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DIRECTORATE OF DISTANCE EDUCATION

RESEARCH METHODOLOGY

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Directorate of Distance Education
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Directorate of Distance Education

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SYLLABUS

Research Methodology

Objectives: The general objective of this course is to introduce students to methods of research. The specific objectives are: To develop understanding of the fundamental theoretical ideas and logic of research; To develop understanding of the issues involved in planning, designing, executing, evaluating and reporting research; To introduce students to many of the technical aspects of how to do empirical research using some of the main data collection and analysis techniques.

Sr. No.	Description
1.	**An Introduction to Research:** Meaning, Process, Defining, Research Problem: Selection, Understanding, Necessity of defined Problem, Research Design, Need and Types of Research Design.
2.	**Sampling Design:** Steps of Sampling Design, Characteristics of Good Sampling Design, Different types of Sampling Design.
3.	**Measurement and Scaling Technique:** Tools of Sound Measurement, Techniques of Developing Measurement Tools, Scaling meaning and Important Scaling Techniques
4.	**Data Collection:** Primary (Interview, Observation and Questionnaire and Collection of Secondary Data).
5.	**Data Analysis:** Measure for Central Tendency, Dispersion, Correlation and Regression Analysis, Time Series and Index Number.
6.	**Hypothesis Testing:** Hypothesis Definition and Formulation, t test, z test, ANOVA
7.	**Multivariate Analysis:** Classification, Important Methods of Factor Analysis, Factor Analysis, Rotation in Factor Analysis, Overview of Cluster Analysis, Discriminant Analysis, Multi Dimensional Scaling, Conjoint Analysis.
8.	**Report Writing:** Technique and Precaution of Interpretation, Significance of Report Writing, Layout and Types of Report.

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Unit 1: Introduction to Research

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Objectives

After studying this unit, you will be able to:

- Recognize the meaning and objectives of research
- Define research in the expression of different authors
- Generalize the Process of research
- Differentiate between different types of research

Introduction

Research means technical and organized search for relevant information on a particular topic. It is defined as an academic activity that involves identifying the research problem, formulating a hypothesis, collecting and analyzing data and reaching specific conclusions in the form of solutions or general theories. The primary objective of research is to find solutions for problems in a methodical and systematic way. A research depends on the field in which the research work is performed. Various types of researches can be done for different fields, like fundamental research for identifying the important principles of the research field and applied research for solving an immediate problem. However, all these researches primarily follow two approaches, quantitative and qualitative. The quantitative approach focuses on the quantity of the data obtained from the research, while the qualitative approach is concerned with the quality of the obtained data.

1.1 Meaning of Business Research

Business research is a systematic and objective process of gathering, recording and analyzing data for aid in making business decisions. Business research comes within the purview of social science research. Social science research refers to research conducted by social scientists (primarily within sociology and social psychology), but also within other disciplines such as social policy, human geography, political science, social anthropology and education. Sociologists and other social scientists study diverse things: from census data on hundreds of thousands of human beings, through the in-depth analysis of the life of a single important person to monitoring what is happening on a street today-or what was happening a few hundred years ago.

Social scientists use many different methods in order to describe, explore and understand social life. Social methods can generally be subdivided into two broad categories. Quantitative methods are concerned with attempts to quantify social phenomena and collect and analyze numerical data, and focus on the links among a smaller number of attributes across many cases. Qualitative methods, on the other hand, emphasize personal experiences and interpretation over quantification, are more concerned with understanding the meaning of social phenomena and focus on links among a larger number of attributes across relatively few cases. While very different in many aspects, both qualitative and quantitative approaches involve a systematic interaction between theories and data.

1.1.1 Research Objectives

Research in common man's language refers to "search for Knowledge".

Research is an art of scientific investigation. It is also a systematic design, collection, analysis and reporting the findings & solutions for the marketing problem of a company. Research is required because of the following reasons:

Notes

1. To identify and find solutions to the problems
2. To help making decisions
3. To develop new concepts
4. To find alternate strategies

1. ***To Identify and Find Solutions to the Problem:*** To understand the problem in depth

Example: "Why is that demand for a product is falling"? "Why is there a business fluctuation once in three years"? By identifying the problem as above, it is easy to collect the relevant data to solve the problem.

2. ***To Help making Decisions:***

Example: Should we maintain the advertising budget same as last year? Research will answer this question.

3. ***To Find Alternative Strategies:*** Should we follow pull strategy or push strategy to promote the product.
4. ***To Develop New Concepts:***

Example: CRM, Horizontal Marketing, MLM, etc.

1.1.2 Marketing Research

Marketing research is an important part of overall business research. Systematic collection and analysis of data relating to sale and distribution of financial products and services is called marketing research. Market research is an early step in the marketing process, and includes an analysis of market demand for a new product, or for existing products, as well as appropriate methods of distributing those products. Techniques in market research include telephone polling and focus group interviews to determine customer attitudes, pricing sensitivity, and willingness to use delivery alternatives. Marketing research, or market research, is a form of business research and is generally divided into two categories: consumer market research and business-to-business (B2B) market research, which was previously known as industrial marketing research. Consumer marketing research studies the buying habits of individual people while business-to-business marketing research investigates the markets for products sold by one business to another.

Did u know? Most large banks have their own market research departments that evaluate not only products, but their Brick and Mortar branch banking networks through which most banking products are sold.

Self Assessment

Fill in the blanks:

1. Business research comes within the purview of ..... research.
2. ..... Market research, which was previously known as industrial marketing research.

Notes

3. ..... methods are concerned with attempts to quantify social phenomena and collect and analyse numerical data.

1.2 Defining Research

Various authors and management gurus have defined research in different ways. Usually a research is said to begin with a question or a problem. The purpose of research is to find solutions through the application of systematic and scientific methods. Thus, research is a systematic approach to purposeful investigation. Some of the proposed definitions of research are:

According to Redman and Mory, research is a systematised effort to gain new knowledge.

According to Clifford Woody, research comprises defining and redefining problems, formulating hypotheses or suggesting solutions; collecting, organising and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions to determine whether they agree with the formulated hypothesis or not.

D. Slesinger and M. Stephenson in the Encyclopedia of Social Sciences define research as: 'the manipulation of things, concepts or symbols for the purpose of generalising to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art.'

Self Assessment

Fill in the blanks:

4. The purpose of research is to find solutions through the application of ..... and ..... methods.
5. Research is a systematised effort to gain .....
6. Research is a systematic approach to ..... investigation.

1.3 Research Process

Until the sixteenth century, human inquiry was primarily based on introspection. The way to know things was to turn inward and use logic to seek the truth. This paradigm had endured for a millennium and was a well-established conceptual framework for understanding the world. The seeker of knowledge was an integral part of the inquiry process. A profound change occurred during the sixteenth and seventeenth centuries. The Scientific Revolution was born. Objectivity became a critical component of the new scientific method. The investigator was an observer, rather than a participant in the inquiry process. A mechanistic view of the universe evolved. We believed that we could understand the whole by performing an examination of the individual parts. Experimentation and deduction became the tools of the scholar. For two hundred years, the new paradigm slowly evolved to become part of the reality framework of society.

The research process is a step-by-step process of developing a research paper. As you progress from one step to the next, it is commonly necessary to backup, revise, add additional material or even change your topic completely. This will depend on what you discover during your research. There are many reasons for adjusting your plan. For example, you may find that your topic is too broad and needs to be narrowed, sufficient information resources may not be available, what you learn may not support your thesis, or the size of the project does not fit the requirements.

Notes

Notes The research process itself involves identifying, locating, assessing, analyzing, and then developing and expressing your ideas. These are the same skills you will need outside the academic world when you write a report or proposal for your boss.

There are nine steps in the research process, that can be followed while designing a research project. They are as follows:

1. Formulate the problem
2. Evaluate the cost of research
3. Prepare the list of information
4. Research design decision
5. Data collection
6. Select the sample type
7. Determine the sample size
8. Organize the field work
9. Analyze the data and report preparation

Defining the research problem and formulation of hypothesis are the hardest steps in the research process.

1.3.1 Problem Formulation

Problem formulation is the key to research process. For a researcher, problem formulation means converting the management problem to a research problem. In order to attain clarity, the MR manager and researcher must articulate clearly so that perfect understanding of each others is achieved.

While problem is being formulated, the following should be taken into account:

1. Determine the objective of the study
2. Consider various environment factors
3. Nature of the problem
4. State the alternative

1. ***Determine the objective:*** Objective may be general or specific. General - Would like to know, how effective was the advertising campaign.

   The above looks like a statement with objective. In reality, it is far from it. There are two ways of finding out the objectives precisely. (a) The researcher should clarify with the MR manager "What effective means". Does effective mean, awareness or does it refer to sales increase or does it mean, it has improved the knowledge of the audience, or the perception of audience about the product. In each of the above circumstances, the questions to be asked from audience varies (b) Another way to find objectives is to find out from the MR Manager, "What action will be taken, given the specified outcome of the study."

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Example: If research finding is that, the previous advertisement by the company was indeed ineffective, what course of action the company intends to take (a) Increase the budget for the next Ad (b) Use different appeal (c) Change the media (d) Go to a new agency.

Caution: If objectives are proper, research questions will be precise. However we should remember that objectives, do undergo a change.

2. ***Consider environmental factors:*** Environmental factors influence the outcome of the research and the decision. Therefore, the researcher must help the client to identify the environmental factors that are relevant.

Example: Assume that the company wants to introduce a new product like Iced tea or frozen green peas or ready to eat chapathis.

The following are the environmental factors to be considered:

(a) Purchasing habit of consumers.

(b) Presently, who are the other competitors in the market with same or similar product.

(c) What is the perception of the people about the other products of the company, with respect to price, image of the company.

(d) Size of the market and target audience.

All the above factors could influence the decision. Therefore researcher must work very closely with his client.

3. ***Nature of the problem:*** By understanding the nature of the problem, the researcher can collect relevant data and help suggesting a suitable solution. Every problem is related to either one or more variable. Before starting the data collection, a preliminary investigation of the problem is necessary, for better understanding of the problem. Initial investigation could be, by using focus group of consumers or sales representatives.

If focus group is carried out with consumers, some of the following question will help the researcher to understand the problem better:

(a) Did the customer ever included this company's product in his mental map?

(b) If the customer is not buying the companies product, the reasons for the same.

(c) Why did the customer go to the competitor?

(d) Is the researcher contacting the right target audience?

4. ***State the alternatives:*** It is better for the researcher to generate as many alternatives as possible during problem formulation hypothesis.

Example: Whether to introduce a Sachet form of packaging with a view to increase sales. The hypothesis will state that, acceptance of the sachet by the customer will increase the sales by 20%. Thereafter, the test marketing will be conducted before deciding whether to introduce sachet or not. Therefore for every alternative, a hypothesis is to be developed.

1.3.2 Evaluate the Cost of Research

There are several methods to establish the value of research. Some of them are (1) Bayesian approach (2) Simple saving method (3) Return on investment (4) Cost benefit approach etc.

Notes

Example: Company 'X' wants to launch a product. The company's intuitive feeling is that, the product failure possibilities is 35%. However, if research is conducted and appropriate data is gathered, the chances of failure can be reduced to 30%. Company also has calculated, that the loss would be ₹ 3,00,000 if product fails. The company has received a quote from MR agency. The cost of research is ₹ 75,000. The question is "Should the company spend this money to conduct research?"

Solution:

$$\text{Loss without research} = 3,00,000 \times 0.35$$

$$= ₹\ 1,05,000$$

$$\text{Loss with research} = 3,00,000 \times 0.30$$

$$= ₹\ 90,000$$

$$\text{Value of research information} = 1,05,000 - 90,000$$

$$= ₹\ 15,000$$

Since the value of information namely ₹ 15000 is lower than the cost of research ₹ 75,000, conducting research is not recommended.

1.3.3 Preparing a List of Needed Information

Assume that company 'X' wants to introduce a new product (Tea powder). Before introducing it, the product has to be test marketed. The company needs to know the extent of competition, price and quality acceptance from the market. In this context, following are the list of information required.

1. ***Total demand and company sales:***

Example: What is the overall industry demand? What is the share of the competitor? The above information will help the management to estimate overall share and its own shares, in the market.

2. ***Distribution coverage:***

Example:

(a) Availability of products at different outlets.

(b) Effect of shelf display on sales.

3. ***Market awareness, attitude and usage:***

Example: "What percentage of target population are aware of firm's product"? "Do customers know about the product"? "What is the customers' attitude towards the product"? "What percentage of customers repurchased the product"?

4. ***Marketing expenditure:***

Example: "What has been the marketing expenditure"? "How much was spent on promotion"?

Notes

5. ***Competitors marketing expenditure:***

Example: "How much competitor spent, to market a similar product"?

1.3.4 Decision on Research Design

1. Should the research be exploratory or conclusive?

   Exploratory research:

Example: "Causes for decline in sales of a specific company's product in a specific territory under a specific salesman".

The researcher may explore all possibilities why sales in falling?

(a) Faulty product planning

(b) Higher price

(c) Less discount

(d) Less availability

(e) Inefficient advertising/salesmanship

(f) Poor quality of salesmanship

(g) less awareness

Not all factors are responsible for decline in sales.

Conclusive research: Narrow down the option. Only one or two factors are responsible for decline in sales. Therefore zero down, and use judgment and past experience.

2. Who should be interviewed for collecting data?

   If the study is undertaken to determine whether, children influence the brand, for ready - to eat cereal (corn flakes) purchased by their parents. The researcher must decide, if only adults are to be studied or children are also to be included. The researcher must decide if data is to be collected by observation method or by interviewing. If interviewed, "Is it a personal interview or telephonic interview or questionnaire?"

3. Should a few cases be studied or choose a large sample?

   The researcher may feel that, there are some cases available which are identical and similar in nature. He may decide to use these cases for formulating the initial hypothesis. If suitable cases are not available, then the researcher may decide to choose a large sample.

4. How to incorporate experiment in research?

   If it is an experiment, "Where and when measurement should take place?", should be decided.

Example: In a test of advertising copy, the respondents can first be interviewed to measure their present awareness, and their attitudes towards certain brands. Then, they can be shown a pilot version of the proposed advertisement copy, following this, their attitude also is to be measured once again, to see if the proposed copy had any effect on them.

If it is a questionnaire, (a) What are the contents of the questionnaire? (b) What type of questions to be asked? Like pointed questions, general questions etc. (c) In what sequence should it be

Notes

asked? (d) Should there be a fixed set of alternatives or should it be open ended. (e) Should the purpose be made clear to the respondents or should it be disguised are to be determined well in advance.

Task Prepare a questionnaire to find if the consumers appreciate your new product as compared to the older ones or not.

1.3.5 Select the Sample Types

The first task is to carefully select "What groups of people or stores are to be sampled". For example, collecting the data from a fast food chain. Here, it is necessary to define what is meant by fast food chain. Also precise geographical location should be mentioned.

Next step is to decide whether to choose probability sampling or non-probability sampling. Probability sampling is one, in which each element has a known chance of being selected.

Notes A non-probability sampling can be convenience or judgment sampling.

1.3.6 Determine the Sample Size

Smaller the sample size, larger the error, vice versa.

Sample size depends up on (a) Accuracy required (b) Time available (c) Cost involved.

Sample size depends on the size of the sample frame/universe. Example: Survey on the attitudes towards the use of shampoo with reference to a specific brand, where husbands, wives or combination of all of them are to be surveyed or a specific segment is to be surveyed.

Caution While selecting the sample, the sample unit has to be clearly specified

1.3.7 Organize the Fieldwork

This includes selection, training and evaluating the field sales force to collect the data

(a) How to analyzing the field work?

(b) What type of questionnaire - structured/unstructured to use?

(c) How to approach the respondents?

(d) Week, day and time to meet the specific respondents etc., are to be decided.

1.3.8 Analyze the Data and Report Preparation

This involves (a) Editing, (b) Tabulating, (c) Codifying etc.

1. The data collected should be scanned, to make sure that it is complete and all the instructions are followed. This process is called editing. Once these forms have been edited, they must be coded.
2. Coding means, assigning numbers to each of the answers, so that they can be analyzed.

Notes

3. The final step is called as data tabulation. It is the orderly arrangement of the data in a tabular form. Also at the time of analyzing the data, the statistical tests to be used must be finalized such as T-Test, Z-test, Chi-square Test, ANOVA, etc.

Self Assessment

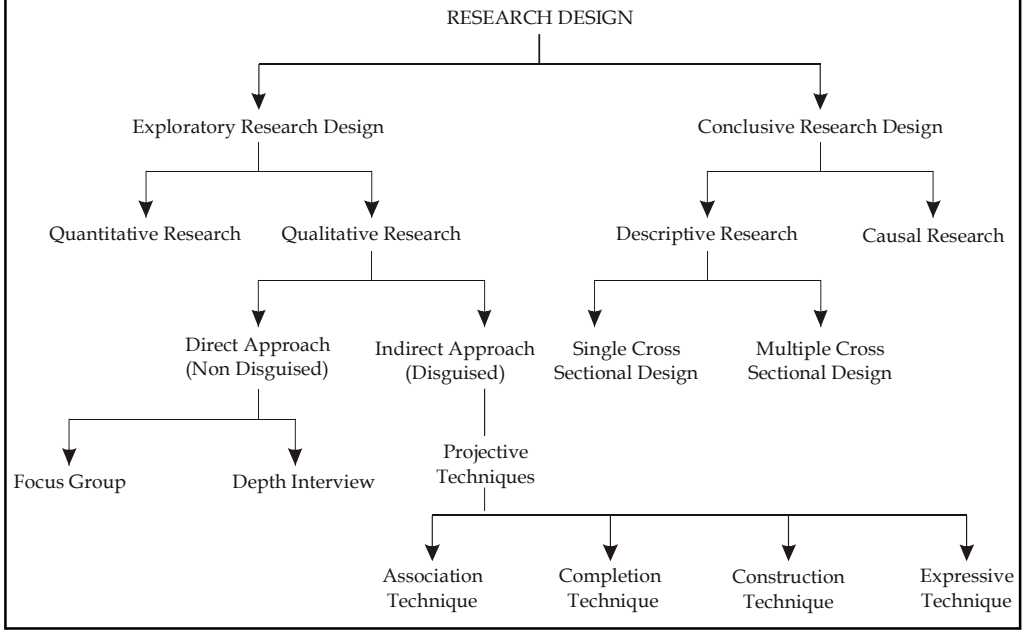
Fill in the blanks:

7. ..... is the orderly arrangement of the data in a tabular form.
8. While selecting the sample, the ..... has to be clearly specified.
9. A ..... sampling can be convenience or judgment sampling.
10. The ..... must decide if data is to be collected by observation method or by interviewing.
11. It is better for the researcher to generate as many alternatives as possible during problem .....
12. There are ..... steps in the research process.

1.4 Types of Research

There are different types of research. A detailed description of the same can be had from Figure 1.1 and the description that follows:

Figure 1.1: Research Methodology



1.4.1 Exploratory Research

This type of research is carried out at the very beginning when the problem is not clear or is vague. In exploratory research, all possible reasons which are very obvious are eliminated, thereby directing the research to proceed further with limited options.

Notes

Sales decline in a company may be due to:

1. Inefficient service
2. Improper price
3. Inefficient sales force
4. Ineffective promotion
5. Improper quality

The research executives must examine such questions to identify the most useful avenues for further research. Preliminary investigation of this type is called exploratory research. Expert surveys, focus groups, case studies and observation methods are used to conduct the exploratory survey.

1.4.2 Descriptive Research

The main purpose of descriptive research is to describe the state of view as it exists at present. Simply stated, it is a fact finding investigation. In descriptive research, definite conclusions can be arrived at, but it does not establish a cause and effect relationship. This type of research tries to describe the characteristics of the respondent in relation to a particular product.

1. Descriptive research deals with demographic characteristics of the consumer. For example, trends in the consumption of soft drink with respect to socio-economic characteristics such as age, family, income, education level etc. Another example can be the degree of viewing TV channels, its variation with age, income level, profession of respondent as well as time of viewing. Hence, the degree of use of TV to different types of respondents will be of importance to the researcher. There are three types of players who will decide the usage of TV: (i) Television manufacturers, (ii) Broadcasting agency of the programme, (iii) Viewers. Therefore, research pertaining to any one of the following can be conducted:
   (a) The manufacturer can come out with facilities which will make the television more user-friendly. Some of the facilities are – (i) Remote control, (ii) Child lock, (iii) Different models for different income groups, (iv) Internet compatibility etc., (v) Wall mounting etc.
   (b) Similarly, broadcasting agencies can come out with programmes, which can suit different age groups and income.
   (c) Ultimately, the viewers who use the TV must be aware of the programmes appearing in different channels and can plan their viewing schedule accordingly.
2. Descriptive research deals with specific predictions, for example, sales of a company's product during the next three years, i.e., forecasting.
3. Descriptive research is also used to estimate the proportion of population who behave in a certain way.

Example: "Why do middle income groups go to Food World to buy their products?"

A study can be commissioned by a manufacturing company to find out various facilities that can be provided in television sets based on the above discussion.

Similarly, studies can be conducted by broadcasting stations to find out the degree of utility of TV programmes.

Notes

Example: The following hypothesis may be formulated about the programmes:

1. The programmes in various channels are useful by way of entertainment to the viewers.
2. Viewers feel that TV is a boon for their children in improving their knowledge- especially, fiction and cartoon programmes.

1.4.3 Applied Research

Applied research aims at finding a solution for an immediate problem faced by any business organization. This research deals with real life situations.

Example: "Why have sales decreased during the last quarter"? Market research is an example of applied research. Applied research has a practical problem-solving emphasis. It brings out many new facts.

1. Use of fibre glass body for cars instead of metal.
2. To develop a new market for the product.

1.4.4 Pure/Fundamental Research or Basic Research

Gathering knowledge for knowledge's sake is known as basic research. It is not directly involved with practical problems. It does not have any commercial potential. There is no intention to apply this research in practice. Tata Institute of Fundamental Research conducts such studies.

*Example:*Theory of Relativity (by Einstein).

1.4.5 Conceptual Research

This is generally used by philosophers. In this type of research, the researcher should collect the data to prove or disapprove his hypothesis. The various ideologies or 'isms' are examples of conceptual research.

Did u know? Conceptual Research is related to some abstract idea or theory.

1.4.6 Causal Research

Causal research is conducted to determine the cause and effect relationship between the two variables.

Example: Effect of advertisement on sales.

1.4.7 Historical Research

The name itself indicates the meaning of the research. Historical study is a study of past records and data in order to understand the future trends and development of the organisation or market. There is no direct observation. The research has to depend on the conclusions or inferences drawn in the past.

Notes

Example: Investors in the share market study the past records or prices of shares which he/she intends to buy. Studying the share prices of a particular company enables the investor to take decision whether to invest in the shares of a company.

Crime branch police/CBI officers study the past records or the history of the criminals and terrorists in order to arrive at some conclusions.

The main objective of this study is to derive explanation and generalization from the past trends in order to understand the present and anticipate the future.

There are however, certain shortcomings of historical research:

1. Reliability and adequacy information is subjective and open to question
2. Accuracy of measurement of events is doubtful.
3. Verification of records are difficult.

Task List the records to be considered while conducting a historical research in analyzing the sales aspect of a television brand

1.4.8 Ex-post Facto Research

In this type of research, an examination of relationship that exists between independent and dependent variable is studied. We may call this empirical research. In this method, the researcher has no control over an independent variable. Ex-post facto literally means "from what is done afterwards". In this research, a variable "A" is observed. Thereafter, the researcher tries to find a causal variable "B" which caused "A". It is quite possible that "B" might not have been caused "A". In this type of analysis, there is no scope for the researcher to manipulate the variable. The researcher can only report "what has happened" and "what is happening".

1.4.9 Action Research

This type of research is undertaken by direct action. Action research is conducted to solve a problem. For example, test marketing a product is an example of action research. Initially, the geographical location is identified. A target sample is selected from among the population. Samples are distributed to selected samples and feedback is obtained from the respondent. This method is most common for industrial products, where a trial is a must before regular usage of the product.

1.4.10 Evaluation Research

This is an example of applied research. This research is conducted to find out how well a planned programme is implemented. Therefore, evaluation research deals with evaluating the performance or assessment of a project.

Example: "Rural Employment Programme Evaluation" or "Success of Midday Meal Programme".

Notes

1.4.11 Library Research

This is done to gather secondary data. This includes notes from the past data or review of the reports already conducted. This is a convenient method whereby both manpower and time are saved.

Self Assessment

Fill in the blanks:

13. ..... is conducted to solve a problem.
14. In ..... research, an examination of relationship that exists between independent and dependent variable is studied.
15. ..... research is generally used by philosophers.
16. Descriptive research deals with ..... characteristics of the consumer
17. Evaluation research is an example of ..... research
18. ..... research is done to gather secondary data.
19. Gathering knowledge for knowledge's sake is known as ..... research.
20. In exploratory research, all possible reasons which are ..... are eliminated

1.5 Summary

- Research originates in a decision process.
- Usually a research is said to begin with a question or a problem.
- In research process, management problem is converted into a research problem which is the major objective of the study.
- Research question is further subdivided, covering various facets of the problem that need to be solved.
- The role and scope of research has greatly increased in the field of business and economy as a whole.
- The study of research methods provides you with knowledge and skills you need to solve the problems and meet the challenges of today is modern pace of development.

1.6 Keywords

Ad Tracking: It is periodic or continuous in-market research to monitor a brand's performance using measures such as brand awareness, brand preference, and product usage.

Advertising Research: It is a specialized form of marketing research conducted to improve the efficacy of advertising.

Concept Testing: To test the acceptance of a concept by target consumers.

Copy Testing: It predicts in-market performance of an ad before it airs by analyzing audience levels of attention, brand linkage, motivation, entertainment, and communication, as well as breaking down the ad's flow of attention and flow of emotion.

Notes

Exploratory Research: Exploratory research provides insights into and comprehension of an issue or situation.

Marketing Research: Marketing research is about researching the whole of a company's marketing process.

Mystery Shopping: An employee or representative of the market research firm anonymously contacts a salesperson and indicates he or she is shopping for a product. The shopper then records the entire experience.

Product Research: This looks at what products can be produced with available technology, and what new product innovations near-future technology can develop.

1.7 Review Questions

1. An Indian company dealing in pesticides hires a qualified business management graduate to expand its marketing activities. Most of the current employees of the company are qualified chemists with science background. During their first review meeting the management graduate says that the "company should be involved in market research to get a better perspective of the problem on hand". On hearing this, one of the science graduate laughs and says "There is no such thing as marketing or business research, research is combined to science alone." What would be your response?
2. What would be the instances in which you might take causal research in your organization?
3. It is said that action research is conducted to solve a problem. Why are the other researches conducted then?
4. What type of research would you undertake in order find why middle income groups go to a particular retail store to buy their products?
5. Which research would you undertake if you have got a practical problem?
6. Which type of research would you conduct when the problem is not clear and all the possible reasons are eliminated? Why?
7. How does a research help the managers to determine the pattern of consumption?
8. Do you think that a market research helps the marketer to identify brand loyalty and establish it with further strength? Why/why not?
9. When records exist in all authenticated form, why is it so that their verification remains a big issue?
10. Is there any difference in pure research and ex-post facto research? Support you answer with suitable reasons.

Answers: Self Assessment

1. Social science
2. Business to Business (B2B)
3. Quantitative
4. Systematic, scientific
5. New knowledge
6. Purposeful
7. Data tabulation
8. sample unit
9. non-probability
10. researcher

Notes

11. formulation hypothesis
12. nine
13. Action research
14. Ex-post Facto
15. Conceptual
16. demographic
17. applied
18. Library
19. basic
20. very obvious

1.8 Further Readings

Books

Abrams, M.A., *Social Surveys and Social Action*, London: Heinemann, 1951.

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Unit 2: Research Problem

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Objectives

After studying this unit, you will be able to:

- Formulate a research problem
- Identify the selection of the problem
- Report the understanding of problem
- State about necessity of defined problem
- Demonstrate the Self Questioning by researcher while defining the problem

Introduction

In all organizations, some kind of research is required to support decision-making, for example, examination of circulation records to determine if fund allocations should be changed. A manager exists in three time dimensions: past, present and future. The past specifies an accurate sense of what was achieved and what was not, while the present specifies what is being achieved. On the other hand, the future time dimension specifies what a manager should achieve.

Research is used to provide facts on the first two, which supports the decisions that will have an impact on the future. These decisions are made on the basis of collected data or facts. The importance of the decisions and their impact on the organization will determine the importance of research.

There is a famous saying that "problem well-defined is half solved". This statement is strikingly true in market research, because if the problem is not stated properly, the objectives will not be clear. If the objective is not clearly defined, the data collection becomes meaningless.

Research problem is a condition that causes a researcher to feel anxious, uneasy and confused. It involves the complete analysis of the problem area involving who, what, where, when and why of the problem situation.

Notes

2.1 Research Problem

A research problem refers to some difficulty which an organisation faces and wishes to obtain a solution for the same.

While doing research, defining the problem is very important because "problem clearly stated is half-solved". This shows how important it is to "define the problem correctly". While defining the problem, it should be noted that definition should be unambiguous. If the problem defining is ambiguous, then the researcher will not know "what data is to be collected" or "what technique is to be used" etc.

Example of an ambiguous definition: "Find out by how much sales has declined recently". Let us suppose that the research problem is defined in a broad and general way as follows:

"Why is the productivity in Korea much higher than that in India"? In this type of question, a number of ambiguities are there, such as:

1. What sort of productivity is to be specified; is it men, machine, materials?
2. To which type of industry is the productivity related to?
3. In which time-frame are we analysing the productivity?

Example of an unambiguous definition: On the contrary, a problem will be as follows:

"What are the factors responsible for increased labour productivity in Korean textile manufacturing industries during 1996-07 relative to Indian textile industries?"

Notes Problem formulation is the key to research process. For a researcher, problem formulation means converting the management problem to a research problem. In order to attain clarity, the M.R. manager and researcher must articulate clearly so that perfect understanding of each others is achieved.

In research process, the first and foremost step happens to be that of selecting and properly defining a research problem. A researcher must find the problem and formulate it so that it becomes susceptible to research. To define a problem correctly, a researcher must know: what a problem is?

Did u know? Like a medical doctor, a researcher must examine all the symptoms (presented to him or observed by him) concerning a problem before he can diagnose correctly.

Self Assessment

Fill in the blanks:

1. In order to attain clarity, the manager and researcher must ..... clearly.
2. Problem ..... is the key to research process.
3. To define a problem correctly, a researcher must know: .....

2.2 Selection of the Problem

Notes

The research problem undertaken for study must be carefully selected. The task is a difficult one, although it may not appear to be so. Help may be taken from a research guide in this connection. Nevertheless, every researcher must find out his own salvation for research problems cannot be borrowed. A problem must spring from the researcher's mind like a plant springing from its own seed. If our eyes need glasses, it is not the optician alone who decides about the number of the lens we require. We have to see ourself and enable him to prescribe for us the right number by cooperating with him. Thus, a research guide can at the most only help a researcher choose a subject.

Inevitably, selecting a problem is somewhat arbitrary, idiosyncratic, and personal. Avoid selecting the first problem that you encounter. Try to select the most interesting and personally satisfying choice from among two or three possibilities. The problem selection should matter to you. You should be eager and enthusiastic.

A good topic should be small enough for a conclusive investigation and large enough to yield interesting results.

Caution Remember that research must yield a publication for it to have meaning.

You may wish to query likely periodical editors to see if they might be interested in an article on your research topic.

In some cases, as with a thesis or a dissertation, some sort of preliminary study may be needed to see if the problem and the study are feasible and to identify snags. Such a PILOT STUDY can be quite valuable.

Task Analyse what problems you might encounter while selecting a problem?

Selection Criteria

1. Your genuine enthusiasm for the problem.
2. Controversial subject should not become the choice of an average researcher.
3. The degree to which research on this problem benefits the profession and society.
4. The degree to which research on this problem will assist your professional goals and career objectives.
5. Too narrow or too vague problems should be avoided.
6. The degree to which this research will interest superiors and other leaders in the field.
7. The degree to which the research builds on your experience and knowledge.
8. Ease of access to the population to be studied and the likelihood that they will be cooperative Affordability.

Notes

9. Likelihood of publication.
10. Relationship to theories or accepted generalizations in the field.
11. Degree to which ethical problems are involved.
12. Degree to which research is unique or fills a notable gap in the literature.
13. Degree to which the research builds on and extends existing knowledge before the final selection of a problem is done, a researcher must ask himself the following questions:
    (a) Whether he is well equipped in terms of his background to carry out the research?
    (b) Whether the study falls within the budget he can afford?
    (c) Whether the necessary cooperation can be obtained from those who must participate in research as subjects?

Self Assessment

Fill in the blanks:

4. A good topic should be small enough for a ..... investigation.
5. A ..... should always avoid selecting the first problem that he encounters.
6. The research problem undertaken for study must be ..... selected.

2.3 Understanding the Problem

Once the problem has been selected, the same has to be understood thoroughly and then the same has to be reframed into meaningful terms from an analytical point of view. The first step in research is to formulate the problem. A company manufacturing television sets might think that it is losing sales to a foreign company. A brief illustration aptly demonstrates how such problem can be ill-conceived. The management of a company felt, a drop in sales was because of the poor quality of product. Subsequently, research was undertaken with a view to improve the quality of the product. But despite an improvement in quality, sales did not pick up. In this case, we may say that the problem is ill-defined. The actual reason was ineffective sales promotion. The problem thus needs to be carefully identified.

Did u know? Marketing problem which needs research can be classified into two categories:

1. Difficulty related problems
2. Opportunity related problems, while the first category produces negative results such as, decline in market share or sales, the second category provides benefits.

Problem definition might refer to either a real-life situation or it may also refer to a set of opportunities. Market research problems or opportunities will arise under the following circumstances: (1) Unanticipated change (2) Planned change. Many factors in the environment can create problems or opportunities. Thus, change in the demographics, technological and legal changes affect the marketing function. Now the question is how the company responds to new technology, or product introduced by the competitor or how to cope with the changes in life-styles. It may be a problem and at the same time, it can also be viewed as an opportunity. In order to conduct research, the problem must be defined accurately.

Notes

While formulating the problem, clearly define:

1. Who is the focus?
2. What is the subject-matter of research?
3. To which geographical territory/area the problem refers to?
4. To which period does the study pertains to?

Example: "Why does the upper-middle class of Bangalore shop at Life-style during the Diwali season"?

Here all the above four aspects are covered. We may be interested in a number of variables due to which shopping is done at a particular place. The characteristic of interest to the researcher may be (1) Variety offered at life-style (2) Discount offered by way of promotion (3) Ambience at the life-style and (4) Personalised service offered. In some cases, the cause of the problem is obvious whereas in others the cause is not so obvious. The obvious causes are the products being on the decline. Not so obvious causes could be a bad first experience for the customer.

Self Assessment

Fill in the blanks:

7. Changes in the demographics, technological and legal changes affect the ..... function.
8. Opportunity related problems produce ..... results.
9. The first step in research is to formulate the ……..

2.4 Necessity of Defined Problem

Defining a research problem properly is a prerequisite for any study and is a step of the highest importance. A problem well defined is half solved. Defining the problem is often more essential than its solution because when the problem is formulated, an appropriate technique can be applied to generate alternative solutions. 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. When you define a research problem you are trying to reduce the outcome of an answer. The question of course when you speak about "marketing research" is how I can target more customers that I can sell my product to. You are looking for specific answers such as: "What type of soda do all foreign born males between the ages of 25-35 drink?" This is defining the problem. What do you consider foreign born males? What constitutes soda? etc. This is important because companies and sales organization attempt to "target" their market instead of taking a shotgun approach. The process is to first make sure any information you obtain is credible and from a reputable organization. Then break down your problem and pick apart any inconsistencies you may see within you research project. Problem formulation is the key to research process. For a researcher, problem formulation means converting the management problem to a research problem. In order to attain clarity, the manager and researcher must articulate clearly so that perfect understanding of each others is achieved.

Notes

Notes A proper definition of research problem will enable the researcher to be on the track whereas an ill-defined problem may create hurdles.

What are the sources of problem identification?

Research students can adopt the following ways to identify the problems:

1. Research reports already published may be referred to define a specific problem.
2. Assistance of any research organisation, which handles a number of projects of the companies, can be sought to identify the problem.
3. Professors working in reputed academic institution can act as guides in problem identification.
4. Company employees and competitors can assist in identifying the problems.
5. Cultural and technological changes can act as a source for research problem identification.
6. Seminars/symposiums/focus groups can act as a useful source.

Self Assessment

Fill in the blanks:

10. ..... and ..... changes can act as a source for research problem identification.
11. Research reports already published may be referred to define a .....
12. When you define a research problem you are trying to ..... the outcome of an answer.
13. A problem well ..... is half solved.

2.5 Self Questioning by Researcher while Defining the Problem

1. Is the research problem correctly defined?
2. Is the research problem solvable?
3. Can relevant data be gathered through the process of marketing research?
4. Is the research problem significant?
5. Can the research be conducted within the available resources?
6. Is the time given to complete the project sufficient?
7. What exactly will be the difficulties in conducting the study, and hurdles to be overcome?
8. Am I competent, to carry the study out?

Managers often want the results of research in accordance with their expectation. This satisfies them immensely. If one were to closely look at the questionnaire, it is found that in most cases, there are stereotyped answers given by the respondents.

Notes

Caution Creativity aspect is fundamentally to be included by a researcher to look at problems in a different perspective.

Self Assessment

Fill in the blanks:

14. Managers often want the results of research in accordance with their .....
15. Assistance of any research organisation, which handles a number of projects of the companies, can be sought to ..... the problem.

2.6 Summary

- Proper problem formulation is the key to success in research.
- It is vital and any error in defining the problem incorrectly can result in wastage of time and money.
- Several elements of introspection will help in defining the problem correctly.
- The task of defining a research problem, very often, follows a sequential pattern.
- The problem is stated in a general way, the ambiguities are resolved, thinking and rethinking process results in a more specific formulation of the problem.
- It is done so that it may be a realistic one in terms of the available data and resources and is also analytically meaningful.
- All this results in a well defined research problem that is not only meaningful from an operational point of view.
- But is equally capable of paving the way for the development of working hypotheses and for means of solving the problem itself.

2.7 Keywords

Marketing Research Problem: It is a situation where your company intends to sell a product or service that fills a specific gap.

Objective of Research: It means to what the researcher aims to achieve.

Pilot Study: A small scale preliminary study conducted before the main research in order to check the feasibility or to improve the design of the research.

Problem Definition: The process in order to clear understanding (explanation) of what the problem is.

Research Problem: It focuses on the relevance of the present research.

2.8 Review Questions

1. The objective of research problem should be clearly defined; otherwise the data collection becomes meaningless. Discuss with suitable examples.

Notes

2. Cultural and technological changes can act as a source for research problem identification. Why/why not?
3. Defining a research problem properly is a prerequisite for any study. Why?
4. What precautions should be taken while formulating a problem?
5. If you are appointed to do a research for some problem with the client, what would you take as the sources for problem identification?
6. It may be a problem and at the same time, it can also be viewed as an opportunity. Why/why not?
7. In some cases, some sort of preliminary study may be needed. Which cases are being referred to and why?
8. A problem well defined is half solved. Comment.
9. While you define a research problem what do you try to do?
10. What do you think as the reason behind specialists suggesting to avoid selecting the first problem that you encounter?

Answers: Self Assessment

1.	articulate	2.	formulation
3.	what a problem is	4.	conclusive
5.	researcher	6.	carefully
7.	marketing	8.	negative
9.	problem	10.	Cultural, technological
11.	specific problem	12.	reduce
13.	defined	14.	expectation
15.	identify		

2.9 Further Readings

Books

C R Kotari, *Research Methodology*, Vishwa Prakashan.

Cooper and Schinder, *Business Research Methods*, TMH.

David Luck and Ronald Rubin, *Marketing Research*, PHI.

Naresh Amphora, *Marketing Research*, Pearson Education.

S. N. Murthy and U. Bhojanna, *Business Research Methods*, 3rd Edition, Excel Books.

Unit 3: Research Design

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3.5 Causal Research Design

3.6 Experimentation

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3.7 Summary

3.8 Keywords

3.9 Review Questions

3.10 Further Readings

Objectives

After studying this unit, you will be able to:

- Define research design
- Describe the need of research design
- Explain the different types of research design
- Identify the Secondary data and qualitative research
- Recognize the Descriptive research design
- Label the causal research design

Notes

Introduction

Research design is simply a plan for a study. This is used as a guide in collecting and analyzing the data. It can be called a blue print to carry out the study. It is like a plan made by an architect to build the house, if a research is conducted without a blue print, the result is likely to be different from what is expected at the start. The blue print includes (1) interviews to be conducted, observations to be made, experiments to be conducted data analysis to be made. (2) Tools used to collect the data such as questionnaire (3) what is the sampling methods used.

3.1 An Overview

Research design can be thought of as the structure of research - it is the "glue" that holds all of the elements in a research project together. A successful design stems from a collaborative process involving good planning and communication.

Research Design is mainly of three types namely, exploratory, descriptive and causal research.

Exploratory research is used to seek insights into general nature of the problem. It provides the relevant variable that need to be considered. In this type of research, there is no previous knowledge; research methods are flexible, qualitative and unstructured.

Notes The researcher in this method does not know "what he will find".

Descriptive research is a type of research, very widely used in marketing research. Generally in descriptive study there will be a hypothesis, with respect to this hypothesis, we ask questions like size, distribution, etc.

Causal research, this type of research is concerned with finding cause and effect relationship. Normally experiments are conducted in this type of research.

3.1.1 Need for Research Design

Before starting the research process, efficient and appropriate research design should be prepared. A research design is needed because of the following benefits it provides:

- It helps in smooth functioning of various research operations.
- It requires less effort, time and money.
- It helps to plan in advance the methods and techniques to be used for collecting and analysing data.
- It helps in obtaining the objectives of the research with the availability of staff, time and money.

The researcher should consider the following factors before creating a research design:

- The method for obtaining information source
- Skills of the researcher and the co-ordinating staff
- Problem objectives
- Nature of the problem
- Time and money available for the research work.

Notes

3.1.2 Types of Research Design

Exploratory, descriptive and causal research are some of the major types. Exploratory research is used to seek insights into general nature of the problem. It provides the relevant variable that need to be considered. In this type of research, there is no previous knowledge, research methods are flexible, qualitative and unstructured. The researcher in this method does not know "what he will find".

Descriptive research is a type of research, very widely used in marketing research. Generally in descriptive study there will be a hypothesis, with respect to this hypothesis, we ask questions like size, distribution, etc.

Causal research, this type of research is concerned with finding cause and effect relationship. Normally experiments are conducted in this type of research.

Self Assessment

Fill in the blanks:

1. ..... research is used to seek insights into general nature of the problem.
2. Research design helps to plan in advance the methods and techniques to be used for collecting and ……..data.

3.2 Exploratory Research

The major emphasis in exploratory research is on converting broad, vague problem statements into small, precise sub-problem statements, which is done in order to formulate specific hypothesis. The hypothesis is a statement that specifies, "how two or more variables are related?"

In the early stages of research, we usually lack from sufficient understanding of the problem to formulate a specific hypothesis. Further, there are often several tentative explanations.

Example: "Sales are down because our prices are too high",

"our dealers or sales representatives are not doing a good job",

"our advertisement is weak" and so on.

In this scenario, very little information is available to point out, what is the actual cause of the problem. We can say that the major purpose of exploratory research is to identify the problem more specifically. Therefore, exploratory study is used in the initial stages of research.

Under what circumstances is exploratory study ideal?

The following are the circumstances in which exploratory study would be ideally suited:

1. To gain an insight into the problem
2. To generate new product ideas
3. To list all possibilities. Among the several possibilities, we need to prioritize the possibilities which seem likely
4. To develop hypothesis occasionally

Did u know? Exploratory study is also used to increase the analyst's familiarity with the problem. This is particularly true, when the analyst is new to the problem area.

Notes

Example: A market researcher working for (new entrant) a company for the first time.

5. To establish priorities so that further research can be conducted.
6. Exploratory studies may be used to clarify concepts and help in formulating precise problems.

Example: The management is considering a change in the contract policy, which it hopes, will result in improved satisfaction for channel members.

An exploratory study can be used to clarify the present state of channel members' satisfaction and to develop a method by which satisfaction level of channel members is measured

7. To pre-test a draft questionnaire
8. In general, exploratory research is appropriate to any problem about which very little is known. This research is the foundation for any future study.

3.2.1 Characteristics of Exploratory Stage

1. Exploratory research is flexible and very versatile.
2. For data collection structured forms are not used.
3. Experimentation is not a requirement.
4. Cost incurred to conduct study is low.
5. This type of research allows very wide exploration of views.
6. Research is interactive in nature and also it is open ended.

3.2.2 Hypothesis Development at Exploratory Research Stage

1. Sometimes, it may not be possible to develop any hypothesis at all, if the situation is being investigated for the first time. This is because no previous data is available.
2. Sometimes, some information may be available and it may be possible to formulate a tentative hypothesis.
3. In other cases, most of the data is available and it may be possible to provide answers to the problem.

The examples given below indicate each of the above type:

Example:

Research Purpose	Research Question	Hypothesis
1. What product feature, if stated, will be most effective in the advertisement?	What benefit do people derive from this Ad appeal?	No hypothesis formulation is possible.
2. What new packaging is to be developed by the company (with respect to a soft drink)?	What alternatives exist to provide a container for soft drink?	Paper cup is better than any other forms, such as a bottle.
3. How can our insurance service be improved?	What is the nature of customer dissatisfaction?	Impersonalization is the problem.

Notes

In example 1: The research question is posed to determine "What benefit do people seek from the Ad?" Since no previous research is done on consumer benefit for this product, it is not possible to form any hypothesis.

In example 2: Some information is currently available about packaging for a soft drink. Here it is possible to formulate a hypothesis which is purely tentative. The hypothesis formulated here may be only one of the several alternatives available.

In example 3: The root cause of customer dissatisfaction is known, i.e. lack of personalised service. In this case, it is possible to verify whether this is a cause or not.

3.2.3 Formulation of Hypothesis in Exploratory Research

The quickest and the cheapest way to formulate a hypothesis in exploratory research is by using any of the four methods:

1. ***Literature Search:*** This refers to "referring to a literature to develop a new hypothesis". The literature referred are – trade journals, professional journals, market research finding publications, statistical publications etc. For example, suppose a problem is "Why are sales down?" This can quickly be analysed with the help of published data which should indicate, "whether the problem" is an "industry problem" or a "firm problem". Three possibilities exist to formulate the hypothesis.

   (a) The company's market share has declined but industry's figures are normal.

   (b) The industry is declining and hence the company's market share is also declining.

   (c) The industry's share is going up but the company's share is declining.

   If we accept the situation that our company's sales are down despite the market showing an upward trend, then we need to analyse the marketing mix variables.

Example:

(a) A TV manufacturing company feels that its market share is declining whereas the overall television industry is doing very well.

(b) Due to a trade embargo imposed by a country, textiles exports are down and hence sales of a company making garment for exports is on the decline.

The above information may be used to pinpoint the reason for declining sales.

2. ***Experience Survey:*** In experience surveys, it is desirable to talk to persons who are well informed in the area being investigated. These people may be company executives or persons outside the organisation. Here, no questionnaire is required. The approach adopted in an experience survey should be highly unstructured, so that the respondent can give divergent views.

Caution Since the idea of using experience survey is to undertake problem formulation, and not conclusion, probability sample need not be used. Those who cannot speak freely should be excluded from the sample.

Notes

Example:

(a) A group of housewives may be approached for their choice for a "ready to cook product".

(b) A publisher might want to find out the reason for poor circulation of newspaper introduced recently. He might meet (i) Newspaper sellers (ii) Public reading room (iii) General public (iv) Business community, etc.

These are experienced persons whose knowledge researcher can use.

3. ***Focus Group:*** Another widely used technique in exploratory research is the focus group. In a focus group, a small number of individuals are brought together to study and talk about some topic of interest. The discussion is co-ordinated by a moderator. The group usually is of 8-12 persons. While selecting these persons, care has to be taken to see that they should have a common background and have similar experiences in buying. This is required because there should not be a conflict among the group members on the common issues that are being discussed. During the discussion, future buying attitudes, present buying opinion, etc., are gathered.

   Most of the companies conducting the focus groups first screen the candidates to determine who will compose the particular group. Firms also take care to avoid groups, in which some of the participants have their friends and relatives, because this leads to a biased discussion. Normally, a number of such groups are constituted and the final conclusion of various groups are taken for formulating the hypothesis. Therefore a key factor in focus group is to have similar groups. Normally there are 4-5 groups. Some of them may even have 6-8 groups. The guiding criteria is to see whether the latter groups are generating additional ideas or repeating the same with respect to the subject under study. When this shows a diminishing return from the group, the discussions stopped. The typical focus group lasts for 1-30 hours to 2 hours. The moderator under the focus group has a key role. His job is to guide the group to proceed in the right direction.

   The following should be the characteristics of a moderator/facilitator:

   (a) *Listening:* He must have a good listening ability. The moderator must not miss the participant's comment, due to lack of attention.

   (b) *Permissive:* The moderator must be permissive, yet alert to the signs that the group is disintegrating.

   (c) *Memory:* He must have a good memory. The moderator must be able to remember the comments of the participants. Example: A discussion is centered around a new advertisement by a telecom company. The participant may make a statement early and make another statement later, which is opposite to what was said earlier. Example: The participant may say that s(he) never subscribed to the views expressed in the advertisement by the competitor, but subsequently may say that the "current advertisement of competitor is excellent".

   (d) *Encouragement:* The moderator must encourage unresponsive members to participate.

   (e) *Learning:* He should be a quick learner.

   (f) *Sensitivity:* The moderator must be sensitive enough to guide the group discussion.

   (g) *Intelligence:* He must be a person whose intelligence is above the average.

   (h) *Kind/firm:* He must combine detachment with empathy.

Notes

Notes **Variation of Focus Group**

1. *Respondent moderator group:* Under this method, the moderator will select one of the participants to act as a temporary moderator.
2. *Dualing moderator group:* In this method, there are two moderators. They purposely take opposing positions on a given topic. This will help the researcher to obtain the views of both groups.
3. *Two way focus group:* Under this method one group will listen to the other group. Later, the second group will react to the views of the first group.
4. *Dual moderator group:* Here, there are two moderators. One moderator will make sure that the discussion moves smoothly. The second moderator will ask a specific question.

4. ***Case Studies:*** Analysing a selected case sometimes gives an insight into the problem which is being researched. Case histories of companies which have undergone a similar situation may be available. These case studies are well suited to carry out exploratory research. However, the result of investigation of case histories are always considered suggestive, rather than conclusive. In case of preference to "ready to eat food", many case histories may be available in the form of previous studies made by competitors. We must carefully examine the already published case studies with regard to other variables such as price, advertisement, changes in the taste, etc.

3.2.4 Secondary Data

Secondary data is information gathered for purposes other than the completion of a research project. A variety of secondary information sources is available to the researcher gathering data on an industry, potential product applications and the market place. Secondary data is also used to gain initial insight into the research problem.

Secondary data analysis saves time that would otherwise be spent collecting data and, particularly in the case of quantitative data, provides larger and higher-quality databases than would be unfeasible for any individual researcher to collect on their own. In addition to that, analysts of social and economic change consider secondary data essential, since it is impossible to conduct a new survey that can adequately capture past change and/or developments.

Secondary data can be obtained from two different research strands:

1. ***Quantitative:*** Census, housing, social security as well as electoral statistics and other related databases.
2. ***Qualitative:*** Semi-structured and structured interviews, focus groups transcripts, field notes, observation records and other personal, research-related documents.

Notes Secondary data can also be helpful in the research design of subsequent primary research and can provide a baseline with which the collected primary data results can be compared to. Therefore, it is always wise to begin any research activity with a review of the secondary data.

Notes

Secondary data is classified in terms of its source - either internal or external. Internal, or in-house data, is secondary information acquired within the organization where research is being carried out. External secondary data is obtained from outside sources.

Internal Data Sources

Internal secondary data is usually an inexpensive information source for the company conducting research, and is the place to start for existing operations. Internally generated sales and pricing data can be used as a research source. The use of this data is to define the competitive position of the firm, an evaluation of a marketing strategy the firm has used in the past, or gaining a better understanding of the company's best customers.

There are three main sources of internal data. These are:

1. ***Sales and marketing reports:*** These can include such things as:
   (a) Type of product/service purchased
   (b) Type of end-user/industry segment
   (c) Method of payment
   (d) Product or product line
   (e) Sales territory
   (f) Salesperson
   (g) Date of purchase
   (h) Amount of purchase
   (i) Price
   (j) Application by product
   (k) Location of end-user
2. ***Accounting and financial records:*** These are often an overlooked source of internal secondary information and can be invaluable in the identification, clarification and prediction of certain problems. Accounting records can be used to evaluate the success of various marketing strategies such as revenues from a direct marketing campaign.

   There are several problems in using accounting and financial data. One is the timeliness factor – it is often several months before accounting statements are available. Another is the structure of the records themselves. Most firms do not adequately setup their accounts to provide the types of answers to research questions that they need. For example, the account systems should capture project/product costs in order to identify the company's most profitable (and least profitable) activities.

   Companies should also consider establishing performance indicators based on financial data. These can be industry standards or unique ones designed to measure key performance factors that will enable the firm to monitor its performance over a period of time and compare it to its competitors. Some example may be sales per employee, sales per square foot, expenses per employee (salesperson, etc.).
3. ***Miscellaneous reports:*** These can include such things as inventory reports, service calls, number (qualifications and compensation) of staff, production and R&D reports. Also the company's business plan and customer calls (complaints) log can be useful sources of information.

External Data Sources

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There is a wealth of statistical and research data available today. Some sources are:

1. Federal government
2. Provincial/state governments
3. Statistics agencies
4. Trade associations
5. General business publications
6. Magazine and newspaper articles
7. Annual reports
8. Academic publications
9. Library sources
10. Computerized bibliographies
11. Syndicated services.

The two major advantages of using secondary data in market research are time and cost savings.

1. The secondary research process can be completed rapidly - generally in 2 to 3 week. Substantial useful secondary data can be collected in a matter of days by a skillful analyst.
2. When secondary data is available, the researcher need only locate the source of the data and extract the required information.
3. Secondary research is generally less expensive than primary research. The bulk of secondary research data gathering does not require the use of expensive, specialized, highly trained personnel.
4. Secondary research expenses are incurred by the originator of the information.

There are also a number of disadvantages of using secondary data. These include:

1. Secondary information pertinent to the research topic is either not available, or is only available in insufficient quantities.
2. Some secondary data may be of questionable accuracy and reliability. Even government publications and trade magazines statistics can be misleading.
3. Data may be in a different format or units than is required by the researcher.
4. Much secondary data is several years old and may not reflect the current market conditions. Trade journals and other publications often accept articles six months before appear in print. The research may have been done months or even years earlier.

Did u know? Many trade magazines survey their members to derive estimates of market size, market growth rate and purchasing patterns, then average out these results. Often these statistics are merely average opinions based on less than 10% of their members.

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3.2.5 Qualitative Research

Qualitative research seeks out the 'why', not the 'how' of its topic through the analysis of unstructured information – things like interview transcripts, e-mails, notes, feedback forms, photos and videos. It doesn't just rely on statistics or numbers, which are the domain of quantitative researchers.

Qualitative research is used to gain insight into people's attitudes, behaviours, value systems, concerns, motivations, aspirations, culture or life-styles. It's used to inform business decisions, policy formation, communication and research. Focus groups, in-depth interviews, content analysis and semiotics are among the many formal approaches that are used, but qualitative research also involves the analysis of any unstructured material, including customer feedback forms, reports or media clips.

Qualitative research is used to help us understand how people feel and why they feel as they do. It is concerned with collecting in-depth information asking questions such as why do you say that?. Samples tend to be smaller compared with quantitative projects that include much larger samples. Depth interviews or group discussions are two common methods used for collecting qualitative information.

Thus we can say that Qualitative research is a type of scientific research. In general terms, scientific research consists of an investigation that:

1. seeks answers to a question
2. systematically uses a predefined set of procedures to answer the question
3. collects evidence
4. produces findings that were not determined in advance
5. produces findings that are applicable beyond the immediate boundaries of the study

Qualitative research shares these characteristics. Additionally, it seeks to understand a given research problem or topic from the perspectives of the local population it involves. Qualitative research is especially effective in obtaining culturally specific information about the values, opinions, behaviors, and social contexts of particular populations.

The strength of qualitative research is its ability to provide complex textual descriptions of how people experience a given research issue. It provides information about the "human" side of an issue - that is, the often contradictory behaviors, beliefs, opinions, emotions, and relationships of individuals. Qualitative methods are also effective in identifying intangible factors, such as social norms, socioeconomic status, gender roles, ethnicity, and religion, whose role in the research issue may not be readily apparent. When used along with quantitative methods, qualitative research can help us to interpret and better understand the complex reality of a given situation and the implications of quantitative data. Although findings from qualitative data can often be extended to people with characteristics similar to those in the study population, gaining a rich and complex understanding of a specific social context or phenomenon typically takes precedence over eliciting data that can be generalized to other geographical areas or populations. In this sense, qualitative research differs slightly from scientific research in general.

The three most common qualitative methods, explained in detail in their respective modules, are participant observation, in-depth interviews, and focus groups. Each method is particularly suited for obtaining a specific type of data.

1. Participant observation is appropriate for collecting data on naturally occurring behaviors in their usual contexts.

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2. In-depth interviews are optimal for collecting data on individuals' personal histories, perspectives, and experiences, particularly when sensitive topics are being explored.
3. Focus groups are effective in eliciting data on the cultural norms of a group and in generating broad overviews of issues of concern to the cultural groups or subgroups represented.

Task Enlist the basic differences between quantitative and qualitative research methods.

Self Assessment

Fill in the blanks:

3. The major emphasis in exploratory research is on converting ....., vague problem statements into ..... and ..... sub-problem statements.
4. Exploratory research is ..... and very .....
5. In experience surveys, it is desirable to talk to persons who are well informed in the area being .....
6. Most of the companies conducting the ..... groups first screen the candidates to determine who will compose the particular group.
7. The moderator must not miss the ..... comment.
8. The moderator must encourage ..... members to participate.

3.3 Descriptive Research Design

The name itself reveals that, it is essentially a research to describe something. For example, it can describe the characteristics of a group such as – customers, organisations, markets, etc. Descriptive research provides "association between two variables" like income and place of shopping, age and preferences.

Descriptive inform us about the proportions of high and low income customers in a particular territory. What descriptive research cannot indicate is that it cannot establish a cause and effect relationship between the characteristics of interest. This is the distinct disadvantage of descriptive research.

Descriptive study requires a clear specification of "Who, what, when, where, why and how" of the research. For example, consider a situation of convenience stores (food world) planning to open a new outlet. The company wants to determine, "How people come to patronize a new outlet?" Some of the questions that need to be answered before data collection for this descriptive study are as follows:

1. Who? Who is regarded as a shopper responsible for the success of the shop, whose demographic profile is required by the retailer?
2. What? What characteristics of the shopper should be measured?
3. Is it the age of the shopper, sex, income or residential address?
4. When? When shall we measure?
5. Should the measurement be made while the shopper is shopping or at a later time?

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6. Where? Where shall we measure the shoppers?
7. Should it be outside the stores, soon after they visit or should we contact them at their residence?
8. Why? Why do you want to measure them?
9. What is the purpose of measurement? Based on the information, are there any strategies which will help the retailer to boost the sales? Does the retailer want to predict future sales based on the data obtained?
10. Answer to some of the above questions will help us in formulating the hypothesis.
11. How to measure? Is it a 'structured' questionnaire, 'disguised' or 'undisguised' questionnaire?

3.3.1 When to use Descriptive Study?

1. To determine the characteristics of market such as:
   (a) Size of the market
   (b) Buying power of the consumer
   (c) Product usage pattern
   (d) To find out the market share for the product
   (e) To track the performance of a brand.
2. To determine the association of the two variables such as Ad and sales.
3. To make a prediction. We might be interested in sales forecasting for the next three years, so that we can plan for training of new sales representatives.
4. To estimate the proportion of people in a specific population, who behave in a particular way?

Example: What percentage of population in a particular geographical location would be shopping in a particular shop?

Hypothesis study at the descriptive research stage (to demonstrate the characteristics of the group).

Management problem	Research problem	Hypothesis
How should a new product be distributed?	Where do customers buy a similar product right now?	Upper class buyers use 'Shopper's Stop' and middle class buyers buy from local departmental stores
What will be the target segment?	What kind of people buy our product now?	Senior citizens buy our products. Young and married buy our competitors products.

3.3.2 Types of Descriptive Studies

There are two types of descriptive research:

1. Longitudinal study
2. Cross-sectional study

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1. ***Longitudinal Study:*** These are the studies in which an event or occurrence is measured again and again over a period of time. This is also known as 'Time Series Study'. Through longitudinal study, the researcher comes to know how the market changes over time.

   Longitudinal studies involve panels. Panel once constituted will have certain elements. These elements may be individuals, stores, dealers, etc. The panel or sample remains constant throughout the period. There may be some dropouts and additions. The sample members in the panel are being measured repeatedly. The periodicity of the study may be monthly or quarterly etc.

Example: For longitudinal study, assume a market research is conducted on ready to eat food at two different points of time T1 and T2 with a gap of 4 months. Each of the above two times, a sample of 2000 household is chosen and interviewed. The brands used most in the household is recorded as follows.

Brands	At T1	At T2
Brand X	500(25%)	600(30%)
Brand Y	700(35%)	650(32.5%)
Brand Z	400(20%)	300(15%)
Brand M	200(10%)	250(12.5%)
All others	200(10%)	250(12.5%)
	200	100%

As can be seen between period T1 and T2 Brand X and Brand M has shown an improvement in market share. Brand Y and Brand Z has decrease in market share, where as all other cate gories remains the same. This shows that Brand A and M has gained market share at the cost of Y and Z.

There are two types of panels: (a) True panel (b) Omnibus panel.

(a) ***True panel:*** This involves repeat measurement of the same variables. Example: Perception towards frozen peas or iced tea. Each member of the panel is examined at a different time, to arrive at a conclusion on the above subject.

(b) ***Omnibus panel:*** In omnibus panel too, a sample of elements is being selected and maintained, but the information collected from the member varies. At a certain point of time, the attitude of panel members "towards an advertisement" may be measured. At some other point of time the same panel member may be questioned about the "product performance".

Advantages of Panel Data

(a) We can find out what proportion of those who bought our brand and those who did not. This is computed using the brand switching matrix.

(b) The study also helps to identify and target the group which needs promotional effort.

(c) Panel members are willing persons, hence a lot of data can be collected. This is because becoming a member of a panel is purely voluntary.

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(d) The greatest advantage of panel data is that it is analytical in nature.

(e) Panel data is more accurate than cross-sectional data because it is free from the error associated with reporting past behaviour. Errors occur in past behaviour because of time that has elapsed or forgetfulness.

Disadvantages of Panel Data

(a) The sample may not be representative. This is because sometimes, panels may be selected on account of convenience.

(b) The panel members who provide the data, may not be interested to continue as panel members. There could be dropouts, migration, etc. Members who replace them may differ vastly from the original member.

(c) Remuneration given to panel members may not be attractive. Therefore, people may not like to be panel members.

(d) Sometimes the panel members may show disinterest and non-committed.

(e) A lengthy period of membership in the panel may cause respondents to start imagining themselves to be experts and professionals. They may start responding like experts and consultants and not like respondents. To avoid this, no one should be retained as a member for more than 6 months.

2. ***Cross-sectional Study:*** Cross-sectional study is one of the most important types of descriptive research, it can be done in two ways:

(a) *Field study:* This includes a depth study. Field study involves an in-depth study of a problem, such as reaction of young men and women towards a product.

Example: Reaction of Indian men towards branded ready-to-wear suit. Field study is carried out in real world environment settings. Test marketing is an example of field study.

(b) *Field survey:* Large samples are a feature of the study. The biggest limitations of this survey are cost and time. Also, if the respondent is cautious, then he might answer the questions in a different manner. Finally, field survey requires good knowledge like constructing a questionnaire, sampling techniques used, etc.

Example: Suppose the management believes that geographical factor is an important attribute in determining the consumption of a product, like sales of a woolen wear in a particular location. Suppose that the proposition to be examined is that, the urban population is more likely to use the product than the semi-urban population. This hypothesis can be examined in a cross-sectional study. Measurement can be taken from a representative sample of the population in both geographical locations with respect to the occupation and use of the products. In case of tabulation, researcher can count the number of cases that fall into each of the following classes:

(i) Urban population which uses the product - Category I

(ii) Semi-urban population which uses the product - Category II

(iii) Urban population which does not use the product - Category III

(iv) Semi-urban population which does not use the product - Category IV.

Here, we should know that the hypothesis need to be supported and tested by the sample data i.e., the proportion of urbanities using the product should exceed the semi-urban population using the product.

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3.3.3 Survey

The survey is a research technique in which data are gathered by asking questions of respondents. Survey research is one of the most important areas of measurement in applied social research. The broad area of survey research encompasses any measurement procedures that involve asking questions of respondents. A "survey" can be anything form a short paper-and-pencil feedback form to an intensive one-on-one in-depth interview.

Types of Surveys

Surveys can be divided into two broad categories: the questionnaire and the interview. Questionnaires are usually paper-and-pencil instruments that the respondent completes. Interviews are completed by the interviewer based on the respondent says. Sometimes, it's hard to tell the difference between a questionnaire and an interview. For instance, some people think that questionnaires always ask short closed-ended questions while interviews always ask broad open-ended ones. But you will see questionnaires with open-ended questions (although they do tend to be shorter than in interviews) and there will often be a series of closed-ended questions asked in an interview.

Survey research has changed dramatically in the last ten years. We have automated telephone surveys that use random dialing methods. There are computerized kiosks in public places that allows people to ask for input. A whole new variation of group interview has evolved as focus group methodology. Increasingly, survey research is tightly integrated with the delivery of service. Your hotel room has a survey on the desk. Your waiter presents a short customer satisfaction survey with your check. You get a call for an interview several days after your last call to a computer company for technical assistance. You're asked to complete a short survey when you visit a web site.

Selecting the Survey Method

Selecting the type of survey you are going to use is one of the most critical decisions in many social research contexts. You'll see that there are very few simple rules that will make the decision for you – you have to use your judgment to balance the advantages and disadvantages of different survey types. Here, all I want to do is give you a number of questions you might ask that can help guide your decision.

Population Issues

He first set of considerations have to do with the population and its accessibility.

1. ***Can the population be enumerated?***

   For some populations, you have a complete listing of the units that will be sampled. For others, such a list is difficult or impossible to compile. For instance, there are complete listings of registered voters or person with active drivers licenses. But no one keeps a complete list of homeless people. If you are doing a study that requires input from homeless persons, you are very likely going to need to go and find the respondents personally. In such contexts, you can pretty much rule out the idea of mail surveys or telephone interviews.

2. ***Is the population literate?***

   Questionnaires require that your respondents can read. While this might seem initially like a reasonable assumption for many adult populations, we know from recent research that the instance of adult illiteracy is alarmingly high. And, even if your respondents can

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read to some degree, your questionnaire may contain difficult or technical vocabulary. Clearly, there are some populations that you would expect to be illiterate. Young children would not be good targets for questionnaires.

3. ***Are there language issues?***

   We live in a multilingual world. Virtually every society has members who speak other than the predominant language. Some countries (like Canada) are officially multilingual. And, our increasingly global economy requires us to do research that spans countries and language groups. Can you produce multiple versions of your questionnaire? For mail instruments, can you know in advance the language your respondent speaks, or do you send multiple translations of your instrument? Can you be confident that important connotations in your instrument are not culturally specific? Could some of the important nuances get lost in the process of translating your questions?

4. ***Will the population cooperate?***

   People who do research on immigration issues have a difficult methodological problem. They often need to speak with undocumented immigrants or people who may be able to identify others who are. Why would we expect those respondents to cooperate? Although the researcher may mean no harm, the respondents are at considerable risk legally if information they divulge should get into the hand of the authorities. The same can be said for any target group that is engaging in illegal or unpopular activities.

5. ***What are the geographic restrictions?***

   Is your population of interest dispersed over too broad a geographic range for you to study feasibly with a personal interview? It may be possible for you to send a mail instrument to a nationwide sample. You may be able to conduct phone interviews with them. But it will almost certainly be less feasible to do research that requires interviewers to visit directly with respondents if they are widely dispersed.

Sampling Issues

The sample is the actual group you will have to contact in some way. There are several important sampling issues you need to consider when doing survey research.

1. ***What data is available?:*** What information do you have about your sample? Do you know their current addresses? Their current phone numbers? Are your contact lists up to date?

2. ***Can respondents be found?:*** Can your respondents be located? Some people are very busy. Some travel a lot. Some work the night shift. Even if you have an accurate phone or address, you may not be able to locate or make contact with your sample.

3. ***Who is the respondent?:*** Who is the respondent in your study? Let's say you draw a sample of households in a small city. A household is not a respondent. Do you want to interview a specific individual? Do you want to talk only to the "head of household" (and how is that person defined)? Are you willing to talk to any member of the household? Do you state that you will speak to the first adult member of the household who opens the door? What if that person is unwilling to be interviewed but someone else in the house is willing? How do you deal with multi-family households? Similar problems arise when you sample groups, agencies, or companies. Can you survey any member of the organization? Or, do you only want to speak to the Director of Human Resources? What if the person you would like to interview is unwilling or unable to participate? Do you use another member of the organization?

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4. ***Can all members of population be sampled?:*** If you have an incomplete list of the population (i.e., sampling frame) you may not be able to sample every member of the population. Lists of various groups are extremely hard to keep up to date. People move or change their names. Even though they are on your sampling frame listing, you may not be able to get to them. And, it's possible they are not even on the list.

5. ***Are response rates likely to be a problem?:*** Even if you are able to solve all of the other population and sampling problems, you still have to deal with the issue of response rates. Some members of your sample will simply refuse to respond. Others have the best of intentions, but can't seem to find the time to send in your questionnaire by the due date. Still others misplace the instrument or forget about the appointment for an interview. Low response rates are among the most difficult of problems in survey research. They can ruin an otherwise well-designed survey effort.

Question Issues

Sometimes the nature of what you want to ask respondents will determine the type of survey you select.

1. ***What types of questions can be asked?***

   Are you going to be asking personal questions? Are you going to need to get lots of detail in the responses? Can you anticipate the most frequent or important types of responses and develop reasonable closed-ended questions?

2. ***How complex will the questions be?***

   Sometimes you are dealing with a complex subject or topic. The questions you want to ask are going to have multiple parts. You may need to branch to sub-questions.

3. ***Will screening questions be needed?***

   A screening question may be needed to determine whether the respondent is qualified to answer your question of interest. For instance, you wouldn't want to ask someone their opinions about a specific computer program without first "screening" them to find out whether they have any experience using the program. Sometimes you have to screen on several variables (e.g., age, gender, experience). The more complicated the screening, the less likely it is that you can rely on paper-and-pencil instruments without confusing the respondent.

4. ***Can question sequence be controlled?***

   Is your survey one where you can construct in advance a reasonable sequence of questions? Or, are you doing an initial exploratory study where you may need to ask lots of follow-up questions that you can't easily anticipate?

5. ***Will lengthy questions be asked?***

   If your subject matter is complicated, you may need to give the respondent some detailed background for a question. Can you reasonably expect your respondent to sit still long enough in a phone interview to ask your question?

6. ***Will long response scales be used?***

   If you are asking people about the different computer equipment they use, you may have to have a lengthy response list (CD-ROM drive, floppy drive, mouse, touch pad, modem, network connection, external speakers, etc.). Clearly, it may be difficult to ask about each of these in a short phone interview.

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Content Issues

The content of your study can also pose challenges for the different survey types you might utilize.

1. ***Can the respondents be expected to know about the issue?***

   If the respondent does not keep up with the news (e.g., by reading the newspaper, watching television news, or talking with others), they may not even know about the news issue you want to ask them about. Or, if you want to do a study of family finances and you are talking to the spouse who doesn't pay the bills on a regular basis, they may not have the information to answer your questions.

2. ***Will respondent need to consult records?***

   Even if the respondent understands what you're asking about, you may need to allow them to consult their records in order to get an accurate answer. For instance, if you ask them how much money they spent on food in the past month, they may need to look up their personal check and credit card records. In this case, you don't want to be involved in an interview where they would have to go look things up while they keep you waiting (they wouldn't be comfortable with that).

Bias Issues

People come to the research endeavor with their own sets of biases and prejudices. Sometimes, these biases will be less of a problem with certain types of survey approaches.

1. ***Can social desirability be avoided?***

   Respondents generally want to "look good" in the eyes of others. None of us likes to look like we don't know an answer. We don't want to say anything that would be embarrassing. If you ask people about information that may put them in this kind of position, they may not tell you the truth, or they may "spin" the response so that it makes them look better. This may be more of a problem in an interview situation where they are face-to face or on the phone with a live interviewer.

2. ***Can interviewer distortion and subversion be controlled?***

   Interviewers may distort an interview as well. They may not ask questions that make them uncomfortable. They may not listen carefully to respondents on topics for which they have strong opinions. They may make the judgment that they already know what the respondent would say to a question based on their prior responses, even though that may not be true.

3. ***Can false respondents be avoided?***

   With mail surveys it may be difficult to know who actually responded. Did the head of household complete the survey or someone else? Did the CEO actually give the responses or instead pass the task off to a subordinate? Is the person you're speaking with on the phone actually who they say they are? At least with personal interviews, you have a reasonable chance of knowing who you are speaking with. In mail surveys or phone interviews, this may not be the case.

Administrative Issues

Last, but certainly not least, you have to consider the feasibility of the survey method for your study.

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1. ***Costs:*** Cost is often the major determining factor in selecting survey type. You might prefer to do personal interviews, but can't justify the high cost of training and paying for the interviewers. You may prefer to send out an extensive mailing but can't afford the postage to do so.
2. ***Facilities:*** Do you have the facilities (or access to them) to process and manage your study? In phone interviews, do you have well-equipped phone surveying facilities? For focus groups, do you have a comfortable and accessible room to host the group? Do you have the equipment needed to record and transcribe responses?
3. ***Time:*** Some types of surveys take longer than others. Do you need responses immediately (as in an overnight public opinion poll)? Have you budgeted enough time for your study to send out mail surveys and follow-up reminders, and to get the responses back by mail? Have you allowed for enough time to get enough personal interviews to justify that approach?
4. ***Personnel:*** Different types of surveys make different demands of personnel. Interviews require interviewers who are motivated and well-trained. Group administered surveys require people who are trained in group facilitation. Some studies may be in a technical area that requires some degree of expertise in the interviewer.

Clearly, there are lots of issues to consider when you are selecting which type of survey you wish to use in your study. And there is no clear and easy way to make this decision in many contexts. There may not be one approach which is clearly the best. You may have to make tradeoffs of advantages and disadvantages. There is judgment involved. Two expert researchers may, or the very same problem or issue, select entirely different survey methods. But, if you select a method that isn't appropriate or doesn't fit the context, you can doom a study before you even begin designing the instruments or questions themselves.

3.3.4 Observation Studies

An observational study draws inferences about the possible effect of a treatment on subjects, where the assignment of subjects into a treated group versus a control group is outside the control of the investigator. This is in contrast with controlled experiments, such as randomized controlled trials, where each subject is randomly assigned to a treated group or a control group before the start of the treatment.

Observational studies are sometimes referred to as natural experiments or as quasi-experiments. These differences in terminology reflect certain differences in emphasis, but a shared theme is that the early stages of planning or designing an observational study attempt to reproduce, as nearly as possible, some of the strengths of an experiment.

Self Assessment

Fill in the blanks:

9. ..... studies are the studies in which an event or occurrence is measured again and again over a period of time.
10. Longitudinal study is also known as .....
11. True panel involves ..... measurement of the same variables.
12. The biggest limitations of field survey are ..... and .....

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3.4 Difference between Exploratory Research and Descriptive Research

Table 3.1

Exploratory Research	Descriptive Research
It is concerned with the "Why" aspect of consumer behaviour i.e., it tries to understand the problem and not measure the result.	It is concerned with the "What", "When" or "How often" on the consumer behaviour.
This research does not require large samples.	This needs large samples of respondents.
Sample need not to represent the population.	Sample must be representative of population.
Due to imprecise statement, data collection is not easy.	Statement is precise. Therefore data collection is easy
Characteristics of interest to be measured is not clear.	Characteristics of interest to be measured is clear.
There is no need for a questionnaire for collecting the data.	There should be a properly designed questionnaire for data collection.
Data collection methods are: Focus group Literature Searching Case study	Use of panel data Longitudinal Cross-sectional studies

Self Assessment

Fill in the blanks:

13. …….research requires large samples.

14. In ……research, there is no need for a questionnaire for collecting the data.

3.5 Causal Research Design

Causal Research are the studies that engage in hypotheses testing usually explain the nature of certain relationships, or establish the differences among groups or the independence of two or more factors in a situation. A research design in which the major emphasis is on determining a cause-and-effect relationship. The research is used to measure what impact a specific change will have on existing norms and allows market researchers to predict hypothetical scenarios upon which a company can base its business plan.

Example: If a clothing company currently sells blue denim jeans, causal research can measure the impact of the company changing the product design to the colour white.

Following the research, company bosses will be able to decide whether changing the colour of the jeans to white would be profitable.

To summarise, causal research is a way of seeing how actions now will affect a business in the future. Nevertheless, it has to be remembered that not all causal research hypotheses can be

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studied. There are many reasons for this, one of them being that true random assignment is not possible in many cases. The three main reasons why you can't test everything deal with:

1. ***Technology,*** or the impossibility by today's technology to be able to do certain tasks, such as assign gender.
2. ***Ethics,*** because we can't randomly assign that some people receive a virus to test its effects, or that some participants have to act as slaves and others as masters to test a hypothesis, and
3. ***Resources,*** if a researcher does not have the money or the equipment needed to perform a study, then it won't be done.

Causal design is the study of cause and effect relationships between two or more variables.

William J. Goode & Paul K. Hatt in Methods in Social Research define cause and effect relationship as:

"*when two or more cases of given phenomenon have one and only one condition in common, that condition may be regarded as the cause and effect of that phenomenon*."

The set of causes generated to predict their effects, can be deterministic or probabilistic in nature. The deterministic cause is the one which is essential and adequate for stimulating the occurrence of another event. While the probabilistic is the one that is essential, but is not the only one responsible for the stimulation of the occurrence of another event.

The objective is to determine which variable might be causing certain behaviour i.e., whether there is a cause and effect relationship between variables, causal research must be undertaken. This type of research is very complex and the researcher can never be completely certain that there are not other factors influencing the causal relationship, especially when dealing with people's attitudes and motivations. There are often much deeper psychological considerations that even the respondent may not be aware of.

In marketing decision making, all the conditions allowing the most accurate casual statements are not usually present but in these circumstances, casual inference will still be made by marketing managers. Because in doing so they would want to be able to make casual statements about the effects of their actions.

Example: The new advertising campaign a company developed has resulted in percentage increase in sales or the sales discount strategy a company followed has resulted in percentage increase in sales. In both of these examples, marketing managers are making a casual statement.

However, the scientific concept of casuality is complex and differs substantiality from the one held by the common person on the street. The common sense view holds that a single event (the cause) always results in another event (the effect) occurring. In science, we recognize that an event has a number of determining conditions or causes which act together to make the event probable. Note that the common sense notion of casuality is that the effect always follows the cause. This is deterministic causation in contrast to scientific notion which specifies the effect only as being probable. This is termed as probabilistic causation. The scientific notion holds that we can only infer casuality and never really prove it. That is the chance of an incorrect inference is always thought to exist. The world of marketing fits the scientific view of casuality. Marketing effects are probabilistically caused by multiple factors and we can only infer a casual relationship. The condition under which we can make casual inference are:

(a) Time and order of occurrence of variables.

(b) Concomitant variation

(c) Elimination of other possible causal factors.

Notes

Causal research design are used to provide a stronger basis for the existence of causal relationship between variables. The researcher is able to control the influence of one or more extraneous variables on the dependent variable. If it is not possible to control the influence of an extraneous variable on the dependent variable, that variable is called confounded variable.

Caution Gender cannot be randomly assigned, and therefore already you cannot test all causal hypotheses.

How to Prepare a Synopsis

Synopsis is an abstract form of research which underlines the research procedure followed and is presented before the guide for evaluating its potentiality. In one sentence it may be described as a condensation of the final report. The structure of synopsis varies and also depends on the guides' choice. However, for our understanding a common structure may be framed as under:

1. ***Defining the Problem:*** In defining the problem of the research objective, definition of key terms, general background information, limitations of the study and order of presentation should be mentioned in brief.
2. ***Review of Existing Literature:*** In this head, researcher should study the summary of different points of view on the subject matter as found in books, periodicals and approach to be followed at the time of writing.
3. ***Conceptual Framework and Methodology:*** Under this head the researcher should first make a statement of the hypothesis. Discussion on the research methodology used, duly pointing out the relationship between the hypothesis and objective of the study and finally discussions about the sources and means of obtaining data should also be made. In this head the researcher should also point out the limitations of methodology, if any, and the natural crises from which the research is bound to suffer for such obvious limitations.
4. ***Analysis of Data:*** Analysis of the data involves testing of hypothesis from data collected and key conclusions thus arrived.
5. ***General Conclusions:*** In general conclusions, the researcher should make a restatement of objectives. Conclusion with respect to the acceptance or rejection of hypothesis, conclusion with respect to the stated objectives, suggested areas of further research and final discussion of possible implications of the study for a model, group, theory and discipline.

Finally the researcher should mention about the bibliographies and appendices. The above format is drawn after a standard framework followed internationally in preparation of a synopsis. However, in our country, keeping in view the object of research, style and structure of synopsis varies and quite often it is found that the research guide exercises his own discretion in synopsis preparation than following some acceptable international norms. A standard format for preparation of synopsis commonly used in management and commerce research in India may be drawn as follows:

1. ***Introduction:*** This includes definition of the problem and its review from a historical perspective.
2. ***Objective of the Study:*** It defines the research purpose and its speciality from the existing available research in the related field.
3. ***Literature Review:*** It includes among other things, different sources from which the required abstract is drawn.

Notes

4. ***Methodology:*** It is intended to draw out the sequences followed in research and ways and manners of carrying out the survey and compilation of data.
5. ***Hypothesis:*** It is a formal statement relating to the research problem and it need to be tested based on the researchers' findings.
6. ***Model:*** It underlies the nature and structure of the model that the researcher is going to build in the light of survey findings.

Self Assessment

Fill in the blanks:

15. ……. research is a way of seeing how actions now will affect a business in the future.
16. Synopsis is an abstract form of research which underlines the research procedure followed and is presented before the guide for evaluating its …….

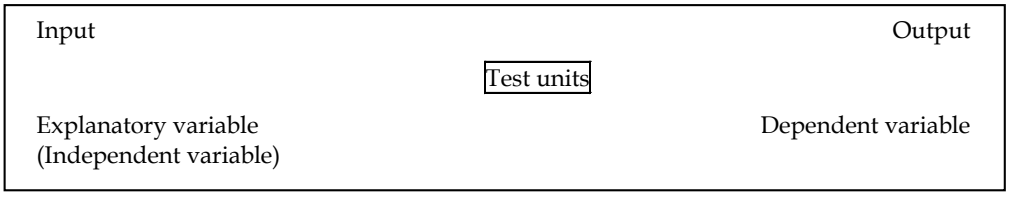
3.6 Experimentation

Experimentation Research is also known as causal research. Descriptive research, will suggest the relationship if any between the variable, but it will not establish cause and effect relationship between the variable. Example: The data collected may show that the no. of people who own a car and their income has risen over a period of time. Despite this, we cannot say "No. of car increase is due to rise in the income". May be, improved road conditions or increase in number of banks offering car loans have caused in increase in the ownership of cars.

To find the causal relationship between the variables, the researcher has to do an experiment.

Example:

1. Which print advertisement is more effective? Is it front page, middle page or the last page?
2. Among several promotional measure, such as Advertisement, personal selling, "which one is more effective"? Can we increase sales of our product by obtaining additional shelf space? What is experimentation? It is research process in which one or more variables are manipulated, which shows the cause and effect relationship. Experimentation is done to find out the effect of one factor on the other. The different elements of experiment are explained below.



Test Units

These are units, on which the experiment is carried out. It is done, with one or more independent variables controlled by a person to find out its effect, on a dependent variable.

Notes

Explanatory Variable

These are the variables whose effects, researcher wishes to examine. For example, explanatory variables may be advertising, pricing, packaging etc.

Dependent Variable

This is a variable which is under study. For example, sales, consumer attitude, brand loyalty etc.

Example: Suppose a particular colour TV manufacturer reduces the price of the TV by 20%. Assume that his reduction is passed on to the consumer and expect the sales will go up by 15% in next 1 year. This types of experiments are done by leading TV companies during festival season.

The causal research finds out, whether the price reduction causes an increase in sales.

Extraneous Variables

These are also called as blocking variables Extraneous variables affects, the result of the experiments.

Example:

1. Suppose a toffee manufacturing company is making an attempt to measure the response of the buyers, on two different types of packaging, at two different locations. The manufacturer needs to keep all other aspects the same, for each buyers group. If the manufacturer allows the extraneous variable namely the "Price", to vary between the two buyer groups, then he will not be sure, as to which particular packaging is preferred by the consumers. Here prices change is an extraneous factor.

   There are two possible courses of action with respect to extraneous variables.

   Extraneous variables may be physically controlled. Example: Price in the above example.

   In the second category, extraneous variables may be totally out of control of the researcher. In this case, we say that the experiment has been confounded i.e., it is not possible to make any conclusions with regard to that experiment. Such a variable is called as "Confounding variables".

2. Company introduces a product in two different cities. They would like to know the impact of their advertising on sales. Simultaneously competitors product in one of the cities is not available during this period due to strike in the factory. Now researcher cannot conclude that sales of their product in that city has increased due to advertisement. Therefore this experiment is confounded. In this case, strike is the confounding variable.

Types of Extraneous Variables

The following are the various types:

1. History
2. Maturation
3. Testing
4. Instrument variation

Notes

5. Selection bias

6. Experimental mortality

1. ***History:*** History refers to those events, external to the experiment, but occurs at the same time, as the experiment is being conducted. This may affect the result. Example: Let us say that, a manufacture makes a 20% cut in the price of a product and monitors sales in the coming weeks. The purpose of the research, is to find the impact of price on sales. Mean while if the production of the product declines due to shortage of raw materials, then the sales will not increase. Therefore, we cannot conclude that the price cut, did not have any influence on sales because the history of external events have occurred during the period and we cannot control the event. The event can only be identified.

2. ***Maturation:*** Maturation is similar to history. Maturation specifically refers to changes occurring within the test units and not due to the effect of experiment. Maturation takes place due to passage of time. Maturation refers to the effect of people growing older. People may be using a product. They may discontinue the product usage or switch over to alternate product.

Example:

(a) Pepsi is consumed when young. Due to passage of time the consumer becoming older, might prefer to consume Diet pepsi or even avoid it.

(b) Assume that training programme is conducted for sales man, the company wants to measure the impact of sales programme. If the company finds that, the sales have improved, it may not be due to training programme. It may be because, sales man have more experience now and know the customer better. Better understanding between sales man and customer may be the cause for increased sales.

Maturation effect is not just limited to test unit, composed of people alone. Organizations also changes, dealers grow, become more successful, diversify, etc.

3. ***Testing:*** Pre-testing effect occurs, when the same respondents are measured more than once. Responses given at a later part will have a direct bearing on the responses given during earlier measurement.

Example: Consider a respondent, who is given an initial questionnaire, intended to measure brand awareness. After exposing him, if a second questionnaire similar to the initial questionnaire is given to the respondent, he will respond quiet differently, because of respondent's familiarity with the earlier questionnaire.

Pretest suffers from internal validity. This can be understood through an example. Assume that a respondent's opinion is measured before and after the exposure to a TV commercial of Hyundai car with Shahrukh Khan as brand ambassador. When the respondent is replying the second time, He may remember, how he rated Hyundai during the first measurement. He may give the same rating to prove that, he is consistent. In that case, the difference between the two measurements will reveal nothing about the real impact.

Alternately some of respondents might give a different rating during second measurement. This may not be due to the fact that the respondent has changed his opinion about Hyundai and the brand ambassador. He has given different rating because, he does not want to be identified as a person with no change of opinion to the said commercial.

In both the cases of above, internal validity suffers.

Notes

4. ***Instrument Variation:*** Instrument variation effect is a threat to internal validity when human respondents are involved. For example, an equipment such as a vacuum cleaner is left behind, for the customer to use for two weeks. After two weeks the respondents are given a questionnaire to answer. The reply may be quite different from what was given by the respondent before the trail of the product. This may be because of two reasons:

   (a) Some of the questions have been changed

   (b) Change in the interviewer for pre-testing and post testing are different

   The measurement in experiments will depend upon the instrument used to measure. Also results may vary due to application of instruments, where there are several interviewers. Thus, it is very difficult to ensure that all the interviewers will ask the same questions with the same tone and develop the same rapport. There may be difference in response, because each interviewer conducts the interview differently.

5. ***Selection Bias:*** Selection bias occurs because 2 groups selected for experiment may not be identical. If the 2 groups are asked various questions, they will respond differently. If multiple groups are participating, this error will occur. There are two promotional advertisement A & B for "Ready to eat food". The idea is to find effectiveness of the two advertisements. Assume that the respondent exposed to 'A' are dominant users of the product. Now suppose 50% of those who saw 'Advertisement A' bought the product and only 10% of those who saw 'Advertisement B' bought the product. From the above, one should not conclude that advertisement 'A' is more effective than advertisement 'B'. The main difference may be due to food preference habits between the groups, even in this case, internal validity might suffer but to a lesser degree.

6. ***Experimental Mortality:*** Some members may leave the original group and some new members join the old group. This is because some members might migrate to another geographical area. This change in the members will alter the composition of the group.

Example: Assume that a vacuum cleaner manufacturer wants to introduce a new version. He interviews hundred respondents who are currently using the older version. Let us assume that, these 100 respondents have rated the existing vacuum cleaner on a 10 point scale (1 for lowest and 10 for highest). Let the mean rating of the respondents be 7.

Now the newer version is demonstrated to the same hundred respondents and equipment is left with them for 2 months. At the end of two months only 80 participant respond, since the remaining 20 refused to answer. Now if the mean score of 80 respondents is 8 on the same 10 point scale. From this can we conclude that the new vacuum cleaner is better?

The answer to the above question depends on the composition of 20 respondents who dropped out. Suppose the 20 respondents who dropped out had negative reaction to the product, then the mean score would not have been 8. It may even be lower than 7. The difference in mean rating does not give true picture. It does not indicate that the new product is better than the old product.

One might wonder, why not we leave the 20 respondent from the original group and calculate the mean rating of the remaining 80 and compare. But this method also will not solve the mortality effect. Mortality effect will occur in an experiment irrespective of whether the human beings or involved or not.

Concomitant Variable

Concomitant variable is the extent to which a cause "X" and the effect "Y" vary together in a predicted manner.

Notes

Example:

1. Electrical car is new to India. People may or may not hold positive attitude about electrical cars. Assume that, the company has undertaken a new advertising campaign "To change the attitude of the people towards this car", so that the sale of this car can increase. Suppose, in testing the result of this campaign, the company finds that both aims have been achieved i.e., the attitude of the people towards electrical car has become positive and also the sales have increased. Then we can say that there is a concomitant variation between attitude and sales. Both variables move in the same direction.
2. Assume that an education institute introduces a new elective which it claims is Job oriented. The college authorities advertise this course in leading news paper. They would like to know the perception of students to this course, and how many are willing to enroll. Now if on testing, it is found the perception towards this course is positive and majority of the respondent are willing to enroll, then we can say that, there is a concomitant variation between perception and enrolment. Both variables move in the same direction.

3.6.1 Experimental Designs

The various experimental designs are as follows:

1. After only design
2. Before-after design
3. Factorial design
4. Latin square design
5. Ex-post facto design

After only Design

In this design, dependent variable is measured, after exposing the test units to the experimental variable. This can be understood with the help of following example.

Assume M/s Hindustan Lever Ltd. wants to conduct an experiment on "Impact of free sample on the sale of toilet soaps". A small sample of toilet soap is mailed to a selected set of customers in a locality. After one month, 25 paise off on one cake of soap coupon is mailed to each of the customers to whom free sample has been sent earlier. An equal number of these coupons are also mailed, to people in another similar locality in the neighborhood. The coupons are coded, to keep an account of the number of coupons redeemed from each locality. Suppose, 400 coupons were redeemed from the experimental group and 250 coupons are redeemed from the control group. The difference of 150 is supposed to be the effect of the free samples. In this method conclusion can be drawn only after conducting the experiment.

Before-after Design

In this method, measurements are made before as well as after.

Example: Let us say that, an experiment is conducted to test an advertisement which is aimed at reducing the alcoholism.

Notes

Attitude and perception towards consuming liquor is measured before exposure to Ad. The group is exposed to an advertisement, which tells them the consequences, and attitude is again measured after several days. The difference, if any, shows the effectiveness of advertisement.

The above example of "Before-after" suffers from validity threat due to the following:

1. ***Before measure effect:*** It alerts the respondents to the fact that they are being studied. The respondents may discuss the topics with friends and relatives and change their behaviour.
2. ***Instrumentation effect:*** This can be due to two different instruments being used, one before and one after, change in the interviewers before and after, results in instrumentation effect.

Factorial Design

Factorial design permits the researcher to test two or more variables at the same time. Factorial design helps to determine the effect of each of the variables and also measure the interacting effect of the several variables.

Example: A departmental store wants to study the impact of price reduction for a product. Given that, there is also promotion (POP) being carried out in the stores (a) near the entrance (b) at usual place, at the same time. Now assume that there are two price levels namely regular price A_1 and reduced price A_2. Let there be three types of POP namely B_1, B_2, & B_3. There are $3 \times 2 = 6$ combinations possible. The combinations possible are B_1A_1, B_1A_2, B_2A_1, B_2A_2, B_3A_1, B_3A_2. Which of these combinations is best suited is what the researcher is interested. Suppose there are 60 departmental stores of the chain divided into groups of 10 stores. Now, randomly assign the above combination to each of these 10 stores as follows:

Combinations	Sales
B_1A_1	S_1
B_1A_2	S_2
B_2A_1	S_3
B_2A_2	S_4
B_3A_1	S_5
B_3A_2	S_6

S_1 TO S_6 represents the sales resulting out of each variable. The data gathered will provide details on product sales on account of two independent variables.

The two questions that will be answered are:

1. Is the reduced price more effective than regular price?
2. Is the display at the entrance more effective than the display at usual location? Also the research will tell us about the interaction effect of the two variables.

Out come of the experiment on sales is as follows:

1. Price reduction with display at the entrance.
2. Price reduction with display at usual place.
3. No display and regular price applicable
4. Display at the entrance with regular price applicable.

Notes

Latin Square Design

Researcher chooses 3 shelf arrangements in three stores. He would like to observe the sales generated in each stores at different period. Researcher must make sure that one type of shelf arrangement is used in each store only once.

In Latin square design, only one variable is tested. As an example of Latin square design assume that a super market chain is interested in the effect of in store promotion on sales. Suppose there are three promotions considered as follows:

1. No promotion
2. Free sample with demonstration
3. Window display

Which of the 3 will be effective? The out come may be affected by the size of the stores and the time period. If we choose 3 stores and 3 time periods, the total number of combination is 33 = 9. The arrangement is as follows:

Time period	Store		
	1	2	3
1	B	C	A
2	A	B	C
3	A	B	C

Latin square is concerned with effectiveness of each kind of promotion on sales.

Ex-post Facto Design

This is a variation of "after only design". The groups such as experiment and control are identified only after they are exposed to the experiment.

Let us assume that a magazine publisher wants to know the impact of advertisement on knitting in 'Women's Era' magazine. The subscribers of magazines are asked whether they have seen this advertisement on "knitting". Those who have read and not read, are asked about the price, design etc. of the product. The difference indicates the effectiveness of advertisement. In this design, the experimental group is set to receive the treatment rather than exposing it to the treatment by its choice.

Self Assessment

Fill in the blanks:

17. Explanatory variable are the variables whose effects, researcher wishes to .....
18. ……are units, on which the experiment is carried out.
19. ……..design helps to determine the effect of each of the variables and also measure the interacting effect of the several variables.

3.7 Summary

- There are primarily four types of research namely exploratory research, descriptive research, Casual and experimental research.

Notes

- Exploratory research helps the researcher to become familiar with the problem. It helps to establish the priorities for further research. It may or may not be possible to formulate Hypothesis during exploratory stage.
- To get an insight into the problem, literature search, experience surveys, focus groups, and selected case studies assist in gaining insight into the problem.
- The role of moderator or facilitator is extremely important in focus group. There are several variations in the formation of focus group.
- Descriptive research is rigid. This type of research is basically dependent on hypothesis.
- Descriptive research is used to describe the characteristics of the groups. It can also be used forecasting or prediction.
- Panel data is used in longitudinal studies. There are two different types of panels. True panel and Omnibus panel. In true panel same measurement are made during period of time. In Omnibus panel different measurement are made during a period of time.
- Cross-sectional studies involves field study and field survey, the difference being the size of sample.
- Causal research is conducted mainly to prove the fact that one factor "X" the cause was responsible for the effect "Y".
- While conducting experiment, the researcher must guard against extraneous source of error. This may confound the experiment.

3.8 Keywords

Causal Research: A research designed to determine cause and effect relationship.

Conclusive Research: This is a research having clearly defined objectives. In this type of research, specific courses of action are taken to solve the problem.

Concomitant Variation: It is the extent to which cause and effect vary together.

Descriptive Research: It is essentially a research to describe something.

Ex-post Facto Research: Study of the current state and factors causing it.

Extraneous Variable: These variables affect the response of test units. Also known as confounding variable.

Field Study: Field study involves an in-depth study of a problem, such as reaction of young men and women towards a product.

Literature Research: It refers to "referring to a literature to develop a new hypothesis".

Longitudinal Study: These are the studies in which an event or occurrence is measured again and again over a period of time.

3.9 Review Questions

1. Can all causal research hypotheses be studied? Why or why not?
2. For each of the situation mentioned below, state whether the research should be exploratory, descriptive or causal and why

   (a) To find out the relationship between promotion and sales.

Notes

(b) To find out the consumer reaction regarding use of new detergents which are economical

(c) To identify the target market demographics, for a shopping mall.

(d) Estimate the sales potential for ready-to-eat food in the northeastern parts of India.

3. In your analysis, what are the advantages and disadvantages of panel data?
4. What do you see as the reason behind Latin Square Design testing only one variable?
5. Do you see any benefit of factorial design over that of before-after design? Support your answer with reasons.
6. Is it necessary for the researcher to mention about the bibliographies and appendices? Why/why not?
7. Illustrate advantages of experience survey by the help of examples.
8. Why is an exploratory research used in the initial stages of research?
9. Which type of research would you use to generate new product ideas and why?
10. Which type of research study would you use to determine the characteristics of market?

Answers: Self Assessment

1.	Exploratory	2.	analyzing
3.	broad, small, precise	4.	flexible, versatile
5.	investigated	6.	focus
7.	participant	8.	unresponsive
9.	Longitudinal	10.	'Time Series Study'
11.	repeat	12.	cost, time
13..	Descriptive	14.	exploratory
15.	Causal	16.	potentiality
17.	examine	18.	Test units
19.	Factorial		

3.10 Further Readings

Books

Cooper and Schinder, *Business Research Methods*, TMH.

CR Kotari, *Research Methodology*, Vishwa Prakashan.

David Luck and Ronald Rubin, *Marketing Research*, PHI.

Naresh Amphora, *Marketing Research*, Pearson Education.

S. N. Murthy and U. Bhojanna, *Business Research Methods*, Excel Books.

William MC Trochim, *Research Methods*, Biztantra.

William Zikmund, *Business Research Methods*, Thomson.

Notes

Unit 4: Sampling Design

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Objectives

After studying this unit, you will be able to:

- Describe the conception of sampling
- Steps involved in the sampling design
- Identify the characteristics of good sampling design
- State the different types of sampling design
- Report about the probability and non-probability sampling
- Explain the various types of errors in sampling
- Tell about determining of sampling size

Notes

Introduction

Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. Each observation measures one or more properties (weight, location, etc.) of an observable entity enumerated to distinguish objects or individuals. Survey weights often need to be applied to the data to adjust for the sample design. Results from probability theory and statistical theory are employed to guide practice.

4.1 Sampling – An Introduction

A sample is a part of a target population, which is carefully selected to represent the population. Sampling frame is the list of elements from which the sample is actually drawn. Actually, sampling frame is nothing but the correct list of population.

Example: Telephone directory, Product finder, Yellow pages.

The sampling process comprises several stages:

1. Defining the population of concern
2. Specifying a sampling frame, a set of items or events possible to measure
3. Specifying a sampling method for selecting items or events from the frame
4. Determining the sample size
5. Implementing the sampling plan
6. Sampling and data collecting
7. Reviewing the sampling process

4.1.1 Distinction between Census and Sampling

Census refers to complete inclusion of all elements in the population. A sample is a sub-group of the population.

When is a Census Appropriate?

1. A census is appropriate if the size of population is small.

Example: A researcher may be interested in contacting firms in iron and steel or petroleum products industry. These industries are limited in number, so a census will be suitable.

2. Sometimes, the researcher is interested in gathering information from every individual.

Example: Quality of food served in a mess.

When is Sample Appropriate?

1. When the size of population is large.
2. When time and cost are the main considerations in research.
3. If the population is homogeneous.

Notes

4. Also, there are circumstances when a census is not possible.

Example: Reactions to global advertising by a company.

Self Assessment

Fill in the blanks:

1. A sample is a part of a ..... population.
2. Sampling ..... is the list of elements from which the sample is actually drawn.
3. A sample is appropriate when the size of population is ..... and .....
4. A census is appropriate if the size of population is .....

4.2 Steps of Sampling Design

Sampling process consists of seven steps. They are:

1. Define the population
2. Identify the sampling frame
3. Specify the sampling unit
4. Selection of sampling method
5. Determination of sample size
6. Specify sampling plan
7. Selection of sample

1. ***Define the population:*** Population is defined in terms of:
   (a) Elements
   (b) Sampling units
   (c) Extent
   (d) Time.

Example: If we are monitoring the sale of a new product recently introduced by a company, say (shampoo sachet) the population will be:

(a) ***Element*** - Company's product

(b) ***Sampling unit*** - Retail outlet, super market

(c) ***Extent*** - Hyderabad and Secunderabad

(d) ***Time*** - April 10 to May 10, 2006

2. ***Identify the sampling frame:*** Sampling frame could be
   (a) Telephone Directory
   (b) Localities of a city using the municipal corporation listing
   (c) Any other list consisting of all sampling units.

Notes

Example: You want to learn about scooter owners in a city. The RTO will be the frame, which provides you names, addresses and the types of vehicles possessed.

3. ***Specify the sampling unit:*** Individuals who are to be contacted are the sampling units. If retailers are to be contacted in a locality, they are the sampling units.

   Sampling unit may be husband or wife in a family. The selection of sampling unit is very important. If interviews are to be held during office timings, when the heads of families and other employed persons are away, interviewing would under-represent employed persons, and over-represent elderly persons, housewives and the unemployed.

4. ***Selection of sampling method:*** This refers to whether

   (a) probability or

   (b) non-probability methods are used.

5. ***Determine the sample size:*** This means we need to decide "how many elements of the target population are to be chosen?" The sample size depends upon the type of study that is being conducted. For example: If it is an exploratory research, the sample size will be generally small. For conclusive research, such as descriptive research, the sample size will be large.

   The sample size also depends upon the resources available with the company.

Did u know? Sample size depends on the accuracy required in the study and the permissible errors allowed.

6. ***Specify the sampling plan:*** A sampling plan should clearly specify the target population. Improper defining would lead to wrong data collection.

Example: This means that, if a survey of a household is to be conducted, a sampling plan should define a "household" i.e., "Does the household consist of husband or wife or both", minors etc., "Who should be included or excluded." Instructions to the interviewer should include "How he should obtain a systematic sample of households, probability sampling non-probability sampling". Advise him on what he should do to the household, if no one is available.

7. ***Select the sample:*** This is the final step in the sampling process.

4.2.1 Characteristics of a Good Sample Design

A good sample design requires the judicious balancing of four broad criteria - goal orientation, measurability, practicality and economy.

1. ***Goal orientation:*** This suggests that a sample design "should be oriented to the research objectives, tailored to the survey design, and fitted to the survey conditions". If this is done, it should influence the choice of the population, the measurement as also the procedure of choosing a sample.

2. ***Measurability:*** A sample design should enable the computation of valid estimates of its sampling variability. Normally, this variability is expressed in the form of standard errors in surveys. However, this is possible only in the case of probability sampling. In non-probability samples, such a quota sample, it is not possible to know the degree of precision of the survey results.

Notes

3. ***Practicality:*** This implies that the sample design can be followed properly in the survey, as envisaged earlier. It is necessary that complete, correct, practical, and clear instructions should be given to the interviewer so that no mistakes are made in the selection of sampling units and the final selection in the field is not different from the original sample design. Practicality also refers to simplicity of the design, i.e. it should be capable of being understood and followed in actual operation of the field work.
4. ***Economy:*** Finally, economy implies that the objectives of the survey should be achieved with minimum cost and effort. Survey objectives are generally spelt out in terms of precision, i.e. the inverse of the variance of survey estimates. For a given degree of precision, the sample design should give the minimum cost. Alternatively, for a given per unit cost, the sample design should achieve maximum precision (minimum variance).

It may be pointed out that these four criteria come into conflict with each other in most of the cases,

Caution The researcher should carefully balance the conflicting criteria so that he is able to select a really good sample design.

Self Assessment

Fill in the blanks:

5. A sampling plan should clearly specify the ..... population.
6. The sample size depends upon the ..... available with the company.

4.3 Types of Sample Design

Sampling is divided into two types:

Probability sampling: In a probability sample, every unit in the population has equal chances for being selected as a sample unit.

Non-probability sampling: In the non-probability sampling, the units in the population have unequal or negligible, almost no chances for being selected as a sample unit.

4.3.1 Probability Sampling Techniques

1. Random sampling.
2. Systematic random sampling.
3. Stratified random sampling.
4. Cluster sampling.
5. Multistage sampling.

Random Sampling

Simple random sample is a process in which every item of the population has an equal probability of being chosen.

Notes

There are two methods used in the random sampling:

1. ***Lottery method:*** Take a population containing four departmental stores: A, B, C and D. Suppose we need to pick a sample of two stores from the population using a simple random procedure. We write down all possible samples of two. Six different combinations, each containing two stores from the population, are AB, AD, AC, BC, BD, CD. We can now write down six sample combination on six identical pieces of paper, fold the piece of paper so that they cannot be distinguished. Put them in a box. Mix them and pull one at random. This procedure is the lottery method of making a random selection.
2. ***Using random number table:*** A random number table consists of a group of digits that are arranged in random order, i.e., any row, column, or diagonal in such a table contains digits that are not in any systematic order.

Notes There are three tables for random numbers

(a) Tippet's table

(b) Fisher and Yate's table

(c) Kendall and Raington table.

The table for random number is as follows:

40743	39672
80833	18496
10743	39431
88103	23016
53946	43761
31230	41212
24323	18054

Example: Taking the earlier example of stores. We first number the stores.

1 A 2 B 3 C 4 D

The stores A, B, C and D have been numbered as 1, 2, 3 and 4.

We proceed as follows, in order to select two shops out of four randomly:

Suppose, we start with the second row in the first column of the table and decide to read diagonally. The starting digit is 8. There are no departmental stores with the number 8 in the population. There are only four stores. Move to the next digit on the diagonal, which is 0. Ignore it, since it does not correspond to any of the stores in the population. The next digit on the diagonal is 1 which corresponds to store A. Pick A and proceed until we get two samples. In this case, the two departmental stores are 1 and 4. The sample derived from this consists of departmental stores A and D.

In random sampling, there are two possibilities (a) Equal probability (b) Varying probability.

(a) ***Equal Probability:*** This is also called as the random sampling with replacement.

Notes

Example: Put 100 chits in a box numbered 1 to 100. Pick one number at random. Now the population has 99 chits. Now, when a second number is being picked, there are 99 chits. In order to provide equal probability, the sample selected is being replaced in the population.

(b) ***Varying Probability:*** This is also called random sampling without replacement. Once a number is picked, it is not included again. Therefore, the probability of selecting a unit varies from the other. In our example, it is 1/100, 1/99, 1/98, 1/97 if we select four samples out of 100.

Systematic Random Sampling

There are three steps:

1. Sampling interval K is determined by the following formula:

$$K = \frac{\text{No. of units in the population}}{\text{No. of units desired in the sample}}$$

2. One unit between the first and Kth unit in the population list is randomly chosen.
3. Add Kth unit to the randomly chosen number.

Example: Consider 1,000 households from which we want to select 50 units.

$$K = \frac{1000}{50}$$

Calculate

To select the first unit, we randomly pick one number between 1 to 20, say 17. So our sample begins with 17, 37, 57…….. Please note that only the first item was randomly selected. The rest are systematically selected. This is a very popular method because we need only one random number.

Stratified Random Sampling

A probability sampling procedure in which simple random sub-samples are drawn from within different strata that are, more or less equal on some characteristics. Stratified sampling is of two types:

1. ***Proportionate stratified sampling:*** The number of sampling units drawn from each stratum is in proportion to the population size of that stratum.
2. ***Disproportionate stratified sampling:*** The number of sampling units drawn from each stratum is based on the analytical consideration, but not in proportion to the size of the population of that stratum.

Sampling process is as follows:

1. The population to be sampled is divided into groups (stratified).
2. A simple random sample is chosen.

Notes

Notes **Reason for Stratified Sampling**

Sometimes, marketing professionals want information about the component part of the population. Assume there are three stores. Each store forms a strata and the sampling from within each strata is being selected. The resultant might be used to plan different promotional activities for each store strata.

Suppose a researcher wishes to study the retail sales of products, such as tea in a universe of 1,000 grocery stores (Kirana shops included). The researcher can first divide this universe into three strata based on the size of the store. This benchmark for size could be only one of the following (a) floor space (b) volume of sales (c) variety displayed etc.

Size of stores	No. of stores	Percentage of stores
Large stores	2,000	20
Medium stores	3,000	30
Small stores	5,000	50
	10,000	100

Suppose we need 12 stores, then choose four from each strata, at random. If there was no stratification, simple random sampling from the population would be expected to choose two large stores (20% of 12) about four medium stores (30% of 12) and about six small stores (50% of 12).

As can be seen, each store can be studied separately using the stratified sample.

Selection by Proportionate Stratified Sample

Assume that there are 60 students in a class of a management school, of this, 10 has to be selected to take part in a Business quiz competition. Assume that the class has students specializing in marketing, finance and HR stream.

The first step is to subdivide the students of the class into 3 homogeneous groups or stratify the student population, by the area in which they are specializing.

Marketing Streaming			Finance Stream		HR Stream
1	32	8	11	33	34
2	36	12	13	35	37
3	40	15	17	38	39
4	43	18	20	41	42
5	46	19	21	44	45
7	47	22	24	49	48
9	60	23	25	59	58
10	57	28	26	60	56
14	50	27	29	52	51
16	53	31	30	55	54

Second step is to calculate the sampling fraction f = n/N

n = Sample size required

N = Population size

Notes

Third step - Determine how many are to be selected from marketing stream (say n1)

$n_1 = 30 \times 1/10 = 30 \times 1/10$

Sample to be selected from marketing strata $n_1 = 30 \times 1/10 = 3$

Now we can select 3 numbers from among 30 numbers at random say 7, 60, 22

Similarly we can select n_2 n_3

$n_2 = 20 \times 1/10 = 2$

The 2 numbers selected at random from finance stream are 13, 59

$N_3 = 10 \times 1/10 = 1$

Stratified sampling can be carried out with:

1. Same proportion across the strata proportionate stratified sample.
2. Varying proportion across the strata disproportionate stratified sample.

Example:

Size of stores	No. of stores (Population)	Sample Proportionate	Sample Disproportionate
Large	2,000	20	25
Medium	3,000	30	35
Small	5,000	50	40
	10,000	100	100

Estimation of universe mean with a stratified sample

Example:

Size of stores	Sample Mean Sales per store	No. of stores	Percent of stores
Large	200	2000	20
Medium	80	3000	30
Small	40	5000	50
		10,000	100

The population mean of monthly sales is calculated by multiplying the sample mean by its relative weight.

$200 \times 0.2 + 80 \times 0.3 + 40 \times 0.5 = 84$

Sample Proportionate

If N is the size of the population.

n is the size of the sample.

i represents 1, 2, 3,……..k [number of strata in the population]

\ Proportionate sampling

Notes

$$P = \frac{n_1}{N_1} = \frac{n_2}{N_2} = \text{.....} = \frac{n_k}{N_k} = \frac{n}{N}$$

$$= \frac{n_1}{N_1} = \frac{n}{N} = n_1 = \frac{n}{N} \times n_1 \text{ and so on}$$

N_1 is the sample size to be drawn from stratum 1

$n_1 + n_2 + \ldots\ldots\ldots\ldots n_k = n$ [Total sample size of the all strata]

Example: A survey is planned to analyse the perception of people towards their own religious practices. The population consists of various religions, viz., Hindu, Muslim, Christian, Sikh, Jain, assuming a total of 10,000. Hindu, Muslim, Christian, Sikh and Jains consists of 6,000, 2,000, 1,000, 500 and 500 respectively. Determine the sample size of each stratum by applying proportionate stratified sampling, if the sample size required is 200.

Solution:

Total population, N = 10,000

Population in the strata of Hindus N_1 = 6,000

Population in the strata of Muslims N_2 = 2,000

Population in the strata of Christians N_3 = 1,000

Population in the strata of Sikhs N_4 = 500

Population in the strata of Jains N_5 = 500

Proportionate Stratified Sampling

$$P = \frac{n_1}{N_1} = \frac{n_2}{N_2} = \frac{n_3}{N_3} = \frac{n_4}{N_4} = \frac{n_5}{N_5} = \frac{n}{N}$$

Let us determine the sample size of strata N_1

$$\frac{n_1}{N_1} = d$$

$$= 20 \times 6$$

$$= 120$$

$$n_2 = \frac{n}{N} \times n_2 = \frac{2000}{10,000} \times 2,000$$

$$= 40$$

$$n_3 = \frac{n}{N} \times N_3 = \frac{200}{10,000} \times 1,000$$

$$= 20$$

$$n_4 = \frac{n}{N} \times N_4 = \frac{200}{10,000} \times 500$$

$$= 10$$

Notes

$$n_5 = \frac{n}{N} \times N_5 = 10$$

$$n = n_1 + n_2 + n_3 + n_4 + n_5$$

$$= 120 + 40 + 20 + 10 + 10$$

$$= 200.$$

Sample Disproportion

Let is the variance of the stratum i,

where i = 1, 2, 3…….k.

The formula to compute the sample size of the stratum i is the variance of the stratum i,

where size of stratum i

r_i = Sample size of stratum i

$$r_i = \frac{N_i}{N}$$

r = Ratio of the size of the stratum i with that of the population.

N_i = Population of stratum i

N = Total population.

Example: The Government of India wants to study the performance of women self help groups (WSHGs) in three regions viz. North, South and West. The total number of WSHGs is 1,500. The number of groups in North, South and West are 600, 500 and 400 respectively. The Government found more variation between WSHGs in the North, South and West regions. The variance of performance of WSHGs in these regions are 64, 25 and 16 respectively. If the disappropriate stratified sampling is to be used with the sample size of 100, determine the number of sampling units for each region.

Solution:

Total Population	$N = 1,500$
Size of the stratum 1,	$N_1 = 600$
Size of the stratum 2,	$N_2 = 500$
Size of the stratum 3,	$N_3 = 400$
Variance of stratum 1,	$\sigma^2 = 8^2 = 64$
Variance of stratum 2,	$\sigma^2 = 5^2 = 25$
Variance of stratum 3,	$\sigma^2 = 4^2 = 16$
Sample size	$n = 100$

Notes

Stratum Number	Size of the stratum N_i	$\frac{N_i}{N}$	[illegible]	[illegible]	[illegible]
1	600	0.4	8	3.2	54
2	500	0.33	5	1.65	28
3	400	0.26	4	1.04	18
Total					**100**

Example: Let us consider a case of 3 strata, of income group with given stratum variance.

Stratum	No. of Households	Stratum Variance
0 - 5000	300	4.00
5001-10,000	450	9.00
> 10,000	750	2.25
Total	**1500**	

Find out the nos. From each stratum for a given sample size of 50?

Solution:

Disproportional Stratified Sampling

Stratum No (i)	No. of elements/ Households	Strata Variance	Stratum Standard Deviation	Sample size (m)	Sampling Ratio (n_i/N)
0 - 5000	300	4.00	2.0	10	0.033
5001-10000	450	9.00	3.0	22	0.049
> 10,000	750	2.25	1.5	18	0.024
Total	**1500**			**50**	

$$n_1\sigma_1 + n_2\sigma_2 + n_3\sigma_3 = (300 \times 2.0) + (450 \times 3.0) + (750 \times 1.5)$$

$$= 600 + 1350 + 1125 = 3075$$

$\therefore$ $$n_1 = \frac{50}{3075} \times 600 = 908$$

$$n_2 = \frac{50}{3075} \times 1350 = 22$$

$$n_3 = \frac{50}{3075} \times 1125 = 18$$

Stratified Sampling in Practice: The main reasons for using stratified sampling for managerial applications are:

1. It can obtain information about different parts of the universe, i.e., it allows to draw separate conclusion for each stratum.
2. It often provides universe estimates of greater precision than other methods of random sampling say simple random sampling.

However, the price paid for these advantages is high because of the complexity of design and analysis.

Notes

Cluster Sampling

The following steps are followed:

1. The population is divided into clusters.
2. A simple random sample of few clusters is selected.
3. All the units in the selected cluster are studied.

Step 1: The above mentioned cluster sampling is similar to the first step of stratified random sampling. But the two sampling methods are different. The key to cluster sampling is decided by how homogeneous or heterogeneous the clusters are.

A major advantage of simple cluster sampling is the case of sample selection. Suppose, we have a population of 20,000 units from which we wish to select 500 units. Choosing a sample of that size is a very time-consuming process, if we use Random Numbers table. Suppose, the entire population is divided into 80 clusters of 250 units each, we can choose two sample clusters (2 × 250 = 500) easily by using cluster sampling. The most difficult job is to form clusters. In marketing, the researcher forms clusters so that he can deal with each cluster differently.

Example: Assume there are 20 households in a locality.

Cross	Houses			
1	X_1	X_2	X_3	X_4
2	X_5	X_6	X_7	X_8
3	X_9	X_{10}	X_{11}	X_{12}
4	X_{13}	X_{14}	X_{15}	X_{16}

We need to select eight houses. We can choose eight houses at random. Alternatively, two clusters, each containing four houses can be chosen. In this method, every possible sample of eight houses would have a known probability of being chosen – i.e. chance of one in two. We must remember that in the cluster, each house has the same characteristics. With cluster sampling, it is impossible for certain random sample to be selected. For example, in the cluster sampling process described above, the following combination of houses could not occur: X_1 X_2 X_5 X_6 X_9 X_{10} X_{13} X_{14}. This is because the original universe of 16 houses have been redefined as a universe of four clusters. So only clusters can be chosen as a sample.

Example: Suppose, we want to have 7500 households from all over the country. In such a case, from the first stage, District, say 30 districts out of 600 are selected from all over the country.

I Stage - Cities: Suppose 5 cities are selected out of each 30 districts; and

II Stage - Wards/Localities: say 10 wards/localities are selected from each city

III Stage - Households: 50 households are selected from each ward/locality.

In stage I, we can employ stratified sampling

In stage II, we can use cluster sampling

In stage III, we can have simple random sampling.

Notes

Caution The use of various methods shall give individually contribute towards accuracy, cost, time, etc. This leads us to conclude that multistage sampling leads to saving of time, labour and money. Apart from this wherever an appropriate frame is not available, the use of multistage sampling has universal appeal.

Multistage Sampling

The name implies that sampling is done in several stages. This is used with stratified/cluster designs.

An illustration of double sampling is as follows.

The management of a newly-opened club is solicits new membership. During the first rounds, all corporates were sent details so that those who are interested may enroll. Having enrolled, the second round concentrates on how many are interested to enroll for various entertainment activities that club offers such as billiards, indoor sports, swimming, gym etc. After obtaining this information, you might stratify the interested respondents. This will also tell you the reaction of new members to various activities. This technique is considered to be scientific, since there is no possibility of ignoring the characteristics of the universe.

Task What are the advantages and disadvantages of multistage sampling? Enlist.

Area Sampling

This is a probability sampling, a special form of cluster sampling.

Example: If someone wants to measure the sales of toffee in retail stores, one might choose a city locality and then audit toffee sales in retail outlets in those localities.

The main problem in area sampling is the non-availability of lists of shops selling toffee in a particular area. Therefore, it would be impossible to choose a probability sample from these outlets directly. Thus, the first job is to choose a geographical area and then list out outlets selling toffee. Then follows the probability sample for shops among the list prepared.

Example: You may like to choose shops which sell the brand-Cadbury dairy milk. The disadvantage of the area sampling is that it is expensive and time-consuming.

4.3.2 Non-probability Sampling Techniques

1. Deliberate sampling
2. Shopping mall intercept sampling
3. Sequential sampling
4. Quota sampling
5. Snowball sampling
6. Panel samples

Notes

Deliberate or Purposive Sampling

This is also known as the judgment sampling. The investigator uses his discretion in selecting sample observations from the universe. As a result, there is an element of bias in the selection. From the point of view of the investigator, the sample thus chosen may be a true representative of the universe. However, the units in the universe do not enjoy an equal chance of getting included in the sample. Therefore, it cannot be considered a probability sampling.

Example: Test market cities are being selected, based on the judgment sampling, because these cities are viewed as typical cities matching with certain demographical characteristics. Judgment sample is also frequently used to select stores for the purpose of introducing a new display.

Shopping Mall Intercept Sampling

This is a non-probability sampling method. In this method the respondents are recruited for individual interviews at fixed locations in shopping malls.

Example: Shopper's Shoppe, Food World, Sunday to Monday.

This type of study would include several malls, each serving different socio-economic population.

Example: The researcher may wish to compare the responses of two or more TV commercials for two or more products. Mall samples can be informative for this kind of studies. Mall samples should not be used under following circumstances i.e., if the difference in effectiveness of two commercials varies with the frequency of mall shopping, change in the demographic characteristic of mall shoppers, or any other characteristic. The success of this method depends on "How well the sample is chosen".

Sequential Sampling

This is a method in which the sample is formed on the basis of a series of successive decisions. They aim at answering the research question on the basis of accumulated evidence. Sometimes, a researcher may want to take a modest sample and look at the results. Thereafter, s(he) will decide if more information is required for which larger samples are considered. If the evidence is not conclusive after a small sample, more samples are required. If the position is still inconclusive, still larger samples are taken. At each stage, a decision is made about whether more information should be collected or the evidence is now sufficient to permit a conclusion.

Example: Assume that a product needs to be evaluated.

A small probability sample is taken from among the current user. Suppose it is found that average annual usage is between 200 to 300 units. It is known that the product is economically viable only if the average consumption is 400 units. This information is sufficient to take a decision to drop the product. On the other hand, if the initial sample shows a consumption level of 450 to 600 units, additional samples are needed for further study.

Quota Sampling

Quota sampling is quite frequently used in marketing research. It involves the fixation of certain quotas, which are to be fulfilled by the interviewers.

Notes

Suppose, 2,00,000 students are appearing for a competitive examination. We need to select 1% of them based on quota sampling. The classification of quota may be as follows:

Example: Classification of Samples

Category	Quota
General merit	1,000
Sport	600
NRI	100
SC/ST	300
Total	**2,000**

Quota sampling involves the following steps:

1. The population is divided into segments on the basis of certain characteristics. Here, the segments are termed as cells.
2. A quota of unit is selected from each cell.

Snowball Sampling

This is a non-probability sampling. In this method, the initial group of respondents are selected randomly. Subsequent respondents are being selected based on the opinion or referrals provided by the initial respondents. Further referrals will lead to more referrals, thus leading to a snowball sampling. The referrals will have demographic and psychographic characteristics that are relatively similar to the person referring them.

Example: College students bring in more students on the consumption of Pepsi. The major advantage of snowball sampling is that it monitors the desired characteristics in the population.

Panel Samples

Panel samples are frequently used in marketing research. To give an example, suppose that one is interested in knowing the change in the consumption pattern of households. A sample of households is drawn. These households are contacted to gather information on the pattern of consumption. Subsequently, say after a period of six months, the same households are approached once again and the necessary information on their consumption is collected.

4.3.3 Distinction between Probability Sample and Non-probability Sample

Probability Sample

1. Here, each member of a universe has a known chance of being selected and included in the sample.
2. Any personal bias is avoided. The researcher cannot exercise his discretion in the selection of sample items.

Example: Random sample and cluster sample.

Notes

Non-probability Sample

In this case, the likelihood of choosing a particular universe element is unknown. The sample chosen in this method is based on aspects like convenience, quota etc.

Example: Quota sampling and Judgment sampling.

Difference between Cluster Sampling and Stratified Random Sampling

The major difference between cluster sampling and stratified sampling lies with the inclusion of the cluster or strata. In stratified random sampling, all the strata of the population is sampled while in cluster sampling, the researcher merely randomly selects a number of clusters from the collection of clusters of the entire population. Thus, only a number of clusters are sampled, all the other clusters are left unrepresented.

The other notable differences between Cluster and Stratified random sampling are as follows:

- When natural groupings are clear in a statistical population, cluster sampling technique is used. While Stratified sampling is a method where in, the member of a group are grouped into relatively homogeneous groups.
- Cluster sampling can be chosen if the group consists of homogeneous members. On the other hand, for heterogeneous members in the groups, stratified sampling is a good option.
- The benefit of cluster sampling over other sampling methods is, it is cheaper as compared to the other methods. While the benefits of stratified sampling are, this method ignores the irrelevant ones and focuses on the vital sub populations. Another advantage is, with stratified random sampling method is that for different sub populations, the researcher can opt for different sampling techniques. The stratified sampling method as well helps in improving the efficiency and accuracy of the estimation and facilitates greater balancing of statistical power of tests.
- The major disadvantage of cluster sampling is, it initiates higher sampling error. This sampling error may be represented as design effect. The disadvantages of stratified random sampling method are, it calls for choice of relevant stratification variables which can be tough at times. When there are homogeneous subgroups, random sampling method is not much useful. The implementation of random sampling method is expensive and If not provided with correct information about the population, then an error may be introduced.
- All strata are represented in the sample; but only a subset of clusters are in the sample.

Self Assessment

Fill in the blanks:

7. Sampling is divided into two types, viz. ..... and .....
8. There are ..... methods used in the random sampling.
9. ..... is also called as the random sampling with replacement.
10. ..... is also called random sampling without replacement.
11. Stratified sampling can be carried out with ..... proportion across the strata proportionate stratified sample.

Notes

4.4 Fieldwork

The fieldwork consists of informal conversations as well as formal standardized interviews, including projectives or questionnaires. Initially, a single person conducted the research. Changes in society have shifted research for the most part into teamwork. However, a single person can still conduct effective research. Traditionally, educational researchers began their research with a set of hypothesis, whereas the fieldworker's hypothesis emerges through the fieldwork.

Fieldwork in its inception may seem to be disorganized. The notes may be scattered, information is coming from all over the place. That is because the hypothesis has not yet emerged. Even though, at times the hypothesis may become very clear rapidly. Once the hypothesis became evident the fieldworker maintains an open mind thus allowing other hypothesis to emerge.

Another important difference between the types of research is the "nature of the proposition sought: his propositions are rarely of the A causes B type, the usual casual interrelationships between two or more variables dealt with in an experimental research".

Much of the naturalistic data is collected by using raw materials: notes stating the actual response given. In order to be accurate recorders are often used. Experienced researchers create their own techniques and develop the ability to remember the information that needs to be recorded.

Did u know? **How does a fieldworker know when the Enquiry should finish?**

The fieldworker knows when the inquiry should finish by analyzing the data as it is gathered. The end arrives when the fieldworker sees patterns and no new significant changes.

Three important points that must be included are:

1. The data can be subjective to quantitative analysis
2. Most practitioners of the method probably consider its products to have full status as actual studies
3. Can be credible regardless of abstraction.

Self Assessment

Fill in the blanks:

12. Fieldwork in its inception may seem to be .....
13. ..... researchers create their own techniques and develop the ability to remember the information that needs to be recorded.

4.5 Errors in Sampling

4.5.1 Sampling Error

The only way to guarantee the minimization of sampling error is to choose the appropriate sample size. As the sample keeps on increasing, the sampling error decreases. Sampling error is the gap between the sample mean and population mean.

Example: If a study is done amongst Maruti car-owners in a city to find the average monthly expenditure on the maintenance of car, it can be done by including all Maruti car-owners. It can

Notes

also be done by choosing a sample without covering the entire population. There will be a difference between the two methods with regard to monthly expenditure.

4.5.2 Non-sampling Error

One way of distinguishing between the sampling and the non-sampling error is that, while sampling error relates to random variations which can be found out in the form of standard error, non-sampling error occurs in some systematic way which is difficult to estimate.

4.5.3 Sampling Frame Error

A sampling frame is a specific list of population units, from which the sample for a study being chosen.

Example:

1. An MNC bank wants to pick up a sample among the credit card holders. They can readily get a complete list of credit card holders, which forms their data bank. From this frame, the desired individuals can be chosen. In this example, sample frame is identical to ideal population namely all credit card holders. There is no sampling error in this case.
2. Assume that a bank wants to contact the people belonging to a particular profession over phone (doctors, lawyers) to market a home loan product. The sampling frame in this case is the telephone directory. This sampling frame may pose several problems: (1) People might have migrated. (2) Numbers have changed. (3) Many numbers were not yet listed. The question is "Are the residents who are included in the directory likely to differ from those who are not included"? The answer is yes. Thus in this case, there will be a sampling error.

4.5.4 Non-response Error

This occurs, because the planned sample and final sample vary significantly.

Example: Marketers want to know about the television viewing habits across the country. They choose 500 households and mail the questionnaire. Assume that only 200 respondents reply. This does not show a non-response error, which depends upon the discrepancy. If those 200 who replied did not differ from the chosen 500, there is no non-response error.

Consider an alternative. The people who responded are those who had plenty of leisure time. Therefore, it is implied that non-respondents do not have adequate leisure time. In this case, the final sample and the planned sample differ. If it was assumed that all the 500 chosen have leisure time, but in the final analysis only 200 have leisure time and not others. Therefore, a sample with respect to leisure time leads to response error.

Guidelines to Increase the Response Rate

Every researcher likes to get maximum possible response from the respondents, and will be most delighted if cent percent respondent unfortunately, this does not happen. The non-response error can be reduced by increasing the response rate. Higher the response rate, more accurate and reliable is the data. In order to achieve this, some useful hints could be as follows:

Notes

1. Intimate the respondents in advance through a letter. This will improve the preparedness.
2. Personalized questionnaire should be accompanied by a covering letter.
3. Ensure/Assure that confidentiality will be maintained
4. Questionnaire length is to be restricted
5. Increase of personal interview, I.D. card is essential to prove the bona fide.
6. Monetary incentives are gifts will act as motivator
7. Reminder/Revisits would help.
8. Send self addressed/stamped envelope to return the completed questionnaire.

4.5.5 Data Error

This occurs during the data collection, analysis of data or interpretation. Respondents sometimes give distorted answers unintentionally for questions which are difficult, or if the question is exceptionally long and the respondent may not have answer. Data errors can also occur depending on the physical and social characteristics of the interviewer and the respondent. Things such as the tone and voice can affect the responses. Therefore, we can say that the characteristics of the interviewer can also result in data error. Also, cheating on the part of the interviewer leads to data error. Data errors can also occur when answers to open-ended questions are being improperly recorded.

Failure of the Interviewer to Follow Instructions

The respondent must be briefed before beginning the interview, "What is expected"? "To what extent he should answer"? Also, the interviewer must make sure that respondent is familiar with the subject. If these are not made clear by the interviewer, errors will occur.

Editing mistakes made by the editors in transferring the data from questionnaire to computers are other causes for errors.

The respondent could terminate his/her participation in data gathering, because it may be felt that the questionnaire is too long and tedious.

Self Assessment

Fill in the blanks:

14. The only way to guarantee the minimization of sampling error is to choose the appropriate .....
15. A ..... is a specific list of population units, from which the sample for a study being chosen.
16. The ..... error can be reduced by increasing the response rate.

4.6 Sample Size Decision

1. The first factor that must be considered in estimating sample size, is the error permissible.
2. Greater the desired precision, larger will be the sample size.
3. Higher the confidence level in the estimate, the larger the sample must be. There is a trade off between the degree of confidence and the degree of precision with a sample of fixed size.

Notes

4. The greater the number of sub-groups of interest within the sample, the greater its size must be.
5. Cost is a factor that determines the size of the sample.
6. The issue of response rate: The issue to be considered in deciding the necessary sample size is the actual number of questionnaires that must be sent out. Calculation-wise, we may send questionnaires to the required number of people, but we may not receive the response. For example, we may like to obtain the family income level from a mail survey, but the researcher may not receive response from everyone. If the researcher feels the response rate is 40%, then he needs to despatch that many extra questionnaires. A low percentage of response can cause serious problems to the researcher. This is known as the non-response error.

Non-response error may be due to (1) failure to locate, (2) flat refusal.

Failure to locate: People move to new destinations. However, if the sample frames used are of recent origin, this problem can be overcome.

Flat refusal: We do not know if those who did not respond hold different views or opinions from those who responded.

This implies that those who don't respond should be motivated. It can be done in any one of the following ways:

1. An advance letter informing the respondents that they will receive a questionnaire and requesting their cooperation. This will generally increase the rate of response.
2. Monetary incentive or gift given to respondents will yield a larger response rate.
3. Proper follow up is necessary after the potential respondent received the questionnaire.

Example: Determine the sample size if standard deviation of the population is 3.9, population mean is 36 and sample mean is 33 and the desired degree of precision is 99%.

Solution:

Given, $\sigma = 3.9$, $\mu = 36$, $\bar{x}$ and $z = 1\%$ (99% precision implies 1% level of significance)

i.e. $z_\alpha = 2.576$ (at 1% l.o.s) (Table value)

We know that sample size n can be obtained using the relation

$$n = \left(\frac{z_\alpha \sigma}{d}\right)^2 \qquad \text{where } d = \mu - \bar{X}$$

$$n = \left(\frac{2.576 \times 3.9}{36 - 33}\right)^2 = 11.21 \approx 11$$

Example: Determine the sample size if the standard deviation of population is 12 and the standard error (standard deviation of the sampling distribution) is 3.69.

Solution:

Given the standard deviation of population

$$\sigma = 12$$

Standard error = $\sigma X = 3.69$

Notes

We know that

$$\sigma X = \frac{\sigma}{\sqrt{n}}$$

$$\Rightarrow \quad \sigma X_2 = \frac{\sigma^2}{n}$$

$$\Rightarrow \quad n = \frac{\sigma^2}{\sigma X^2} = \left(\frac{12}{3.69}\right)^2$$

$$\Rightarrow \quad n = 10.57 \; 11$$

Example: Determine the sample size, if sample proportion p = 0.4 and standard error of proportion is 0.043.

Solution:

Given that $p = 0.4 \; 1 \Rightarrow q = 0.6 \; \sigma_p = 0.043$

We know that $\sigma_p = \sqrt{\frac{pq}{n}}$

$$\Rightarrow \quad \sigma_p^2 = \frac{pq}{n}$$

$$\Rightarrow \quad n = \frac{pq}{\sigma_p^2} = \frac{0.4 \times 0.6}{(0.043)^2}$$

$$= 129.79 \; 130$$

Example: Determine the sample size if the standard deviation of population is 8.66, sample mean is 45, population mean 43 and the desired degree of precision is 95%.

Solution:

Given that $\mu = 43, \; \bar{X} = 45$

$\sigma = 8.66 \qquad z = 5\%$ l.o.s

$$\Rightarrow \quad z_\alpha = 1.96$$

We know that sample size n can be obtained using the relation

$$n = \left(\frac{z_\alpha \sigma}{d}\right)^2$$

where $d = \mu - \bar{X}$

$$n = \left(\frac{1.96 \times 8.66}{43 - 45}\right)^2 = 72.03 \approx 72$$

Notes

Self Assessment

Fill in the blanks:

17. Greater the desired precision, _____will be the sample size

18. There is a trade off between the degree of confidence and the degree of _____with a sample of fixed size.

4.7 Sampling Distribution

A sampling distribution is the probability distribution of a given statistic based on a random sample of certain size n. It may be considered as the distribution of the statistic for all possible samples of a given size. The sampling distribution depends on the underlying distribution of the population, the statistic being considered, and the sample size used. The sampling distribution is frequently opposed to the asymptotic distribution, which corresponds to the limit case.

Example: Consider a normal population with mean and variance. Assume we repeatedly take samples of a given size from this population and calculate the arithmetic mean for each sample – this statistic is called the sample mean. Each sample will have its own average value, and the distribution of these averages will be called the "sampling distribution of the sample mean". This distribution will be normal $N(m, s^2/n)$ since the underlying population is normal.

The standard deviation of the sampling distribution of the statistic is referred to as the standard error of that quantity. For the case where the statistic is the sample mean, the standard error is:

$$\sigma_z = \frac{\sigma}{\sqrt{n}}$$

where σ is the standard deviation of the population distribution of that quantity and n is the size (number of items) in the sample.

Self Assessment

Fill in the blanks:

19. Sampling distribution depends on the underlying distribution of the ....., the statistic being considered, and the sample size used.

20. The standard deviation of the sampling distribution of the statistic is referred to as the ..... of that quantity

4.8 Summary

- Sample is a representative of population while Census represents cent percent of population.
- The most important factors distinguishing whether to choose sample or census is cost and time. There are seven steps involved in selecting the sample.
- There are two types of sample, namely, Probability sampling and Non-probability sample.
- Probability sampling includes random sampling, stratified random sampling systematic sampling, cluster sampling, Multistage sampling.

Notes

- Random sampling can be chosen by Lottery method or using random number table.
- Samples can be chosen either with equal probability or varying probability.
- Random sampling can be systematic or stratified.
- In systematic random sampling, only the first number is randomly selected. Then by adding a constant "K" remaining numbers are generated.
- In stratified sampling, random samples are drawn from several strata, which has more or less same characteristics.
- In multistage sampling, sampling is drawn in several stages.

4.9 Keywords

Census: It refers to complete inclusion of all elements in the population. A sample is a sub-group of the population.

Deliberate Sampling: The investigator uses his discretion in selecting sample observations from the universe. As a result, there is an element of bias in the selection.

Multistage Sampling: The name implies that sampling is done in several stages

Quota Sampling: Quota sampling is quite frequently used in marketing research. It involves the fixation of certain quotas, which are to be fulfilled by the interviewers.

Random Sampling: Simple random sample is a process in which every item of the population has an equal probability of being chosen.

Sample Frame: Sampling frame is the list of elements from which the sample is actually drawn.

Stratified Random Sampling: A probability sampling procedure in which simple random sub-samples are drawn from within different strata, that are, more or less equal on some characteristics.

4.10 Review Questions

1. What do you analyse as the advantages and disadvantages of probability sampling?
2. Which method of sampling would you use in studies, where the level of accuracy can vary from the prescribed norms and why?
3. Shopping Mall Intercept Sampling is not considered a scientific approach. Why?
4. Quota sampling does not require prior knowledge about the cell to which each population unit belongs. Does this attribute serve as an advantage or disadvantage for Quota Sampling?
5. What suggestions would you give to reduce non sampling error?
6. One mobile phone user is asked to recruit another mobile phone user. What sampling method is this known as and why?
7. Sampling is a part of the population. True/False? Why/why not?
8. Determine the sample size if the standard deviation of population is 20 and the standard error is 4.1.
9. What do see as the reason behind purposive sampling being known as judgement sampling?

Notes

10. Suppose, the population consists of 45,000 households, divided into five (5) strata on the basis of monthly income. This can be illustrating as below:

0	-	1000
1001	-	5000
5001	-	7500
7501	-	10,000
Above 10,000		

Then

(a) Find out the number of units from each strata if the sample constitutes 1% of the population.

(b) If selection is for 150 items selecting equally from each strata, find out the number of sample units from each strata.

Answers: Self Assessment

1.	target	2.	frame
3.	large, homogeneous	4.	small
5.	target	6.	resources
7.	probability, non-probability	8.	two
9.	Equal Probability	10.	Varying Probability
11.	same	12.	disorganized
13.	Experienced	14.	sample size
15.	sampling frame	16.	non response
17.	larger	18.	precision
19.	population	20.	standard error

4.11 Further Readings

Books

Cooper and Schinder, *Business Research Methods*, TMH.

CR Kotari, *Research Methodology*, Vishwa Prakashan.

David Luck and Ronald Rubin, *Marketing Research*, PHI.

Naresh Amphora, *Marketing Research*, Pearson Education.

S.N. Murthy & U. Bhojanna, *Business Research Methods*, 3rd Edition, Excel Books.

William Zikmund, *Business Research Methods*, Thomson.

Unit 5: Measurement and Scaling Techniques

Notes

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Objectives

After studying this unit, you will be able to:

- Recognize the tools of sound measurement
- Explain the techniques of developing measurement tools
- Describe the meaning and techniques of scaling
- Differentiate among Comparative and non-comparative scales
- Describe the Multi-dimensional scaling techniques

Introduction

Measurement is assigning numbers or other symbols to characteristics of objects being measured, according to predetermined rules. Concept (or Construct) is a generalized idea about a class of objects, attributes, occurrences, or processes.

Relatively concrete constructs comprises of aspects such as Age, gender, number of children, education, income. Relatively abstract constructs take into accounts the aspects such as Brand loyalty, personality, channel power, satisfaction.

Notes

Scaling is the generation of a continuum upon which measured objects are located.

Scale is a quantifying measure – a combination of items that is progressively arranged according to value or magnitude. The purpose is to quantitatively represent an item's, person's, or event's place in the scaling continuum.

5.1 Measurement Scales: Tools of Sound Measurement

These are of four kinds of scales, namely:

1. Nominal scale
2. Ordinal scale
3. Interval scale
4. Ratio scale

5.1.1 Nominal Scale

In this scale, numbers are used to identify the objects. For example, University Registration numbers assigned to students, numbers on their jerseys.

The purpose of marking numbers, symbols, labels etc. in this type of scaling is not to establish an order but it is to simply put labels in order to identify events and count the objects and subjects. This measurement scale is used to classify individuals, companies, products, brands or other entities into categories where no order is implied. Indeed, it is often referred to as a categorical scale. It is a system of classification and does not place the entity along a continuum. It involves a simple count of the frequency of the cases assigned to the various categories, and if desired numbers can be nominally assigned to label each category.

Characteristics

1. It has no arithmetic origin.
2. It shows no order or distance relationship.
3. It distinguishes things by putting them into various groups.

Use: This scale is generally used in conducting in surveys and ex-post-facto research.

Example: Have you ever visited Bangalore?

Yes-1

No-2

'Yes' is coded as 'One' and 'No' is coded as 'Two'. The numeric attached to the answers has no meaning, and is a mere identification. If numbers are interchanged as one for 'No' and two for 'Yes', it won't affect the answers given by respondents. The numbers used in nominal scales serve only the purpose of counting.

The telephone numbers are an example of nominal scale, where one number is assigned to one subscriber. The idea of using nominal scale is to make sure that no two persons or objects receive the same number. Similarly, bus route numbers are the example of nominal scale.

Notes

"How old are you"? This is an example of a nominal scale.

"What is your PAN Card number?

Arranging the books in the library, subject wise, author wise - we use nominal scale.

Caution It should be kept in mind that nominal scale has certain limitation, viz.

1. There is no rank ordering.
2. No mathematical operation is possible.
3. Statistical implication - Calculation of the standard deviation and the mean is not possible. It is possible to express the mode.

5.1.2 Ordinal Scale (Ranking Scale)

The ordinal scale is used for ranking in most market research studies. Ordinal scales are used to ascertain the consumer perceptions, preferences, etc. For example, the respondents may be given a list of brands which may be suitable and were asked to rank on the basis of ordinal scale:

1. Lux
2. Liril
3. Cinthol
4. Lifebuoy
5. Hamam

Rank	Item	Number of respondents
I	Cinthol	150
II	Liril	300
III	Hamam	250
IV	Lux	200
V	Lifebuoy	100
Total		**1,000**

In the above example, II is mode and III is median.

Statistical implications: It is possible to calculate the mode and the median.

In market research, we often ask the respondents to rank the items, like for example, "A soft drink, based upon flavour or colour". In such a case, the ordinal scale is used. Ordinal scale is a ranking scale.

Rank the following attributes of 1-5 scale according to the importance in the microwave oven:

Attributes	Rank
A) Company Image	5
B) Functions	3
C) Price	2
D) Comfort	1
E) Design	4

Ordinal scale is used to arrange things in order. In qualitative researches, rank ordering is used to rank characteristics units from the highest to the lowest.

Notes

Characteristics

1. The ordinal scale ranks the things from the highest to the lowest.
2. Such scales are not expressed in absolute terms.
3. The difference between adjacent ranks is not equal always.
4. For measuring central tendency, median is used.
5. For measuring dispersion, percentile or quartile is used.

Scales involve the ranking of individuals, attitudes or items along the continuum of the characteristics being scaled.

From the information provided by ordinal scale, the researcher knows the order of preference but nothing about how much more one brand is preferred to another i.e., there is no information about the interval between any two brands. All of the information, a nominal scale would have given, is available from an ordinal scale. In addition, positional statistics such as the median, quartile and percentile can be determined. It is possible to test for order correlation with ranked data. The two main methods are Spearman's Ranked Correlation Coefficient and Kendall's Coefficient of Concordance which shall be discussed later in the unit.

Did u know? **What is the difference between nominal and ordinal scales?**

In nominal scale numbers can be interchanged, because it serves only for the purpose of counting. Numbers in Ordinal scale have meaning and it won't allow interchangeability.

1. Students may be categorized according to their grades of A, B, C, D, E, F etc. where A is better than B and so on. The classification is from the highest grade to the lowest grade.
2. Teachers are ranked in the University as professor, associate professors, assistant professors and lecturers, etc.
3. Professionals in good organizations are designated as GM, DGM, AGM, SR.MGR, MGR, Dy. MGR., Asstt. Mgr. and so on.
4. Ranking of two or more households according to their annual income or expenditure, e.g.

Households	A	B	C	D	E
Annual Income (Rs)	5,000	9,000	7,000	13,000	21,000

If highest income is given #1, than we write as

Households	**Order of Households on the Basis of Annual Income**
A	E (1)
B	D(2)
C	B(3)
D	C(4)
E	A(5)

One can ask respondents questions on the basis of one or more attributes such as flower, colour, etc., and ask about liking or disliking, e.g., whether the respondent likes soft drinks or not.

Notes

I strongly like it	+2
I like it	+1
I am indifferent	0
I dislike it	-1
I strongly dislike it	-2

In this manner, ranking can be obtained by asking the respondent their level of acceptability. One can then combine the individual ranking and get a collective ranking of the group.

Interval scale uses the principle of "equality of interval" i.e., the intervals are used as the basis for making the units equal assuming that intervals are equal.

It is only with an interval scaled data that researchers can justify the use of the arithmetic mean as the measure of average. The interval or cardinal scale has equal units of measurement thus, making it possible to interpret not only the order of scale scores but also the distance between them. However, it must be recognized that the zero point on an interval scale is arbitrary and is not a true zero. This, of course, has implications for the type of data manipulation and analysis we can carry out on data collected in this form. It is possible to add or subtract a constant to all of the scale values without affecting the form of the scale but one cannot multiply or divide the values. It can be said that two respondents with scale positions 1 and 2 are as far apart as two respondents with scale positions 4 and 5, but not that a person with score 10 feels twice as strongly as one with score 5. Temperature is interval scaled, being measured either in Centigrade or Fahrenheit. We cannot speak of 50°F being twice as hot as 25°F since the corresponding temperatures on the centigrade scale, 100°C and -3.9°C, are not in the ratio 2:1.

Interval scales may be either numeric or semantic.

Characteristics

1. Interval scales have no absolute zero. It is set arbitrarily.
2. For measuring central tendency, mean is used.
3. For measuring dispersion, standard deviation is used.
4. For test of significance, t-test and f-test are used.
5. Scale is based on the equality of intervals.

Use: Most of the common statistical methods of analysis require only interval scales in order that they might be used. These are not recounted here because they are so common and can be found in virtually all basic texts on statistics.

5.1.3 Interval Scale

Interval scale is more powerful than the nominal and ordinal scales. The distance given on the scale represents equal distance on the property being measured. Interval scale may tell us "How far the objects are apart with respect to an attribute?" This means that the difference can be compared. The difference between "1" and "2" is equal to the difference between "2" and "3".

Interval scale uses the principle of "equality of interval" i.e., the intervals are used as the basis for making the units equal assuming that intervals are equal.

It is only with an interval scaled data that researchers can justify the use of the arithmetic mean as the measure of average. The interval or cardinal scale has equal units of measurement thus, making it possible to interpret not only the order of scale scores but also the distance between

Notes

them. However, it must be recognized that the zero point on an interval scale is arbitrary and is not a true zero. This, of course, has implications for the type of data manipulation and analysis we can carry out on data collected in this form. It is possible to add or subtract a constant to all of the scale values without affecting the form of the scale but one cannot multiply or divide the values. It can be said that two respondents with scale positions 1 and 2 are as far apart as two respondents with scale positions 4 and 5, but not that a person with score 10 feels twice as strongly as one with score 5. Temperature is interval scaled, being measured either in Centigrade or Fahrenheit. We cannot speak of 50°F being twice as hot as 25°F since the corresponding temperatures on the centigrade scale, 100°C and -3.9°C, are not in the ratio 2:1.

Interval scales may be either numeric or semantic.

Characteristics

1. Interval scales have no absolute zero. It is set arbitrarily.
2. For measuring central tendency, mean is used.
3. For measuring dispersion, standard deviation is used.
4. For test of significance, t-test and f-test are used.
5. Scale is based on the equality of intervals.

Use: Most of the common statistical methods of analysis require only interval scales in order that they might be used. These are not recounted here because they are so common and can be found in virtually all basic texts on statistics.

Example:

1. Suppose we want to measure the rating of a refrigerator using interval scale. It will appear as follows:

   (a) Brand name Poor …… Good

   (b) Price High …….. Low

   (c) Service after-sales Poor …… Good

   (d) Utility Poor ……Good

   The researcher cannot conclude that the respondent who gives a rating of 6 is 3 times more favourable towards a product under study than another respondent who awards the rating of 2.

2. How many hours you spend to do class assignment every day?

   (a) < 30 min.

   (b) 30 min. to 1 hr.

   (c) 1 hr. to 1½ hrs.

   (d) > 1½ hrs.

   Statistical implications: We can compute the range, mean, median, etc.

Task Analyse the difference between interval and ordinal scales.

Notes

5.1.4 Ratio Scale

Ratio scale is a special kind of internal scale that has a meaningful zero point. With this scale, length, weight or distance can be measured. In this scale, it is possible to say, how many times greater or smaller one object is being compared to the other.

These scales are used to measure actual variables. The highest level of measurement is a ratio scale. This has the properties of an interval scale together with a fixed origin or zero point. Examples of variables which are ratio scaled include weights, lengths and times. Ratio scales permit the researcher to compare both differences in scores and in the relative magnitude of scores. For instance, the difference between 5 and 10 minutes is the same as that between 10 and 15 minutes, and 10 minutes is twice as long as 5 minutes.

Given that sociological and management research seldom aspires beyond the interval level of measurement, it is not proposed that particular attention be given to this level of analysis. Suffice it, to say that virtually all statistical operations can be performed on ratio scales.

Characteristics

1. This scale has an absolute zero measurement.
2. For measuring central tendency, geometric and harmonic means are used.

Use: Ratio scale can be used in all statistical techniques.

Example: Sales this year for product A are twice the sales of the same product last year.

Statistical implications: All statistical operations can be performed on this scale.

Self Assessment

Fill in the blanks:

1. ..... scale may tell us "How far the objects are apart with respect to an attribute?"
2. Ratio scale is a special kind of internal scale that has a meaningful .....

5.2 Techniques of Developing Measurement Tools

The scale construction techniques are used for measuring the attitude of a group or an individual. In other words, scale construction technique helps in estimate the interest or behaviour of an individual or a group towards others or another's environment rather than oneself. While performing a scale construction technique, you need to consider various decisions related to the attitude of the individual or group. A few of these decisions are:

- Determining the level of the involved data; identifying whether it is nominal, ordinal, interval or ratio.
- Identifying the useful statistical analysis for the scale construction.
- Identifying the scale construction technique to be used.
- Selecting the physical layout of the scales.
- Determining the scale categories that need to be used.

There are two primary scale construction techniques, comparative and non-comparative. The comparative technique is used to determine the scale values of multiple items by performing

Notes

comparisons among the items. In the non-comparative technique, scale value of an item is determined without comparing with another item. Furthermore, these two techniques are also of many types. The various types of comparative techniques are:

1. ***Pairwise comparison scale:*** This is an ordinal level scale construction technique, where a respondent is provided with two items and then asked him to select his/her choice.
2. ***Rasch model scale:*** In this technique, multiple respondents are simultaneously involved with several items and from their responses comparisons are derived to determine the scale values. Rank-order scale: This is also an ordinal level scale constructing technique, where a respondent is provided with multiple items, which he needs to rank accordingly.
3. ***Constant sum scale:*** In this scale construction technique, a respondent is usually provided with a constant amount of money, credits or points that he needs to allocate to various items for determining the scale values of the items.

The various types of non-comparative techniques are:

1. ***Continuous rating scale:*** In this technique, respondents generally use a series of numbers known as scale points for rating an item. This technique is also known as graphic rating scaling.
2. ***Likert scale:*** This technique allows the respondents to rate the items on a scale of five to seven points depending upon the amount of their agreement or disagreement on the item.
3. ***Semantic differential scale:*** In this technique, respondents are asked to rate the different attributes of an item on a seven-point scale.

Self Assessment

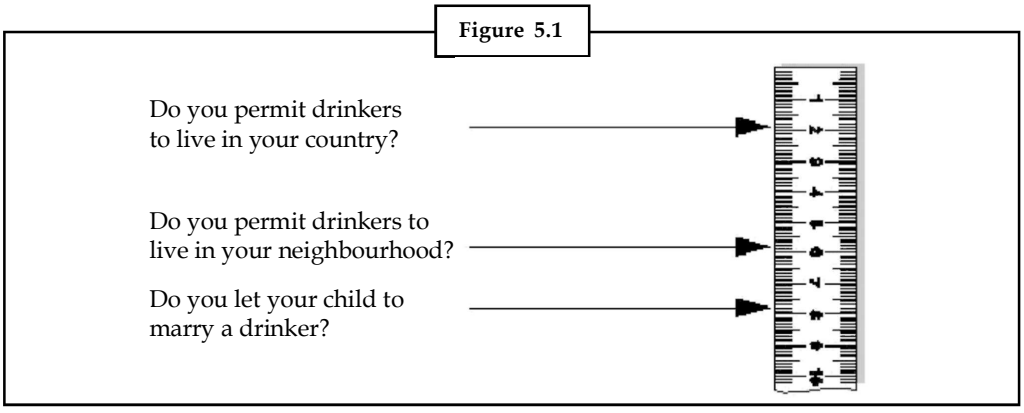
Fill in the blanks:

3. Scale construction techniques are used for measuring the …….of a group.
4. The comparative technique is used to determine the scale values of …….items by performing comparisons among the items.

5.3 Scaling – Meaning

Scaling is a process or set of procedures, which is used to assess the attitude of an individual. Scaling is defined as the assignment of objects to numbers according to a rule. The objects in the definition are text statements, which can be the statements of attitude or principle. Attitude of an individual is not measured directly by scaling. It is first migrated to statements and then the numbers are assigned to them. Figure below shows the how to scale the attitude of individuals.

Figure 5.1



Notes

In the above figure, we are going to assess the attitude of an individual by analysing his thoughts about drinkers. You can see that as you move down, the attitude or behaviour of people towards drinkers become more provisional. If an individual agrees with a statement in the list, then it is more likely that he will also agree with all of the assertions above that statement. Thus in this example, the rule is growing one. So this is called scaling. Scaling is done in the research process to test the hypothesis. Sometimes, you can also use scaling as the part of probing research.

Self Assessment

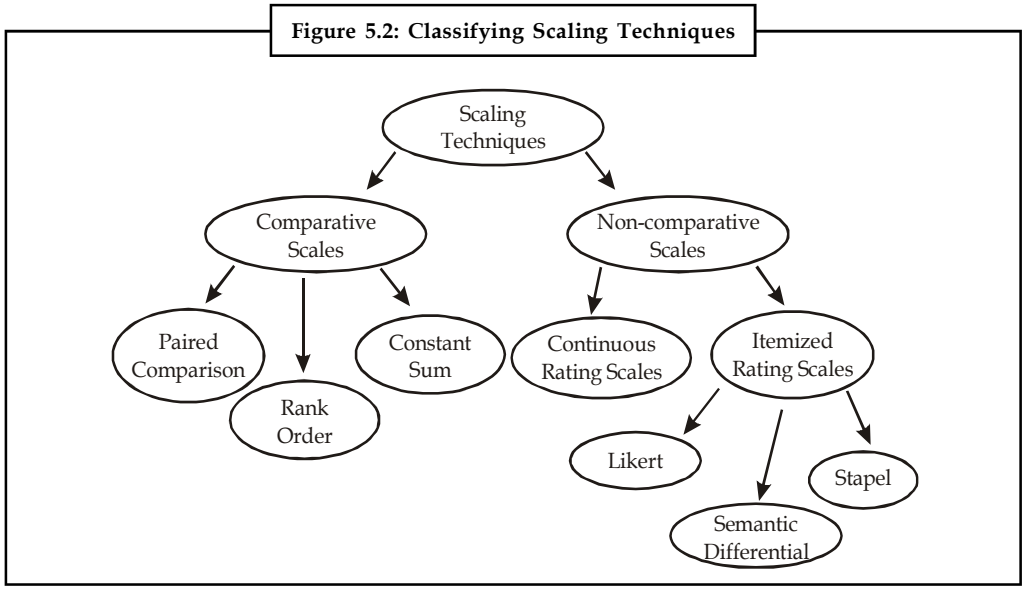
Fill in the blanks:

5. ……of an individual is not measured directly by scaling.
6. Scaling is done in the research process to test the…….

5.4 Comparative and Non-comparative Scaling Techniques

1. ***Comparative Scales:*** It involve the direct comparison of two or more objects.
2. ***Non-comparative Scales:*** Objects or stimuli are scaled independently of each other.

Figure 5.2: Classifying Scaling Techniques



5.4.1 Comparative Scaling Techniques

Paired Comparison

Example: Here a respondent is asked to show his preferences from among five brands of coffee – A, B, C, D and E with respect to flavours. He is required to indicate his preference in pairs. A number of pairs are calculated as follows. The brands to be rated are presented two at a time, so each brand in the category is compared once to every other brand. In each pair, the respondents were asked to divide 100 points on the basis of how much they liked one compared to the other. The score is totally for each brand.

No. of pairs = $\frac{N(N-1)}{2}$

Notes

In this case, it is $\frac{5(5-1)}{2}$

A&B	B&D
A&C	B&E
A&D	C&D
A&E	C&E
B&C	D&E

If there are 15 brands to be evaluated, then we have 105 paired comparison(s) and that is the limitation of this method.

Example: For each pair of professors, please indicate the professor from whom you prefer to take classes with a 1.

	Cunningham	**Day**	**Parker**	**Thomas**
Cunningham		0	0	0
Day	1		1	0
Parker	1	0		0
Thomas	1	1	1	0
# of times Preferred	3	1	2	0

Rank Order Scaling

1. Respondents are presented with several objects simultaneously
2. Then asked to order or rank them according to some criterion
3. Data obtained are ordinal in nature-Arranged or ranked in order of magnitude
4. Commonly used to measure preferences among brands and brand attributes

Example: Please rank the instructors listed below in order of preference. For the instructor you prefer the most, assign a "1", assign a "2" to the instructor you prefer the 2nd most, assign a "3" to the instructor that you prefer 3rd most, and assign a "4" to the instructor that you prefer the least.

Instructor	**Ranking**
Cunningham	1
Day	3
Parker	2
Thomas	4

Constant Sum Scaling

1. Respondents are asked to allocate a constant sum of units among a set of stimulus objects with respect to some criterion
2. Units allocated represent the importance attached to the objects

Notes

3. Data obtained are interval in nature
4. Allows for fine discrimination among alternatives

Example: Listed below are 4 marketing professors, as well as 3 aspects that students typically find important. For each aspect, please assign a number that reflects how well you believe each instructor performs on the aspect. Higher numbers represent higher scores. The total of all the instructors' scores on an aspect should equal 100.

Instructor	Availability	Fairness	Easy Tests
Cunningham	30	35	25
Day	30	25	25
Parker	25	25	25
Thomas	15	15	25
Sum Total	100	100	100

5.4.2 Non-comparative Scale

Continuous Rating Scale

VERY POOR …….....VERY GOOD

0 10 20 30 40 50 60 70 80 90 100

Likert Scale

It is known as summated rating scale. This consists of a series of statements concerning an attitude object. Each statement has '5 points', Agree and Disagree on the scale. They are also called summated scales, because scores of individual items are summated to produce a total score for the respondent. The Likert Scale consists of two parts-item part and evaluation part. Item part is usually a statement about a certain product, event or attitude. Evaluation part is a list of responses like "strongly agree" to "strongly disagree". The five point-scale is used here. The numbers like +2, +1, 0, –1, –2 are used. Now, let us see with an example how the attitude of a customer is measured with respect to a shopping mall.

Table 5.1: Evaluation of Globus-the Super Market by Respondent

S.No.	Likert scale items	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1.	Salesmen at the shopping mall are courteous	-	-	-	-	-
2.	Shopping mall does not have enough parking space	-	-	-	-	-
3.	Prices of items are reasonable.	-	-	-	-	-
4.	Mall has wide range of products to choose	-	-	-	-	-
5.	Mall operating hours are inconvenient	-	-	-	-	-
6.	The arrangement of items in the mall is confusing	-	-	-	-	-

Notes

The respondents' overall attitude is measured by summing up his (her) numerical rating on the statement making up the scale. Since some statements are favourable and others unfavourable, it is the one important task to be done before summing up the ratings. In other words, "strongly agree" category attached to favourable statement and "strongly disagree" category attached to unfavourable. The statement must always be assigned the same number, such as +2, or –2. The success of the Likert Scale depends on "How well the statements are generated?" The higher the respondent's score, the more favourable is the attitude. For example, if there are two shopping malls, ABC and XYZ and if the scores using the Likert Scale are 30 and 60 respectively, we can conclude that the customers' attitude towards XYZ is more favourable than ABC.

Caution The Likert Scale must contain an equal number of favourable and unfavourable statements.

Semantic Differential Scale

This is very similar to the Likert Scale. It also consists of a number of items to be rated by the respondents. The essential difference between Likert and Semantic Differential Scale is as follows:

It uses "Bipolar" adjectives and phrases. There are no statements in the Semantic Differential Scale.

Each pair of adjective is separated by a seven point scale.

Notes Some individuals have favourable descriptions on the right side, while some have on the left side. The reason for the reversal is to have a combination of both favourable and unfavourable statements.

Semantic Differential Scale Items

Please rate the five real estate developers mentioned below on the given scales for each of the five aspects. Developers are

S. No.	Scale items	–3	–2	–1	0	+1	+2	+3	-
1.	Not reliable	_	_	_	_	_	_	_	Reliable
2.	Expensive	_	_	_	_	_	_	_	Not expensive
3.	Trustworthy	_	_	_	_	_	_	_	Not trustworthy
4.	Untimely delivery	_	_	_	_	_	_	_	Timely delivery
5.	Strong Brand Image	_	_	_	_	_	_	_	Poor brand image

The respondents were asked to tick one of the seven categories which describes their views on attitude. Computation is being done exactly the same way as in the Likert Scale. Suppose, we are trying to evaluate the packaging of a particular product. The seven point scale will be as follows:

"I feel ……..

1. Delighted
2. Pleased
3. Mostly satisfied

Notes

4. Equally satisfied and dissatisfied
5. Mostly dissatisfied
6. Unhappy
7. Terrible.

Thurstone Scale

This is also known as an equal appearing interval scale. The following are the steps to construct a Thurstone Scale:

Step 1: To generate a large number of statements, relating to the attitude to be measured.

Step 2: These statements (75 to 100) are given to a group of judges, say 20 to 30, who were asked to classify them according to the degree of favourableness and unfavourableness.

Step 3: 11 piles are to be made by the judges. The piles vary from "most unfavourable" in pile 1 to neutral in pile 6 and most favourable statement in pile 11.

Step 4: Study the frequency distribution of ratings for each statement and eliminate those statements, which different judges have given widely scattered ratings.

Step 5: Select one or two statements from each of the 11 piles for the final scale. List the selected statements in random order to form the scale.

Step 6: The respondents whose attitudes are to be scaled were given the list of statements and asked to indicate their agreement or disagreement with each statement. Some may agree with one statement while some may agree with more than one statement.

Example:

1. Crime and violence in movies:
   (a) All movies with crime and violence should be prohibited by law.
   (b) Watching crime and violence in movies is a waste of time.
   (c) Most movies with crime are bad and harmful.
   (d) The direction and theme in most crime movies are monotonous.
   (e) Watching a movie with crime and violence does not interfere with my routine life.
   (f) I have no opinion one way or the other, about watching movies with crime and violence.
   (g) I like to watch movies with crime and violence.
   (h) Most movies with crime and violence are interesting and absorbing.
   (i) Crime movies act as a knowledge bank gained by the audience.
   (j) People learn "how to be safe and protect oneself" by seeing a movie on crime.
   (k) Watching crime in a movie does not harm our life-style.

   Conclusion: A respondent might agree with statements 8, 9 and 10. Such agreement represents a favourable attitude towards crime and violence. On the contrary, if items 1, 3, 4 are chosen by respondents, it shows that respondents are unfavourably disposed towards crime in movies. If the respondent chooses 1, 5 and 11, it could be interpreted to indicate that s(he) is not consistent in his(her) attitude about the subject.

Notes

2. Suppose, we are interested in the attitude of certain socio-economic class of respondents towards savings and investments. The final list of statements would be as follows:

   (a) One should live for the present and not the future. So, savings are absolutely not required.

   (b) There are many attractions to spend the money saved.

   (c) It is better to spend savings than risk them in investments.

   (d) Investments are unsafe as the money is also blocked.

   (e) You earn to spend and not to invest.

   (f) It is not possible to save these days.

   (g) A certain amount of income should be saved and invested.

   (h) The future is uncertain and investments will protect us.

   (i) Some amount of savings and investments are a must for every individual.

   (j) One should try to save more so that most of it could be invested.

   (k) All savings should be invested for the future.

   Conclusion: A respondent agreeing to statements 8, 9 and 11 would be considered having a favourable attitude towards savings and investments. The person agreeing with statements 2, 3 and 4 is an individual with an unfavourable attitude. Also, if a respondent chooses statements 1, 3, 7 or 9, his attitude is not considered consistent.

Multidimensional Scaling

This is used to study consumer attitudes, particularly with respect to perceptions and preferences. These techniques help identify the product attributes that are important to the customers and to measure their relative importance. Multi-Dimensional Scaling is useful in studying the following:

1. (a) What are the major attributes considered while choosing a product (soft drinks, modes of transportation)? (b) Which attributes do customers compare to evaluate different brands of the product? Is it price, quality, availability etc.?
2. Which is the ideal combination of attributes according to the customer? (i.e., which two or more attributes consumer will consider before deciding to buy.)
3. Which advertising messages are compatible with the consumer's brand perceptions?

Notes The multidimensional scaling is used to describe similarity and preference of brands. The respondents were asked to indicate their perception, or the similarity between various objects (products, brands, etc.) and preference among objects. This scaling is also known as perceptual mapping.

There are two ways of collecting the input data to plot perceptual mapping:

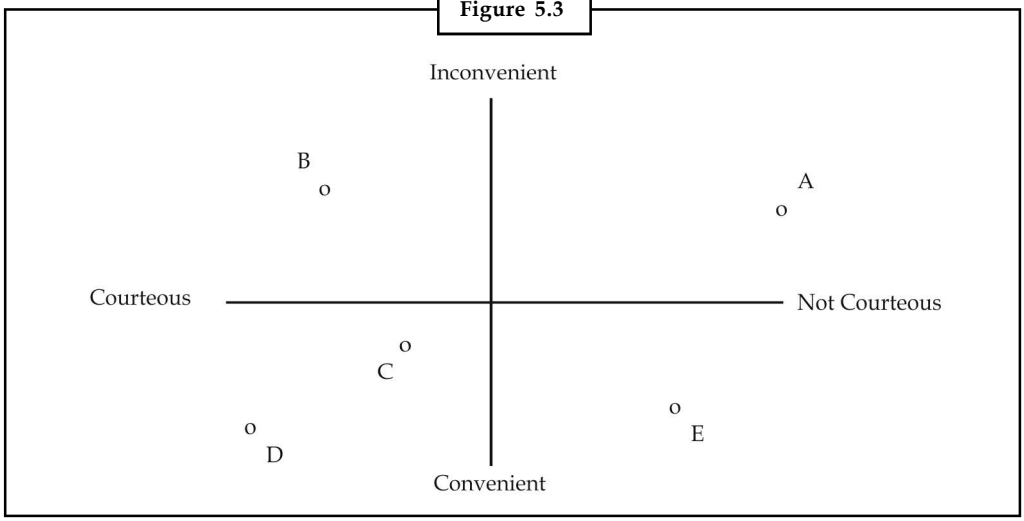
1. ***Non-attribute method:*** Here, the researcher asks the respondent to make a judgment about the objects directly. In this method, the criteria for comparing the objects is decided by the respondent himself.

Notes

2. ***Attribute method:*** In this method, instead of respondents selecting the criteria, they were asked to compare the objects based on the criteria specified by the researcher.

For example, to determine the perception of a consumer: Assume there are five insurance companies to be evaluated on two attributes namely (1) convenient locality (2) courteous personal service. Customers' perception regarding the five insurance companies are as follows:

Figure 5.3



A, B, C, D and E are five insurance companies.

1. According to the map, B & E are dissimilar insurance companies.
2. C is being located very conveniently.
3. A is a less convenient in location compared to E.
4. D is a less convenient in location than C.
5. E is a less convenient location compared to D.

Did u know? **What tools are used in MDS?**

Software such as SPSS, SAS and Excel are the packages used in MDS. Brand positioning research is one of SPSS's important features. SAS is a business intelligence software. Excel is also used to a certain extent.

Stapel Scales

1. Modern versions of the Stapel scale place a single adjective as a substitute for the semantic differential when it is difficult to create pairs of bipolar adjectives.
2. The advantage and disadvantages of a Stapel scale, as well as the results, are very similar to those for a semantic differential.

However, the stapel scale tends to be easier to conduct and administer.

Notes

Table 5.2: Basic Non-comparative Scales

Scale	Basic Characteristics	Examples	Advantages	Disadvantages
Continuous Rating Scale	Place a mark on a continuous line	Reaction to TV commercials	Easy to construct	Cumbersome scoring unless computerized
Itemized Rating Scales				
Likert Scale	Degree of agreement on a numbered scale	Measurement of attitudes, perceptions	Easy to construct, administer, & understand	More time consuming
Semantic Differential	Numbered scale with bipolar labels	Brand, product, & company images	Versatile	Difficult to construct appropriate bipolar adjectives
Stapel Scale	Unipolar numbered scale, no neutral point	Measurement of attitudes & images	Easy to construct, can administer over telephone	Confusing difficult to apply

Self Assessment

Fill in the blanks:

7. The advantage and disadvantages of a Stapel scale, as well as the results, are very similar to those for a ..... differential.
8. ..... Scaling is used to study consumer attitudes, particularly with respect to perceptions and preferences
9. Thurstone Scale is also known as an ..... scale.
10. Semantic Differential Scale is very similar to the ..... Scale.
11. The Likert Scale consists of two parts - ..... and .....
12. In ..... Scaling respondents are presented with several objects simultaneously.
13. Comparative Scales involve the direct comparison of .....objects.

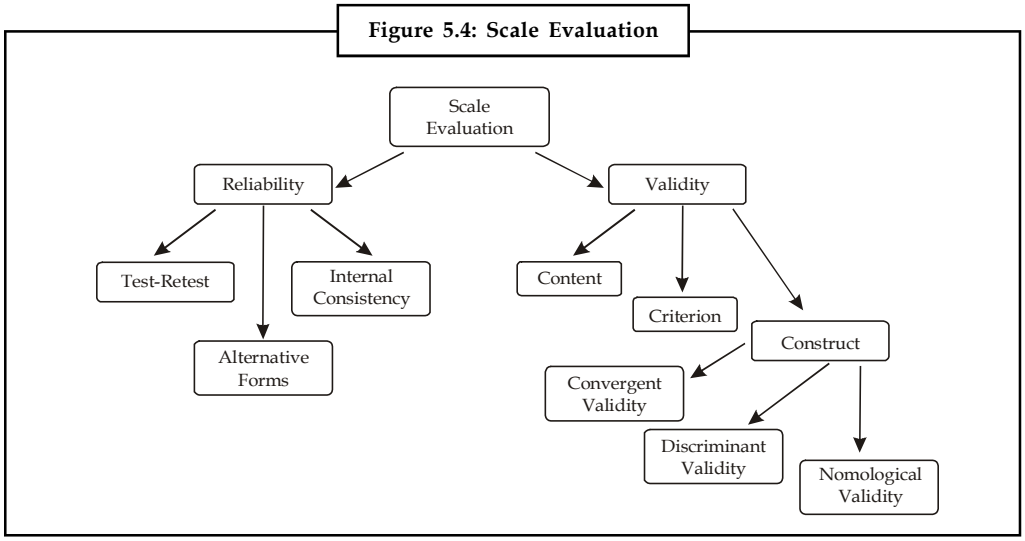
5.5 Criteria for the Good Test

There are two criteria to decide whether the scale selected is good or not. They are:

1. Reliability; and
2. Validity

Notes

Figure 5.4: Scale Evaluation



5.5.1 Reliability Analysis

Reliability means the extent to which the measurement process is free from errors. Reliability deals with accuracy and consistency. The scale is said to be reliable, if it yields the same results when repeated measurements are made under constant conditions.

Example: Attitude towards a product or brand preference.

Reliability can be ensured by using the same scale on the same set of respondents, using the same method. However, in actual practice, this becomes difficult as:

1. Extent to which a scale produces consistent results
2. Test-retest Reliability: Respondents are administered scales at 2 different times under nearly equivalent conditions
3. Alternative-form Reliability: 2 equivalent forms of a scale are constructed, then tested with the same respondents at 2 different times
4. Internal Consistency Reliability:
   (a) The consistency with which each item represents the construct of interest
   (b) Used to assess the reliability of a summated scale
   (c) Split-half Reliability
5. Items constituting the scale divided into 2 halves, and resulting half scores are correlated: Coefficient alpha (most common test of reliability)
6. Average of all possible split-half coefficients resulting from different splitting of the scale items.

Notes

5.5.2 Validity Analysis

The paradigm of validity focused in the question "Are we measuring, what we think, we are measuring?" Success of the scale lies in measuring "What is intended to be measured?" Of the two attributes of scaling, validity is the most important.

There are several methods to check the validity of the scale used for measurement:

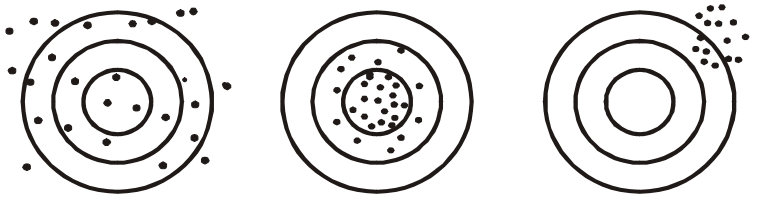
1. ***Construct Validity:*** A sales manager believes that there is a clear relation between job satisfaction for a person and the degree to which a person is an extrovert and the work performance of his sales force. Therefore, those who enjoy high job satisfaction, and have extrovert personalities should exhibit high performance. If they do not, then we can question the construct validity of the measure.
2. ***Content Validity:*** A researcher should define the problem clearly. Identify the item to be measured. Evolve a suitable scale for this purpose. Despite these, the scale may be criticised for being lacking in content validity. Content validity is known as face validity. An example can be the introduction of new packaged food. When new packaged food is introduced, the product representing a major change in taste. Thousands of consumers may be asked to taste the new packaged food. Overwhelmingly, people may say that they liked the new flavour. With such a favourable reaction, the product when introduced on a commercial scale may still meet with failure. So, what is wrong? Perhaps a crucial question that was omitted. The people may be asked if liked the new packaged food, to which the majority might have "yes" but the same respondents were not asked, "Are you willing to give up the product which you are consuming currently?" In this case, the problem was not clearly identified and the item to be 'measured' was left out.
3. ***Predictive Validity:*** This pertains to "How best a researcher can guess the future performance from the knowledge of attitude score"?

Example: An opinion questionnaire, which is the basis for forecasting the demand for a product has predictive validity. The procedure for predictive validity is to first measure the attitude and then predict the future behaviour. Finally, this is followed by the measurement of future behaviour at an appropriate time. Compare the two results (past and future). If the two scores are closely associated, then the scale is said to have predictive validity.

4. ***Criterion Validity:***
   (a) Examines whether measurement scale performs as expected in relation to other variables selected as meaningful criteria, i.e., predicted and actual behavior should be similar
   (b) Addresses the question of what construct or characteristic the scale is actually measuring
5. ***Convergent Validity:*** Extent to which scale correlates positively with other measures of the same construct.
6. ***Discriminant Validity:*** Extent to which a measure does not correlate with other constructs from which it is supposed to differ.
7. ***Nomological Validity:*** Extent to which scale correlates in theoretically predicted ways with measures of different but related constructs.

Notes

Figure 5.5: Reliability and Validity on Target



Self Assessment

Fill in the blanks:

14. An ..... questionnaire, which is the basis for forecasting the demand for a product has predictive validity.
15. Those who enjoy high job satisfaction, and have extrovert personalities should exhibit ..... performance.
16. Reliability deals with ..... and .....
17. There are two criteria to decide whether the scale selected is good or not, viz. ..... and .....

5.6 Summary

- Measurement can be made using nominal, ordinal, interval or ratio scale.
- The scales show the extent of likes/dislikes, agreement disagreement or belief towards an object.
- Each of the scale has certain statistical implications.
- There are four types of scales used in market research namely paired comparison, Likert, semantic differential and thurstone scale.
- Likert is a five point scale whereas semantic differential scale is a seven point scale.
- Bipolar adjectives are used in semantic differential scale.
- Thurstone scale is used to assess attitude of the respondents group regarding any issue of public interest.
- Validity and reliability of the scale is verified before the scale is used for measurement.
- Validity refers to "Does the scale measure what it intends to measure".
- There are three methods to check the validity which type of validity is required depends on "What is being measured".

Notes

5.7 Keywords

Interval Scale: Interval scale may tell us "How far the objects are apart with respect to an attribute?"

Likert Scale: This consists of a series of statements concerning an attitude object. Each statement has '5 points', Agree and Disagree on the scale.

Ordinal Scale: The ordinal scale is used for ranking in most market research studies.

Ratio Scale: Ratio scale is a special kind of internal scale that has a meaningful zero point.

Reliability: It means the extent to which the measurement process is free from errors.

5.8 Review Questions

1. What do you analyse as the merits of Thurstone Scale?
2. What might be the limitations of Thurstone Scale?
3. Which do you find to be more favorable of the attribute and non-attribute method of perceptual mapping and why?
4. In your opinion, what might be the uses of multi dimensional scaling?
5. One of the limitations of MDS can be that it keeps changing from time to time. What else than this do you see as the major drawbacks it has?
6. What can be the reasons for which you think that maintaining reliability can become difficult?
7. Does measurement scale always perform as expected in relation to other variables selected as meaningful criteria? Why/why not?
8. On an average, how many cups of tea do you drink in a day and why? Reply technically.
9. Explain the construction of
   (a) Likert scale
   (b) Semantic differential scale
   (c) Thurstone scale
10. Despite reliability, a scale may not have content validity. Comment.
11. Identify the type of scale, you will use in each of the following (ordinal, nominal, internal, ratio). Justify your answer.

Answers: Self Assessment

1.	Interval	2.	zero point
3.	attitude	4.	multiple
5	Attitude	6.	hypothesis
7.	semantic	8.	Multidimensional
9.	equal appearing interval	10.	Likert
11.	item part, evaluation part	12.	Rank Order

13. two or more
14. opinion
15. high
16. accuracy, consistency
17. reliability, validity

Notes

5.9 Further Readings

Books

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