validity of which is usually unknown'

On the basis of these definitions two points can be suggested about a hypothesis:

First: A hypothesis is a testable statement, which means that it displays the relationship between those variable, which are measurable or potentially measurable.

Second: A hypothesis exhibits either a general or specific relationship between variables. A hypothesis is a tentative generalization, The validity of which remains to be tested. Goode and Hatt defined it as a proposition which can be put to test to determine validity.

Formulation of Hypothesis:

There are no precise rules for formulating hypothesis and deducing consequences but there are some difficulties that arise in formulating the hypothesis. However, there are certain necessary conditions that are conducive to their formulation. They are:

Richness of background knowledge: In the absence of knowledge concerning a subject matter, one can make no well founded judgement of relevant hypothesis. Background knowledge is essential for perceiving relationships among the variables and to determine what findings other researchers have reported on the problem under study.

New knowledge, new discoveries and new inventions should always form continuity with the already existing corpus of knowledge and therefore it becomes all the more essential to be well versed with the already existing knowledge

Hypothesis can be formulated correctly by persons who have rich experience and academic background, but they can never be formulated by those who have poor background knowledge.

Logical and Scientific approach: Formulation of proper hypothesis depends on one's experience and logical insight. Hypothesis does not have a clear cut and definite theoretical background. Partly, it is a matter of lifting upon an idea on some problem and it is not always possible to have complete information of, and acquaintance with the scientific methods for formulating hypothesis. This lack of scientific knowledge presents difficulty in formulation of hypothesis. A researcher may begin a study by selecting one of the theories in his own area of interest and deduce a hypothesis from this theory through logic which is possible only when the researcher has a proper understanding of the scientific method and has a versatile intellect. At times, conversations and consultations with colleagues and experts from different fields are also helpful in formulating important and useful hypothesis.

Concept-

1. Formulation of a research problem in quantitative research is the construction of hypothesis.
2. Hypotheses bring clarity, specificity and focus to a research problem, but are not essential for a study.
3. Within the context (study area) of a research study, you can construct as many hypotheses as you consider being/ to be appropriate.
4. The importance of hypotheses lies in their ability to bring direction, specificity and focus to a research study.
5. They tell a researcher what specific information to collect, and thereby provide greater focus.
6. They tell a researcher what specific information to collect, and thereby provide greater focus.
7. You could then design a study to collect the information needed to verify your hunch (Assumption).
8. Hypothesis should be 'uni-dimensional' – that is, it should test only one relationship or hunch at a time.

9. To be able to develop a good hypothesis you must be familiar with the subject area (the literature review is of immense help). The more insight you have into a problem, the easier it is to construct a hypothesis. For example:

I. "The average age of the male students in this class is higher than that of the female student" Here hypothesis is clear, specific and easy to test. It tells you what you are attempting to compare (average age of this class), which population groups are being compared (female and male students), and what you want to establish (higher average age of the male students). Other examples.

II. There is no significant difference in the proportion of male and female smokers in the study population.

III. A greater proportion of females than males are smokers in the study population.

IV. A total of 60 per cent of females and 30 per cent of males in the study population are smokers.

V. There are twice as many female smokers as male smokers in the study population.

10. Population or about the outcome of a programme, but you *do have a hunch* to form the basis of certain *assumptions or guesses*. You test these, mostly one by one, by collecting information that will enable you to conclude if your hunch was right. The verification process can have one of three outcomes. Your hunch may prove to be: right, partially right or wrong. Without this process of verification, you cannot conclude anything about the validity of your assumption.

11. Hence, a hypothesis is a hunch, assumption, suspicion, assertion or an idea about a phenomenon,

12. Relationship or situation, the reality or truth of which you do not know. A researcher calls these

13. Assumptions, assertions, statements or hunches hypotheses and they become the basis of an enquiry. In most studies the hypothesis will be based upon either previous studies or your own or someone else's observations.

Nature of Hypothesis:

The hypothesis is a clear statement of what is intended to be investigated. It should be specified before research is conducted and openly stated in reporting the results. This allows to:

- Identify the research objectives.
- Identify the key abstract concepts involved in the research.

- Identify its relationship to both the problem statement and the literature review.
- A problem cannot be scientifically solved unless it is reduced to hypothesis form.
- It is a powerful tool of advancement of knowledge, consistent with existing knowledge
- conducive to further enquiry.
- It can be tested – verifiable or falsifiable.
- Hypotheses are not moral or ethical questions.
- It is neither too specific nor to general.
- It is a prediction of consequences.
- It is considered valuable even if proven false.

Types of Hypothesis-

Hypothesis can be classified into several types but broadly two types-

1. Research hypothesis (Null hypothesis) –H0
2. Alternative hypothesis- H1

Testing of hypothesis- Two types in which type-

1. Type- I Error- **Rejection** of null hypothesis when it is **true**
2. Type- II Error- **Acceptance** of null hypothesis when it is **false**

Alternative hypothesis is usually the one which one wishes to prove and the null hypothesis is the one which one wishes to disprove. Type first error is more dangerous.

Classification of Hypothesis -

(A). **At the lowest level of abstraction**-are which at the state of existence of certain empirical uniformities. This is also called as common Sense Propositions without any justification. Ex. In Rural India the child marriage is very common and they get married at the age group of 15-20 years.

(B). **At relatively higher level of abstraction**-are hypothesis which are concerned with Complex Ideal type.

(C). **At the highest level of abstraction**. It is concerned with the relation amongt the analytical variables.

Source of Hypothesis-

A good hypothesis can only be derived from experience in research. Though hypothesis should precede the collection of data, but some degree of data collection,

literature review or a pilot study will help in the development and gradual refinement of the hypothesis. A researcher should have quality of an alert mind to derive a hypothesis and quality of critical mind of rejecting faulty hypothesis. The following sources can help the researcher in coming up with a good hypothesis:

1. Individual intension is source of hypothesis.

2. Insights for formulation of hypothesis.

3. Hypothesis arises from, findings of other studies (existing body of knowledge).

4. Hypothesis may be derived as deduction from the theoretical system.

5. The value orientation of the culture may provide the base for hypothesis.

Criteria for Good Hypothesis:

1. Hypotheses are statement about relation between variables.
2. Hypotheses carry clear implication for testing the stated relation.

Characteristics of a Good Hypothesis:

1. The hypothesis should be conceptually clear.
2. The hypothesis must be testable.
3. The hypothesis should be related with exhibiting body of theory and facts.
4. The hypothesis should be related with exhibiting body of theory and facts.
5. Hypothesis should be related to available scientific tools and techniques.
6. Hypothesis should be related to available scientific tools and techniques.
7. Hypothesis should be covered with other hypothesis of the same field.
8. Hypothesis should be simple.
9. Hypothesis should be specific.
10. Hypothesis should be capable of empirical test.

The Functions of a Hypothesis-

While some researchers believe that to conduct a study requires a hypothesis, having a hypothesis is not essential, as already mentioned. However, a hypothesis is

important in terms of bringing clarity to the research problem. Specifically, a hypothesis serves the following functions:

1. The formulation of a hypothesis forces you to precisely specify what you want to find out about, thus, bringing specificity and clarity to your study.
2. The specificity and clarity needed to construct a hypothesis ensure you only collect the information you need, thereby providing focus to your study. This also enhances the validity of your study as it ensures you are measuring what you set out to measure.
3. As it provides a focus, the construction of a hypothesis enhances objectivity in a study.
4. The testing of hypothesis y enable you to enables you to specifically conclude
5. What is true or what is false, thus, enabling you to contribute towards theory formulation.

Process of Hypothesis Testing- Testing in systematic methods from following steps (6)-

1. State the hypothesis of interest.
2. Determine the appropriate test statistics.
3. Specify the level of statistical significances.
4. Determine the decision rule for rejecting or not rejecting null hypothesis.
5. Collect data and perform needed conclusions.
6. Decide to reject or not to reject the null hypothesis.

Definition of Definition:

Definition is an explanation of the meanings of a word. It is an act or power of making definite and clear.

Concept:

Concept is a word that expresses an abstraction that formed by generalization to particular e.g. Aggression.

Conceptual Scheme:

Conceptual scheme is a set of concepts interrelated by hypothetical and theoretical prepositions.

Construct:

Construct is a concept with the additional meaning of having been created or appropriated for special/ specific purpose. e.g. mass, energy, hostility, introversion and achievement.

Theory:

A theory is a set of inter-related constructs (concepts) definition, propositions that present a systematic view of phenomena by specifying relations among variables with the purpose of explaining and predicting the phenomena.

(i) Theory is a set of preposition consisting of defined and inter-related constructs.

(ii) Theory set out the interrelationship among a set of variables (constructs)

(iii) Theory explains phenomena.

Problem:

An interrogative sentence or statement asks. There are three criteria of good problem and problem statements.

1. The problem should express a relation between two or more variables.
2. Problem should be stated clearly and un-ambiguously in question form.
3. Problem and problem statement should be such as to imply possibilities of empirical testing.

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CHAPTER-11
TESTING OF HYPOTHESIS

Concept of Sampling:-

Sampling is the process of selecting a few (a sample) from a bigger group to become the basic for estimating the prevalence of an unknown piece of information

1- Population:-

Can be finite and infinite. The population is finite if it consists of a fixed number of elements so that it is possible to enumerate in the totally. But, Infinite population is when; theoretical impossible to observe all the elements of population.

2- Sampling Frame:-

The elementary units or the group of cluster of such units may form the basis of sampling process in which case they are called as sampling units. A list containing all such sampling units is known as sampling frame. The sampling frame consists of a list of items from which the sample is to be drawn. For instance, one can use telephone directory as a frame for conducting opinion survey in a city. Whatever the frame may be it should be a good representative of the population.

3- Statistic(s) and Parameter(s):

A statistic is a characteristic of a sample, whereas a parameter is a characteristic of a population. Thus, when we work out certain measures such as mean, median, mode, etc., from samples, they are called statistics for they describe the characteristics of a sample. But when such measures describe the characteristics of a population, they are known as parameters. For example, the population means (μ) is a parameter, whereas the sample means (X) is a statistic. To obtain the estimate of a parameter from a statistic constitutes the prime objective of sampling analysis.

4- Sampling Error:

Sampling survey does imply the study of a small portion of population and as such there would naturally be a certain amount of inaccuracy in the information collected. This inaccuracy may be termed as sampling error or error variance. In other words, sampling errors are those errors which arise on account of sampling and they generally happen to be random variations (in case of random sampling) in the sample estimates around the true population values. It can be numerically described as under:

If universe is homogeneous; the smaller the sampling error and vice versa. Sample size decreases as the sample size increases and vice versa. Non-sampling error

come during the collecting actual information and such error occur in all survey (sample/population) but we have no way to measure of this error.

Sampling error = Frame error + Chance error + Response error

5-Precision:

Precision is a range within which the population average (or other parameters) will lie in accordance with reliability specified in the confidence level as a percentage of the estimate ± or as a numerical quantity. For example, if the estimate is Rs. 4000 and the precision desired is ± 4 per cent, then the true value will be not less than Rs. 3840 and not more than Rs. 4160. This is the range (Rs. 3840 to Rs. 4160) within which the true answer should lie. But if we desire that the estimate should not deviate from the actual value by more than Rs. 200 in either direction, in that case the range would be Rs. 3800 to Rs. 4200.

6-Confidence Level and Significance Level:

The confidence level or reliability is expected percentage of times that the actual value will fall within the stated precision limit. Thus, if we take a confidence level of 95 per cent, then we mean that there are 95 chances in 100 (or .95 in 1) that the sample results represent the true condition of the population within a specified precision range against five chances in 100 (or .05 in 1) that it does not.

Precision is the range within which the answer may vary and still be acceptable; confidence level indicates the likelihood that the answer will fall within that range, and the significance level indicated the likelihood that the answer will fall outside that range. It may be remembered that if the level of confidence in 95 per cent, then the significance level will be (100-95), i.e., 5 per cent, if the confidence level is 99 per cent, the significance level is (100-99), i.e., 1 per cent, and so on.

7-Sampling Distribution:-

We are often concerned with sampling distribution in sampling analysis. If we take certain number of samples and for each sample compute various statistical measures such as mean, standard deviation, etc., and then we can find that each sample may give its own value for the statistic under consideration. All such values of a particular statistic, say mean, together with their relative frequencies will constitute the sampling distribution of the particular statistic, say mean. Accordingly, we can have sampling distribution of mean, or the sampling distribution of standard deviation or the sampling distribution of any other statistical measure. It may be noted that each item in a sampling distribution is a particular statistic of a sample.

Errors in Testing of Hypothesis:

There are basically two types of errors we make in the context of testing of Hypothesis. These are called as Type-I error and the Type-II error. In type-I error, we may reject Null hypothesis when Null hypothesis is true. Type-II error is when we accept Null hypothesis when the Null Hypothesis is not true. In other words, Type-I error means rejection of hypothesis which should have been accepted and Type-II error means accepting the hypothesis which should have been rejected. Type-I error is denoted by alpha known as alpha error, also called the level of significance of test and Type-II error is denoted by beta known as beta error.

	Accept Null hypothesis	Reject Null hypothesis
Null hypothesis (true)	Correct decision	Type-I error (alpha error)
Null hypothesis (false)	Type-II error (beta error)	Correct decision

The probability of Type-I error is usually determined in advance and is understood as the level of significance of testing the hypothesis. If Type-I error is fixed at 5%, it means that there are about 5 chance in 100 that we will reject Null hypothesis when Null hypothesis is true. We can control Type-I error just by fixing at a lower level. For instance, if we fix it at 1%, we will say that the maximum probability of committing Type-I error would only be 0.01.

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CHAPTER-12
INTERPRETATION AND REPORT WRITING

Layout of Research Report-

A. Preliminary pages (Before introduction start)

B. Main text (from introduction to references)

C. End matter (Appendices)

Different steps in writing report-

i. Logical analysis of subject matter

ii. Preparation of final outlines

iii. Preparation of rough draft

iv. Rewriting and policing of rough draft

v. Preparation of final bibliography

vi. Writing of final draft

Types of report-

A. Technical report-

i. Summary of result

ii. Nature of study

iii. Methods employed

iv. Data

v. Analysis of data and presentation of findings

vi. Conclusions

vii. Bibliography

viii. Technical appendices

ix. Index

B. Popular report/popular articles-

i. The findings and their implications

ii. Recommendation of their action

iii. Objectifies of the study

iv. Methods employed

v. Results

vi. Technical appendices

C. Oral presentation-

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CHAPTER-13
SOCIAL RESEARCH & SOCIAL SURVEY

Social Research:

Meaning of Social Research: P.V. Young defined the social research as the systematic method of discovering new facts or verifying old facts, their sequences, inter relationships, causal explanations and the natural laws which govern them.

Basic Assumptions of Social Research:

1. Existence of cause and effect relationship.
2. Existence of sequence or law in social activities.
3. Possibility of detached study.
4. Existence of ideal types.
5. Possibility of a representative sample.

Subject Matter of Social Research:

Overall, the subject matter of social research may be classified into following three parts.

1. Fundamental research
2. Applied research
3. Quasi social research

1. Fundamental Research:

The researches, which deal with the fundamental principles of sociology. They may be conducted either for the verification of some old theory or establishment of a new one.

2. Applied Research:

Applied research deal with the possibilities of application of the results of fundamental research to social problem. It, therefore, deals with the social therapy or social engineering.

3. Quasi- social Research:

Social Sciences have many common boundaries among them. Naturally there are a large number of problems, which we may call as border ling problems. An applied research in psychological and socio anthropological researches come under this category.

Social Survey

Definition and meaning of Social Survey-

The term social survey indicates the study of social phenomenon through survey methods. Some of the definitions of social survey are as follows:

1. The survey is in brief, simply a method of analysis in scientific and orderly form for defined purpose of a given social situation or problem or population (H.N. Morse).
2. A social survey is a process by which quantitative facts are collected about the social aspect of community's compositions and activities.
3. A social survey is a fact finding study dealing chiefly with working class poverty and with the nature and problems of community.

Differences

Social Survey	Social Research
1. It is concerned with specific persons, specific problems & situations e.g. tribes, low lying area etc.	1. It is concerned with general and abstract problem e.g. effect of family environment upon delinquencies.
2. The object is to fulfill immediate needs and use of knowledge available at a given time. Thus it is practical in nature.	2. The object is long time research of broad prospective in order to develop more accurate procedures and theories. Thus, its primary aim is theoretical in nature.
3. The purpose is to improve the lot of men. Thus it is utilitarian in nature.	3. The purpose is to increase the general knowledge of man or improvement in the techniques of study. Thus it is purely scientific in nature.
4. It results in a social reform and administrative change or a remedial measure for removing immediate evils.	4. It results in formulation of new theories or discovery of new techniques of study or modification of old concepts.
5. It may form the basis of some hypothesis.	5. It develops the hypothesis and thus evolves a theory.
6. A hypothesis is not necessary for it. Generally, a social survey is best under taken without any hypothesis. The hypothesis may be the results of it.	6. A hypothesis is essential for proceeding on with the work of social research. The social research is mainly concerned with the testing of hypothesis thus formed.

7. It may be conducted on professional basis. Many surveys are conducted not for any interest in the topic but on payment from other invested parties e.g. the habit of newspaper reading opinion survey etc.	7. It is never conducted on professional basis, as no one stands to gain specially through such a type of study. Thirst for knowledge is the only incentive and its ultimate satisfaction is the only reward for a social scientists.

Objectives of social survey:

1. Supply of information on any problem
2. Description of phenomena
3. Explanation of phenomena

Subject matter of social survey:

1. Demographic characteristics
2. Social environments
3. Social activities
4. Opinion and activities

Types of social survey:

1. General and specific Survey
2. Regular and ad-hoc survey
3. Preliminary and final survey
4. Census and sample survey

Pilot studies and pretests:

Pilot studies and pretests are necessary measure for framing a perfect schedule. |A pilot study is undertaken before a schedule or questionnaire is drafted, a pretest is taken after it has been completed. Pilot study is the preliminary study of the universe in question to get an early idea about it. It may be under taken without any hypothesis or with provisional hypothesis. It gives an idea of different variables involved, nature or the problem, possible difficulties in interviewing, kind of response likely to be available etc.

When the schedule has been prepared, it is tested once again to find if any desire pencies have been left out. It is known as pretest.

Even after a theoretical preparation has been made some sort of trial survey is necessary to gain specific knowledge of the subject and get an idea of the various problems likely to be faced in the course of the survey. These trail survey are variously known as pilot study, pre-testing, test tube survey etc.

In pre-testing the same procedure is followed as it is to be adopted in actual survey. Every detail is to be followed with same precision. The number of cases to be included in the pilot study sample differs according to nature of survey. Generally, 10 or 20 cases are taken. Sometimes even 25 cases are considered enough.

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CHAPTER-14
RELIABILITY

Meaning Definition of reliability:

In its simplest sense, reliability refers to the precision or accuracy of the measurement or score. Well-made scientific instruments should yield accurate results both at present as well as over time. In other words, such an instrument should give consistent results. Reliability refers to this consistency of scores or measurement, which is reflect in the reproducibility of the scores. A test is said to be consistent over a given period of time when all the examinees retain their same relative ranks of two separate testing with the same test. A test is also said to be consistent (When administered once), if the examinees who obtain high scores on one set of items also score high on an equivalent set of items. Thus, reliability may be defined as the consistency of scores obtained from one set of measures to another. According to Anastai (1968), reliability refers to "The consistency of scores obtained by the same individuals when re-examined with test on different occasions or with different sets of equivalent items. Thus, reliability may be defined as the consistency of scores obtained from one set of measures to another.

Student should note that any test is neither perfectly reliable nor perfectly unreliable. Thus, reliability is not an absolute principle; rather, it is always a matter of degree.

Methods (or types) of reliability: There are three most common methods of estimating the reliability coefficient of test scores.

1. Test- retest reliability: In test-retest reliability the single form of the test is administered twice on the same sample with a reasonable time gap. In this way, two administrations of the same test yield the two independent set of scores. The two sets, when correlated, give the value of the reliability coefficient. The reliability coefficient thus obtained is also known as the temporal stability coefficient and indicates to what extent the examinees retain their relative position as measured in terms of the test score over a given period of time. A high test-retest reliability coefficient indicates that the examinee who obtains a low score on the first administration tends to score low on the second administration and its converse, when the examinee score low on the second administration and its converse, when the examinee scores high on the first administration, tends to score high on the second administration.

2. Internal consistency reliability: Internal consistency reliability indicates the homogeneity of the test. If all the items of the test measure the same function or trait, the test is said to be a homogeneous one and its internal consistency reliability would be pretty high. The most common method of estimating internal consistency reliability is the split-half method in which the test is divided into two equal or nearly equal halves. The common way of splitting the test is the odd-even method. Almost any split can be accepted except the first half of the items and the second half of the items.

The Flanagan formula for estimating reliability is very sililar to the Rulon formula. In the Flanagan formula, Variance of the score of odd numbered items and the real score of the even-numbered items are calculated separately and then, an estimate of error variance is made.

Thus, the Rulon formula and the Flanagan formula have yielded the same coefficient of reliability from the data of which automatically checks the accuracy of the computation. These two formulas are also applicable to the computation of reliability of the alternate-forms of the test. The advantage of these two formulas over the Spearman-Brown formula is that one need not calculate the reliability coefficient of the half-test scores.

3. **Alternate forms reliability:** Alternate forms reliability is known by various names such as the parallel-forms reliability, equivalent forms reliability and the comparable-forms reliability. Alternate-forms reliability requires that the test be developed in tow forms, which should be comparable or equivalent two forms of the test are administered to the same sample with the time interval of usually a fortnight. Pearson between two sets of scores obtained from two equivalent forms becomes the measures of reliability. Such a coefficient is known as the coefficient of equivalence.

Freeman (1962) has listed the following criteria for judging wheather or not the two forms of the test are parallel.

1. The number of items in both the forms should be the same.

2. Items in both the forms should have infirmity regarding the content, the rance of difficulty and the adequacy of sampling.

3. Distribution of the indexes of difficulty of items in both should be similar.

4. Items in both the forms should be of equal degree of homogeneity, which can be shown either by inter-item correlation or by correlating each item with sub test scores or with total test scores.

5. Means and standard deviations of both the forms should be equal.

6. Mode of administration and scoring of both the forms should be uniform.

Factors influencing reliability of test scores: The reliability of test scores is influenced by a large number of factors and all these factors can be categorized under two heads viz. Extrinsic and intrinsic. Extrinsic factors are those factors which lie outside the test itself and tend to make the test reliable or unreliable. Intrinsic factors, on the other hand, refer to those factors which lie within the test itself and influence the reliability of the test.

Extrinsic factors: Important extrinsic factors affecting the fallibility of a test may be enumerated as follows:

1. Group variability: When the group of examinees being tested is homogeneous in ability, the reliability of test scores is likely to be lowered. But when the examinees vary widely in their range of ability, that is, the group of examinees is a heterogeneous one,

the reliability of the test scores is likely to be high, The effect of variability on reliability can be examined by seeing what happens when variability is zero. In such an extreme case, all individuals receive the same score and therefore, standard deviation is zero.

2. Guessing by the examinees: Guessing in a test is an important source of unreliability. In two-alternative response options there is a 50 percent chance of answering the items correctly on the basis of the guess. In multiple-choice items the chances of getting the answer correct purely by guessing are reduced. Guessing has two important effects upon the total test scores. First, it tends to raise the total score and thereby makes the reliability coefficient spuriously high. Second, guessing contributes to the error score (or error or measurement) than to the true score. The higher the contribution to the error score, the lower is the reliability of the test.

3. Environmental Conditions: As far as possible, the testing environment should be uniform. Arrangement should be such that light, sound, and other comforts are equal and uniform to all the examinees, otherwise it will tend to lower the reliability of the test scores.

4. Momentary fluctuations in the examinee: Momentary fluctuations influence the test score sometimes by raising the score and sometimes by lowering it. Accordingly, they tend to affect the reliability. A broken pencil, momentary distraction by the sudden sound of an aero plane flying above, anxiety regarding non-completion of homework, mistake in giving the answer and knowing no way to change it, are some of the factors which explain momentary fluctuations in the examinee.

Intrinsic Factors:

1. Length of the test: A longer test tends to yield a higher reliability co- efficient than a shorter test. Lengthening the test or averaging total test scores obtained from several repetitions of the same test tends to increase the reliability. For example, suppose the test scores are being averaged after its three repeated applications and the test is lengthened three times the present length and administered once, then statistically the result of both averaging and lengthening will the same variance and the same inter-item correlations as items of the original test.

2. Range of the total scores: If the obtained total scores on the test are very close to each other, that is, if there is lesser variability among them, the reliability of the test is lowered. On the other hand if the total scores on the test vary widely, the reliability of the test is increased. Putting this in statistical terms, it can be said that when the standard deviation of the total scores is low, the reliability is also low.

3. Homogeneity of items: Homogeneity of items is an important factor in reliability. The concept of homogeneity of items includes two things item reliability (or inter-item correlation) and the homogeneity of function of trait measured from one item to another. When the items measure different functions and the inter co- relations of items are zero or near it (that is, when the test is heterogeneous one), the reliability is zero or very low. When all items measure the same function or trait and when the inter-item correlation is high, the reliability of the test is also high.

4. Difficulty value of items: In general, items having indexes of difficulty at 0.5 or close to it, yield higher reliability than items of extreme indexes of difficulty. In other words, when items are or too easy too difficult, the test yields very poor reliability (because such items do not contribute to the reliability).

5. Discrimination Value: When the test is composed of discriminating items, the item-total test correlation is likely to be high and then, the reliability is also likely to be high. But when items do not discriminate well between superior and inferior, that is, when items have poor discrimination values, the item-total correlation is affected, which ultimately fluctuates the reliability of the test.

6. Scorer reliability: Scorer reliability is also known as random reliability. By scorer reliability is meant how closely two or more scorer agree in scoring or rating the same set of responses. If they do not agree, the reliability is likely to be lowered.

Others Factors affecting the reliability of research instruments:-

i. The wording of questions

ii. The physical setting –

iii. The respondent's mood –

iv. The interviewer's mood

v. The nature of interaction

vi. The regression effect of an instrument –

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CHAPTER-15
VALIDITY

Meaning:

The term "Validity" means truth or fidelity. Thus, validity refers to the degree to which a test measure what is claims to measure. Validity is not the self correlation of the test; rather it is correlation with some outside independent criteria, which are regarded by experts as the best measure of the trait or ability being measured by the test.

According to Anastasi (1968) "The validity of a test concerns what the test measures and how well it does so".

According to Lindquist (1951): Validity of a test as the accuracy with which it measures that which is intended to measure or as the degree to which it approaches infallibility in measuring what it purports to measure.

Properties of the validity: Validity has three important properties:

1- A test is not generally valid. It is valid only for a particular purpose. For example a test of statistical ability will be valid only for measuring statistical ability because it is put only to the use of measuring that ability. It will be worthless for other uses like measuring the knowledge or geography, history etc.

2- Validity is not a fixed degree of the test because validation is not a fixed process, rather an unending process. The validity of a test computed in the beginning becomes less dependable and therefore, the test constructor should compute a fresh validity of the test in the light of the new meaning attached.

3- Validity, like reliability is matter of degree and not an all-or-none property. A test meant for measuring a particular trait or ability cannot be either perfectly valid or not valid at all.

Types of Validity:

There are three types of validity:

1. Content or curricular validity
2. Criterion related validity
3. Construct validity.

1. **Content or curricular validity:** Content validity is also designated by other terms such as intrinsic validity, relevance, curricular validity and representativeness. When

a test is constructed so that its content or term measures what the whole test claims to measure the test is said to have content or curricular validity. Thus, content validity is concerned with the relevance of the contents or the items individually and as a wholes.

Anastasi (1968) has said that content vaidity involves essentially the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured.

Psychometricians are of the view that content validity requires both item validity and sampling validity. Item validity is basically concerned with whether the test items represent measurement in the intended content area. Sampling validity concerned with the extent to which test samples of the total content area.

Content validity of a test is examined in two ways:

a. **By the expert's judgment:** Suppose the investigator wants to examine the content validity of a test on Indian history. For this purpose, the content (or items) of the test will be submitted to a group of subject matter experts. These experts will judge whether or not the items represent all the important events of Indian history, whether or not some additional items should be added for complete coverage, what should be the relative weights of the items of a particular event etc.

b. **By statistical analysis:** It may also be applied to ensure that all items measure the same thing, that is, a statistical test of internal consistency may provide evidence for the content validity.

The following points should be fully covered for ensuring full content validation of test:

(1) The area of content (or items) should be specified explicitly so that all major portions in equal proportion be adequately covered by the items.

(2) Before the item writing starts, the content area should be fully defined in clear words and must include the objectives. The factual knowledge and the application of principles and not just the subject matter.

(3) The relevance of contents or items should be established in the light of the examinees responses to those contents and not in the light of apparent relevance of the contents themselves.

Face Validity:

It is often confused with content validity, but in the strict sense it is quite different. Face validity refers not to what the test actually claims to measure but to what it

appears to measure superficially. Thus, face validity should not be taken in the technical sense, nor should it be regarded as substitute for objectively determined validity. When a test item looks valid to the group of examinee, the test is said to have face validity.

2. Criterion related validity:

Criterion related validity is a very common and popular type of test validity. As its name implies, criterion related validity is one which is obtained by comparing or correlating the test scores with the scores on a criterion available at present measure of essentially the same variable that the test claims to. There are two subtypes of criterion related validity.

a. **Predictive Validity:** Predictive validity is also designated as empirical validity or statistical validity. As its name implies in predicative validity a test is correlated against the criterion to be time gap (period) of months or years is allowed to lapse, after which the criterion scores are obtained. Subsequently, the test scores and the criterion scores are correlated and obtained correlation becomes the index of validity coefficient. Marshall and Hales (1972) have said "The predictive validity coefficient is a Pearson product moment correlation between the scores on the test and an appropriate criterion, where the criterion measure is obtained after the desired lapse of time."

b. **Concurrent Validity:** Concurrent validity is very similar to predicative validity except that there is no time gap in obtaining test scores and criterion scores. The test is correlate with a criterion which is available at the present time. Scores on newly constructed intelligence test may be correlated with scores obtained on an already standardized test of intelligence. The resulting coefficient of correlation will be on indicator of concurrent validity. It the correlation is too high, it will indicate that the new test is needles duplication of the previous one.

Concurrent validity can be determined by establishing relationship or discrimination. The relationship method is simple and it involved determination of the relationship between scorers on the test and scores on some other establishment criterion which are concurrently available. In this method, the steps involved are as follows:

(i) The test is administered to a defined group of individuals.

(ii) The criterion or previously established valid test is also administered to the same group of individuals.

(iii)Subsequently the two sets of scores are correlated.

(iv) The resulting coefficient indicates the concurrent validity of the test. It the coefficients is high, the test has good concurrent validity.

3. **Construct validity:** Construct validity is the third important type of validity. The term Construct validity 'was first introduced in 1954 in the Technical recommendations of the American Psychological Association and since then it has been frequently used by measured theorists.

Construct validation is a more complex and difficult process than content validation and criterion related validation. Hence, an investigator decides to compute construct validity any universe of content entirely satisfactory and adequate to define the quality of the test. In other words, construct validity is computed only when the scope for investigating criterion related validity or content validity is bleak. Construct validity has also been given other names such as factorial validity and trait validity.

Anastasi (1968) has defined it as the extent to which the test may be said to measure a theoretical construct or trait.

According to Nunally (1970) a construct indicates a hypothesis which tells us that, "A variety of behaviours will correlates with one another in studies of individual differences and or will be similarly affected by experimental treatments.

Factors effecting validity:

a- Length of the test

b- Range of ability (or sample heterogeneity)

c- Ambiguous directions

d- Socio cultural differences

e- Addition of inappropriate items.

General Relationship between Validity and reliability:-

1. A test is valid may or may not be reliable.
2. A test is not valid may or may not be reliable.
3. A test is reliable may or may not be valid.
4. A test is not reliable is never valid.
5. Validity is more important than reliability.
6. Reliability is necessary but not sufficient condition of test.

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CHAPTER-16
VARIABLES

Meaning of variables:

A variable, as the name implies, is something which varies. Variables may be defined as those attributes of objects, events, things and beings, which can be measured. In other words, variables are the characteristics or conditions that are manipulated, controlled or observed by the experimenter. Intelligence, anxiety, aptitude, income, education, authoritarianism, achievement etc. are the examples of variables commonly employed in psychology, sociology and education.

Classification of Variables:

A-Dependent Variables and Independent Variables

The dependent variable (D.V.) is defined as one, which the experimenter makes a prediction. The independent variables (IV) is defined as one which is manipulated, measured and selected by the experimenter for the purpose of producing observable on the basis of which the prediction about the D.V. is made. The occasional synonym of IV is controlled variable, which is rarely used because of its confusing nature with control variable. Underwood (1966) calls the IV as the stimulus variable and the D.V. as the response variables.

The independent variable (or the stimulus variable as Underwood calls it) may also be classified on the basis of the nature of the variables. Depending upon the nature of variable, the independent variables may be classified into three categories: task variables, environmental variables and subject variables.

a. Task Variables

The task variables refer to those characteristics which are associated with a behavioural task presented to the subject. It includes the physical characteristics of the apparatus as well as many features of the task procedures.

b. Environmental Variables

Environmental variables refer to those characteristics of the environment, which are not the physical parts of the task as such, but tend to produce changes in the behavioural measures. Noise, temperature, levels of illumination, and time of the day are examples of environmental variables.

c. Subject Variables:

Subject variables refer to those characteristics of the subject which are likely to produce changes in the behavioural measures. Sex, age, weight, anxiety, intelligence etc, are the characteristics of the subject (animals or human) which may be conveniently termed as subject variables.

B- Qualitative Variables and Quantitative Variables:

The qualitative variables refer to those variables which consist of categories that cannot be ordered in magnitude. Sex, race and religion are examples of qualitative variables because they cannot be ordered in magnitude. The quantitative variables refer to those variables which are composed of categories that can be ordered in magnitude. Intelligence age, levels of illumination, intensity of sound etc. are examples of quantitative variables.

C- Moderator Variables and Intervening Variables:

The moderate variables may be defined as those variables which are manipulated or selected by the experimenter because they are suspected to moderate the relationship of the independent variables with the dependent variable. For example, suppose the investigator wants to study the relative effectiveness of the lecture method and the demonstration method upon the class-room achievement. The interviewing variables are the variables, which theoretically exist and tend to influence the behavioural measure. Such variables cannot be seen and/or manipulate by the experimenter and their effect can be inferred from the effects of the independent variables as well as the moderator variables upon the dependent variables.

D- Active Variables and Attribute Variables:

A variable which is manipulated by the experimenter is the active variable and the variable which is not manipulated but measured by the experimenter is the attribute variable or organism variable. Examples of active variables are reward, punishment, methods of teaching etc. Some of the examples of attribute variables are age, sex intelligence, race, anxiety etc.

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CHAPTER-17
PARTICIPATORY RURAL APPRAISAL

Meaning:

Participatory Rural Appraisal (PRA) describes a range of techniques and approaches that are aimed at actively involving communities in identifying problems, formulating plants and implementing decisions.

PRA is both an attitude and a methodology. It helps the outsiders to understand the village system, dynamics and interactions by using various techniques as well as by methods of direct observation and discussion.

Why PRA -

- To avoid biases
- To promote people's participation
- To improve effectiveness and economy
- It is quick and gives result in short time
- It empowers the people in identifying their problems and solving them

Purpose of PRA-

- To understand the farmers' criteria and choices in identifying the problems and opting solutions.
- To know Indigenous Technical Knowledge (ITK)- the locally-evolved practices by the farmers with potential performance.
- For triangulation (verifying) of data gathered from different sources.
- To make self-critical analysis of problems and their solutions.

PRA Techniques:

PRA has become essential part of project preparation and its implementation in agricultural field. For undertaking PRA exercise in the village, some techniques are to be adopted by the PRA team.

1. Handing over the stick
2. Secondary data review.

3. Direct observations.
4. Semi-structured interview (SSI)
    i. Individual interview
    ii. Key informants interview
    iii. Group interview
    iv. Focused group interview

Operational Guidelines for Organizing PRA:

While going to village for PRA, the teams should follow the suggestions as given below to ensure participatory learning.

Before:

- Meet the villagers in informal atmosphere and tell them about yourself and purpose of coming.
- Build up personal report.
- Identify the willing participants who want to share their experiences.
- Set the climate.
- Select suitable commonplace where more and more people can participant in discussion.

During:

- Listen carefully
- Show empathy
- Be patient
- Be a careful observer
- Do not interrupt or suggest
- Be polite, gentle and accommodative.
- Try to understand villager's way of reasoning
- Try to follow local social customs
- Accept villagers' hospitality

- Avoid sensitive issues for discussion
- Don't deviate from the topic for long period
- Don't prolong the group interview unnecessarily
- Resolve the discussion around the main issue without blocking
- Ask open-ended questions with what, when, where, which, who, why, how to rephrase question
- Find out some people for focused group discussion

After

- At the end of the interview, thank the people individually
- Sit down with PRA team and record all the information collected

PRA tools:

The most commonly used PRA tools are discussed here for clear understanding of the tools and their use.

1. Participatory Mapping :

i) Social map is a diagram depicting village layout, roads, human habitation, schools, post office, temple, anganwadi centre, cattle, ownership of assets, etc.

ii) Resources map of a village shows mainly available natural resources such as topography, forest areas, degraded land, pastures, water resources, agricultural lands which are the major elements for overall development plan.

iii) This technique provides great scope for intervention: Further development and services are identified and marked on the map as perceived by the people. It also acts as the basis for identifying other social issues in a particular village.

2. Transect Walk:

A transect walk is an exploratory walk which is undertaken by a multidisciplinary team of scientists along with village people to observe, cross-check and critically examine and record minute details of a particular areas physically. At the site, villagers share their problems and discuss in detail with the team members. The team travels (visits) the area from north to south, east to west or from highest to lowest point.

The purpose is to get an idea about farming practices, cropping patterns, etc to get cross- sectional view of the village.

3. Time Line:

It is a method of visualizing key historical events and major changes perceived by the villagers e.g. flood, soil erosion, climate changes, culture etc.

The best informants are the old people of the village. It helps us to trace trends through history and study of nature of change.

4. Seasonality Analysis:

5. Matrix Ranking/Preference Ranking:

Method of ranking and scoring reveals priorities and preferences of the villagers. It provides opportunities to all the village people to value and rank the problems and prioritize themselves. Sometimes villagers also explain their reasons for giving preference. Matrix ranking is very useful to obtain precise information on relationship among different criteria. The purpose is to gain better understanding of farmers decision making process to identify criteria used to prioritize and select certain items or activities over others.

6. Venn Diagram:

This PRA tool is applied to represent the role of individuals/institutions and the degree of their importance in decision-making and their performance. In the diagram, the size and distance of circle from the centre indicate importance of facilities to the village. Overlapping of circle indicate their inter-relationship and interaction with another institution. Overlapping may be small or large as per extent of interaction. If the circles are separate, represent not contact and if they touch each other means that information is passing between institutions.

7. Wealth ranking:

Wealth ranking is a method in which village people jointly determine the relative wealth nests taking into account all assets, sources of income, and liabilities of an individual family. In this method, different socio-economic groups of household are identified including poorest of the poor and other groups. Criteria for rich or poor are determined by the village people themselves.

This tool enables the PRA team to categories the villagers, rich, middle class, poor and landless so that correct target groups of the village will become obvious.

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CHAPTER-18

Common variables & their measurements to assess the SES of Farmers

Meaning & scoring pattern of some important variables

Age: Age refers to the chronological age in number of years completed by the respondents at the time of investigation.

Education: Education of the respondents was judged from the level of education, number of years of formal education achieved by the respondents. The scores assigned to various levels of education were illiterate (O), can read only (1) can read and write (2) Primary (3) Junior high school (4) High School (5) Intermediate (6) Under graduate (7) and Post Graduate (8).

Caste: Caste of respondent was categorized into three sub-categories viz. SC/ST, OBC and general and scores were given as 1,2 and 3 respectively.

Type of Family: It was worked out on two types (1) single and (2) Joint. The scores assigned to family types were 1 for single and 2 for joint respectively.

Family Size: Size of family was grouped into three categories on the following basis and scores assigned to them accordingly: (1) Mean- S.D. (2) Mean $\pm$ S.D. (3) Mean + S.D.

Housing Pattern: To find out the housing pattern of the respondents, the house were categorized and scored as follows: Hut (1) Kuccha (2), Mixed (3) and Pucca (4).

Land Holding: Land holding was grouped into four categories viz. marginal (below 1 ha.), small (1.0-2.0 ha.), medium (2.0-3.0 ha.), medium large (3.0-4.0 ha.) and large (4.0 and above).

Occupation: The occupation of the respondent families was worked out on the basis of enterprise which contributes more than 50 percent share in total annual income as main and below that as subsidiary occupation. Occupation of the respondents families was categorized into following categories and scores assigned as given in brackets; Agriculture labour (1), Caste based occupation (2), Agriculture (3) Agro-based enterprise (4) Business (5) Service (6). For subsidiary occupation; the same scoring pattern was used.

Social Participation: For social participation of the respondents the various categories and scores assigned are given in brackets: No participation (0), Members of one

organization (1), Member of two organization (2) Member of more than two organizations/office bearer (3)

Annual Income: Annual Income of the respondents was calculated on money values with unit of rupees considering all the sources and grouped into categories on the basis of equal class interval.

Material Possession: The material possession of households was studied in terms of farm power, agricultural implements, household materials, transportation materials, communication materials.

Farm Power Possession: The materials included for the study were bullock (1) pumping set (2) Power tiller (3) electric motor (4) tractor (5) etc.

Agricultural Implements: The agriculture implements included for the study with their respective scores in parenthesis were desi plough, kudal, pata, mould board plough, leveller, sprayer, duster, winnower, chaff cutter, shavel (1 each) disc plough, cane crasher (2 each) and seed drill, thresher, cultivator (3 each)

Household Material Possession: Scores were assigned to various household materials viz. fan, cooler, heater, stove, pressure cooker, electric press, watch, chair, dining table, petromex, cots (1 each), double bed, dressing table, crockery, cylinder gas chulla, sewing machine, smokeless chulla (2each) and sofa set (3)

Transportation Materials: The score were assigned to various transportation sources like cycle (1), Bullock cart, Scooter Bike (2 each), tempo, Car, Jeep, Tractor Trolley (3 each) and Truck (4)

Communication Media Possession: The scores were assigned to various communication sources like news paper journals, agriculture magazine, agricultural books (1 each), Radio, tape recorder (2 each), Disc, T.V., V.C.R. VCD (4 each), Telephone and cell phone (3 each)

Extension Contact with Information Sources: To study the information sources utilization pattern (ISUP), informal, formal and mass media sources were included. So far as the contact of the respondents with each information source is concerned, the each source was measured on 7 points continuum viz. never, yearly, half yearly, quarterly, monthly, fortnightly, weekly and daily and 0, 1,2,3,4,5,6,7 scores were assigned to them respectively.

Sources: SES scale developed by Trivedi and Pareek (1969).

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CHAPTER-19
CASE STUDY, PROJECTIVE TECHNIQUES, CONTENT ANALYSIS

Case study:

Meaning of case study-

Case study is a method of exploring and analyzing of life of a social unit, be that a person, a family, an institution, cultural group or even entire community.

Case study is a way of organizing social data so as to preserve the unitary character of the social object being studied expressed somewhat differently. It is an approach, which views any social unit as a whole.

P.V. Young

Importance of case study:

1. Case study helps in formulating valid hypothesis, when various case are thoroughly studied and carefully analyzed, the researcher can arrive at various generalization, which may be developed into useful hypothesis. In fact, study of relevant literature and case study are the only two important sources of hypothesis.
2. Case study is useful in framing questionnaire, schedule or other forms.
3. Case study is helpful in stratification of the sample by studying the individual units thoroughly we can put them in definite classes or types.
4. It is possible to locate deviant cases. Deviant cases are those units that behave against the proposed hypothesis. A general tendency is to ignore them, but for scientific analysis, they are very important, the analysis of such cases may lead to a lot of clarification of theory itself.
5. Where the problem under study forms a process rather than one incident e.g. courtship process, clique formation etc, case study is the suitable method. The case data is essential for valid study of such problems.

Case study and statistical methods-

1. Case history depends upon narrative type description of life situations, while statistical method tries to measure them quantitatively. Thus, statistical methods are more structured and formal while the case study has a lot of free scope of description.

2. Case study takes into consideration comparatively fewer cases and aims at more intensive study. The statistical method on the other hand believes in inertia of large number.

3. Case studies are intensive in nature. The number of cases is limited, but the aspects of life to be studied cover a very wide range. Statistical studies are extensive in nature. They include a large number of cases but study one or two aspects only.

Basic Assumptions:

1. **Totality of the being:** The first fundamental assumption of case study is that a unit is individual whole and cannot be studied piecemeal and in fragments. In order to study the behavior of an individual at any particular time it is not enough to study his situation at the particular time alone.

2. **Underlying unity:** The other assumption is that in the face of apparent diversity among different units there is an underlying unity. A particular unit has its uniqueness but it is not different from other units in all respects.

3. **Complexity of social phenomena:** Social phenomena are not only a total whole it is very complex also. A greater part of man's life is subjective, unknown and incapable of observation, the understanding of human nature and his action.

4. **Influence of time:** Social phenomena are influenced by time also. In order to find out the real motives behind any action, we have to study the problem in its historical perspective. Without the knowledge of the past history the study would remain incomplete and would yield results that would be untrue.

Sources of case data:

Personal documents: Diaries, autobiography, memories, letters etc.

Life history: Life history is the study of various events of respondent's life together with attempt to find their social significance. It is in this way that life history differs from the pure historical narrative of facts.

Limitations of case study method

- Generalizations are drawn from few cases, thus, what the researcher thinks to be the common trait of human nature may be personal peculiarity of the subject and therefore applicable to particular person under particular circumstances.

- The method is quite loose and unsystematic. No controls are exercised upon the informer and researcher. The data collected in this way is generally incapable of verification and the generalizations drawn from it are also not very accurate.

- The time and money needed for case study is much greater than in other methods. Even if 100 cases are studied under this method, it may very well take nearly two years.

Improvement of case study method

- The subject must be viewed as a specimen in a cultural series.
- The organic matters of action ascribed should be socially relevant.
- The peculiar role of family group in transmitting the culture must be recognized.
- The specific method of elaboration of organic materials into social behavior must be shown.
- The continuous related character of experience from childhood through adulthood must be stressed.
- The social situation must be carefully and continuously specified as a factor.
- The life history material must itself be organized and conceptualized.

PROJECTIVE TECHNIQUES

Meaning of projective techniques: Values, attitudes, needs and wishes as well as impulses and motives are projected upon objects and behavior outside the individual e.g. a hungry man may invest inedible objects with food properties.

Characteristics of Projective Techniques:

- It should be possible to study men's motives, emotions, values, attitudes and needs by somehow getting to project these internal states onto external objects.
- A basic principle is that the more unstructured and ambiguous a stimulus, the more a subject can and will project his emotions, needs, motives, attitudes and values. The structure of a stimulus of least from one important point of view is the degree of choice available to the subjects.
- Another important characteristic of projective methods is their relative lack of objectivity.
- Recall that one of the powerful advantages of objective method is that different observers agree on the scoring of responses.
- Projective tests and measures require large inferential leaps indeed, longer than those of other methods. Thus, their reliability and validity are difficult problems.

- A significant virtue of projection and projective method is that almost anything can be used as a stimulus.
- The principles of projection can be used in many other ways; drawing pictures, writing essays, using finger paints, playing with dolls & toys, role playing, hand writing, telling stories in response to vague stimuli, associating words to other words interpreting music etc.

Classification of Projective Techniques

Lind zey classified based on the types of response.

(1) Association techniques: These techniques require the subject to respond at the presentation of stimulus with the first thing that comes to mind.

a. Rorschach test: These individual is asked by a highly skilled examiner to respond to ten ink blots of varying shapes & colours.

b. Word association methods: Are more premising. Emotionally tinged words are included with natural words. (Getzels & Jackson).

(2) Construction techniques: Here the focus is on the product of the object. The subject is required to produce, to construct, something at direction usually a story or a picture.

* Simple stimulus: Like asking children to tell a story about what happen to them yesterday.

* Complex stimulus: Thematic Apperception Test (TAT) is some sort of standard stimulus is used.

(3) Completion technique: Schmuck measured the attitude of school children towards school by having them complete sentence like studying is ..... This school ..... Others: such as story completion, discussion completion etc.

(4) Choice or ordering techniques: These methods require simple responses. The subject chooses from among several alternatives, as in a multiple- choice item test, the item or choice that appears most relevant correct, attractive and strong eg. set of picture, set of sentence.

(5) Expressive techniques: Expressive projective techniques are similar to construction techniques, the subject is required to form some sort of product out of raw material. But the emphasis is on the manner in which he does this- the end product is not important with the construction methods, the content and perhaps the style, of the story or other product are analyzed, with say finger painting or play therapy. It is the process of the activity and not the end product that is important. The subject

expresses his needs, desires, emotions and motives through working with manipulating and interacting with materials including other people, in a manner or style that uniquely expresses his personality.

Ex- The principal expressive methods are play, drawing, painting, finger painting & role playing. Finger painting is a partiality rich expressive method. The subject is given pots of a special type of paint and told to draw what he likes with the paints using his fingers and hands.

CONTENT ANALYSIS

Meaning:

Content analysis is a method of studying and analyzing communications in a systematic, objective and quantitative manner to measure variables. Most content analysis has not been done to measure variables, as such. Rather, it has been used to determine the relative emphasis or frequency of various communication, phenomena, propaganda, trends, styles, changes in content readability. In fact, it is a method to analysis as well as observation.

Some Aspects of Method in Content Analysis:

a. **Definition and categorization of universe:** Breaking of universe into categories and a number of sub categories.

b. **Units of analysis:** Berelson list out four major units of analysis (i) The words (ii) The themes, (iii) The items and (iv) The characteristics, space and time measures.

(i) The word-the word is the smallest unit. eg.

- ❖ Value words (Good)
- ❖ Non value words (Bad)
- ❖ Difficult, medium, easy words

(ii) The theme- A theme is often a sentence, a preposition about something.

- ❖ Self reference- I, we
- ❖ Descriptive- Child training

(iii) The items- Item unit is important- an essay, news story, T.V. programme, class recitation or discussion

(iv) Character, space and time measures- are probably not too useful in behavioural research, (Story of individual character, number of pages, paragraphs, number of minutes of discussion and so on.)

c- Quantification: All materials are potentially quantifiable.

(i) Nominal measurement- name may be given.

(ii) Ordinal Ranking or measurement- order can be made.

(iii) Interval measurement- interval can be used.

(iv) Rating- Children composition can be rate as a whole for degrees of creativity, originally, inter direction and other direction, achievement orientation, interests, value, nature and other variables.

General enquirer: The computer and content analysis:- Large Quantities is a set of computer programmes geared to the content and statistical analysis of verbal materials so generalized that it can be applied to variety of research problems.

The basis of the system is the dictionary which is a large set of words (short phrases) each words being defined by tags or categories. Pronouns like I, me and mine are tagged 'self' and army, church as well as administration are tagged large group. These are called first order tags. They represent the common or manifest meaning or the dictionary words.

The second order tags- they represent the connotative meaning of words, status connotation and institutional contexts.

The use of content analysis and available materials in behavioral research:

i. A large number of variables can be measured through content analysis of both available materials and deliberately created materials of projective kind-needs, values, attitude, stereo types, authoritarianism, creativity and so on.

ii. Education has suffered from a lack of analysis of the educational information people absorb from the press and other media of public communication, news articles, editorials special features etc.

iii. Newspaper, editorials, magazines, T.V. can be content analysed.

iv. Education experiment- It may be possible to use content analysis to assess the effects of experiment treatment on dependent variables.

v. Content analysis can be used to validate other methods of observation and measurement.

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