Module I

1

INTRODUCTION TO MARKETING RESEARCH - I

Unit Structure

1.0 OBJECTIVE

After studying this unit, the students will be able to:

- Understand the concept of marketing research and its features, function and importance.
- Get an insight into the steps in marketing research and various ethical practice in the field of marketing research.

1.1 INTRODUCTION

Good instincts and intuition certainly play important roles in business. But, gut feelings about customers' needs and preferences aren't enough. If business want to minimize risk and improve chances of success, business need sound and objective data. That's where market research comes in.

Market research is the process of collecting and analysing information about the customers business want to reach, calledtarget market. This information providesbusiness intelligence that helps in making informed decisions. Market research can help in creating a business plan, launch a new product or service, improve existing products and services, expand into new markets, develop an advertising campaign, set prices, andselect a business location.

1.2 MARKETING RESEARCH

The environment for marketing has become extremely dynamic. Without adequate preparation, it is difficult for organizations to survive in such an

environment. Marketing research is one of the most effective tools that help organizations excel in the marketplace. Obtaining necessary information about customers' tastes and preferences is the key to business success.

Marketing research provides information about consumers and their reactions to various products, prices, distribution, and promotion strategies. Marketers who collect accurate and relevant information quickly and design their strategies quicker than their competitors are more likely to be successful.

Marketing research helps in effective planning and implementation of business decisions by providing accurate, relevant, and timely information. The process of marketing research involves a series of steps that systematically investigate a problem or an opportunity facing the organization.

The research process provides a scientific platform, contrary to the traditional intuitive approach of decision making by managers which used to put large amounts of resources of the organization at risk. Organizations in areas such as IT, pharmaceuticals, telecom, manufacturing, transportation, advertising, banking, law, education and even governments utilize marketing research to find solutions to different kinds of decision-making problems.

1.2.1 Definition

According to Philip Kotler, Marketing research is defined as,*"the systematic design, collection, analysis, and reporting of data and findings relevant to a specific marketing situation facing the company"*

*"Marketing research is the inclusive term which embraces all research activities carried on for the management of marketing work, the gathering, recording and analysing of all facts about problems relating to the transfer and sale of goods and services from producer to consumer."***Harry Hapner**

*"The systematic gathering, recording and analysis of data about problems relating to the marketing of goods and services"***The American Marketing Association.**

*"The systematic objective and exhaustive research for and study of the facts relevant to any problem in the field of marketing."***RichardCrisp**

*"Marketing research is the careful and objective study of product design, markets, and such transfer activities as physical distribution and warehousing, advertising and sales management."***Clark and Clark**

Thus, Marketing research is the systematic gathering, recording, and analysis of qualitative **and** quantitative **data about issues relating to** marketing **products and services.**

Marketing Research V/s Market Research

Marketing research is a broader term including market research. Marketing research is concerned with all the major functions of marketing. Market research is primarily concerned with knowing the capacity of the market to absorb a particular product. Marketing research is not only concerned with the jurisdiction of the market but also covers nature of the market, product analysis, sales analysis, time, place and media of advertising, personal selling and marketing intermediaries and their relationships etc.

1.2.2 Features of Marketing Research

1. Part of Marketing Management: Marketing research is one of the important part and function of marketing management. The information collected through marketing research helps marketing department in framing appropriate marketing mix. It also helps marketing managers to keep updated with latest information, trends and changes in marketing environment which in turn facilitates them in decision making.

2. Systematic Study: Marketing research is systematic study related various aspects of marketing. It follows well defined procedures for collection and analysis of marketing related data. Some of the steps of marketing research are as follows:

- Collection of data
- Recording of data
- Tabulating of data
- Analysis and Interpretation of data

Each of these steps is performed by experts under the supervision of marketing department. Hence, marketing research is systematic study from beginning till end.

3. Market Oriented: Marketing research is market-oriented activity. It starts with marketing problem and ends with solution of said marketing problem. It helps the firm in identifying needs and wants of customers and also provides profitable ways to satisfy that needs and wants. It also facilitates marketing department in establishing channel of distribution so that products can reach market easily, quickly and cheaply.

4. Continuous Process: Marketing environment is dynamic in nature. The constant changes in takes place in marketing environment. It is imperative for marketing managers to keep abreast with latest change related to customer needs and preferences, competitors, suppliers, dealers etc. Hence, firms need to undertake process of marketing research on continuous basis.

5. Data Collection: Marketing research gives importance to accurate data collection. In marketing research, suitable data should be collected objectively and accurately. The data collected must be reliable. It should

be analysed in a systematic manner. This will provide comprehensive picture of the marketing situation and possible solutions.

6. Larger Scope: The scope of marketing research is wider and larger. It is specialized activity which includes several functions like:

- Product research
- Market research
- Consumer research
- Promotion research
- Price research
- Distribution research

7. Helps in Decision Making: Marketing research assist managers in decision making process. It helps managers in taking practical and sound decisions. The information collected through marketing research helps marketing managers in:

- Product design decisions
- Pricing decisions
- Promotion decisions
- Place decisions

It not only helps marketing managers but also other functional department managers like finance, human resource, production etc. in decision making. The decisions based on experience and research is better than decision based on intuition.

8. Applied Research: Marketing research is branch of applied research. It is applied knowledge. It is concerned with specific marketing problem and suggests alternative solutions and possible outcome of each alternative. The research is conducted to understand specific marketing problems.

9. Intelligence Tool: In recent time, data and information is considered important part of marketing. It is said that those possess accurate marketing data, can control the market and business. Marketing research acts as intelligence tool of management. It is type of commercial intelligence activity. It gives management first-hand information related to various aspects of markets which provides competitive advantage to firm.

10. Use of Different Methods: Marketing department used different methods for undertaking marketing research. The mathematical and statistical tools are used for data analysis and interpretation. Percentages, ratios, averages, z-test, t-test, chi-square tests, etc. are used for presentation and interpretation of findings. The use of computer software has made it more convenient for in-depth analysis, cross-sectional studies, detection of errors in sampling and questionnaires.

The use of marketing research methods depends upon the nature, objectives etc. of marketing problems. Marketing department has to decide

the method which is suitable for the conduct of marketing research project. This selection is important as the quality of research work depends on the method used for the marketing research purpose.

11. Not Pure Science: Although, marketing research conducted with helps of systematic process and scientific methods are adopted during different stages of marketing research but marketing research is not pure and exact science. It only suggests possible solutions to marketing manager for consideration and selection.

12. Uncertain in Nature: Marketing research is uncertain in nature. The main focal point for any marketing research is consumers. It studies consumers behaviour but it is difficult to predict consumers behaviour precisely and accurately. It is not a physical science, but social science. Due to this inherent nature, it suffers from certain levels of inaccuracy.

1.2.3 Functions of Marketing Research

Marketing research performs five basic functions. These areDescription, Evaluation, Explanation, Prediction and finally Aid in Decision-Making. These functions are related to the research project undertaken. Usually, every research study performs all the five functions explained below:

1. Description: Marketing research provides data and gives information or description of customers who buy the product. This includes information about their age, sex, education, income and the amount of money that they are willing to spend on the product. Description of the customers is useful in order to draw certain conclusions about the customers and their buying behaviour. Even marketing strategies can be decided as per the information available.

2. Evaluation: Marketing research is useful for understanding the views or reactions of the buyers. This includes views of consumers on packaging, advertising, sales promotion measures used. A manufacturer gets these details as well as the information about his product in comparison with the products of his competitors. This facilitates evaluation of the marketing policies. For example, how farthepackaging of the product is attractive to consumers or superior as compared to packaging by competitors and so on.

3. Explanation: Marketing research givesexplanation to certain questions of a manufacturer. It may be related to decline in sales, retailers' negative reaction or resistance of consumers in a particular marketing area. Marketing research enables a manufacturer to understand why sales are reducingor why the response of the retailers is negative or why consumers in a particular region are not willing to purchase a specific product. Such explanation is important as it enables a manufacturer to adjust his marketing policies in order to rectify the prevailing unfavourable situation.

4. Prediction: Marketing research conducts prediction function. Such predictions may be related to consumers, market environment, market competition, possible socio-economic changes and so on.

This prediction function enables a manufacturer to understand how much people will spend on the specific product in the next year or the fashions that consumers may prefer in the next year. In addition, prediction about the possible turnover in the years to come is also possible through suitable marketing research studies.

In brief, marketing research is useful for understanding the marketing environment likely to develop in future. This facilitates proper adjustment in the marketing policies for the future period. In this sense, the prediction function is important even when all predictions made through research studies may not prove to be fully correct. However, the trend indicated can be used for appropriate policy decisions.

5. Helps in Decision Making: One more function of marketing research is to facilitate the process of decision-making in the marketing field. Marketing research guides the manufacturer as regards the manner in which he can make effective advertising appeal or create incentive among his salesmen or distributors. It also gives him guidance as regards price fixation and sales promotion techniques that will be useful for the future period. This function of marketing research is closely related to other functions that it performs. These functions facilitate reasonably correct decision-making by marketing managers.

In brief, the basic function of marketing research is to support marketing decision-making process. Marketing research does not provide ready-made decisions or exact solutions on all marketing problems. It only provides the clues or possible solutions that should be taken into consideration in the decision-making process. It provides support to skills and abilities of marketing managers.

1.2.4 Significance of Marketing Research in Marketing Decision Making:

1. Identifying Needs and Wants: Marketing and market is all about customers. It is very crucial for the firm to understand their target market and target customers. Marketing research helps in identifying consumers needs and wants. It also facilitates mangers to analyse their potential customers from various aspects like age, gender, income, standard of living etc.

2. Formulating Marketing Strategies: Today, market has become more competitive. It is not only restricted to local market but become national and also global market. Marketing research facilitated marketing managers in formulating marketing strategies for local, national and global market.

3. Framing Promotion Mix: Promotion mix plays crucial role in product life cycle. Marketing research uses promotional research to study media mix, advertising effectiveness and integrated communication tools. Research on such aspects will help in promoting effectively a company's product in the market.

4. Assist Selling Process: Marketing research assist in selling process of the product. It is used to analyse and evaluate performances of a company within a particular market. It also studies effectiveness of a sales force. It helps in identifying sales territories. Such information helps the companies in identifying areas of shortcoming in sales. It also examines alternative methods for distribution of goods.

5. Helps in Sales Forecasting: The most challenging task for any production manager is to keep optimum levels of inventory. However, production is undertaken in anticipation of demand. Therefore, scientific forecast of sales is required. Marketing research helps in sales forecasting by using market share method, sales force estimate method and jury method. This can also help in fixing sales quotas and marketing plans.

6. Revitalize Brands: Marketing research is used to study and find out the existing brand position. It finds out the recall value of brands. It explores the possibilities of brand extension or prospects of changing existing brand names. The main purpose of marketing is to create brand loyalty. Marketing research helps in developing techniques to popularize and retain brand loyalty.

7. Introduction of New Products: Marketing research helps in testing the new products in one or two markets on a small scale. This helps in finding out consumer response to new product and develop a suitable marketing mix. It reveals the problems of the customers regarding new products. Thus, it controls the risk involved in introducing a new product.

8. Export Promotions: The development in transport and communication has helped in globalization and digitalization of world trade. This has helped in boosting the growth of international markets. Marketing research helps in conducting market survey for export. It. collects information on marketing environment prevailing in a country. By collecting data on consumers from different countries, it indicates export potentials.

9. Assist in Decision Making: Marketing research plays a vital role in the decision-making processes by supplying relevant, up-to-date and accurate data to the decision-makers. Managers need up-to-date information to access customer needs and wants, market situation, technological change and extent of competition.

10. Identify Business Opportunities: Marketing research helps in identifying business opportunities. It helps in identifying new market opportunities for existing and new products. For instance, various

marketing research point out growing trend of binge watching which in turn created new trend of entertainment called OTT platforms i.e., web series.

11. Lower Business Risks: Marketing research helps in lowering the various risks associated with business. It provides information on market share, nature of competition, customer satisfaction levels, sales performances and channel of distribution etc. This helps the firms in solving problems and thus it will reduce the business risks.

12. Provides Direction: Marketing works on the bases of a lot of marketing research data derived from the research work, analyses, marketing research projects, etc. It does not work on simply pushing its product on a customer, unlike sales. Marketing researchers can guide the requirement of the consumer and what is really important for him. Marketing research can direct firm for both short-term as well as long-term requirement of focused customer.

13. Creates Future Customers: Unlike sales, marketing research does not focus on selling only today for achieving target of the day or target of the month; it focuses on creating a customer base for today as well as tomorrow. The base is created by creating a relationship with the customer by knowing his likes and dislikes, by being in touch with the king of the market on regular basis in some form or the other.

1.2.5 Limitations of Marketing Research:

Marketing research plays a crucial role in excelling marketing performance. In fact, it is inevitable to understand and treat customers more effectively than competitors. Marketer can satisfy customers by maintaining close contact with the target market by marketing research. It is one of the basic tasks of modern marketing. However, it is not free from limitations. Marketing manager must be aware of these limitations.

1. Extraneous Factors: Extraneous means external and uncontrollable factors. In most of the cases, the extraneous factors affect marketing research results adversely. Due to impact of such factors, the net impact cannot be estimated.

For example, if marketer wants to study the impact of 10% price rise on demand and he raises price by 10%. As a result, demand falls by 20%. Here, decrease in demand cannot be fully attributed to price hike only. Demand might have been affected by other factors like introduction of new superior product, attractive offer of competitors, availability of powerful substitutes, etc., over and above price rise.

Whatever degree of precaution is taken, one cannot eliminate effect of such factors completely, and as a result, marketing research cannot serve the purpose.

2. Time Gap: The time gap makes marketing research irrelevant. Systematic marketing research project needs more time. It takes weeks, months, even years. When marketing research is carried on to investigate or solve the problem, final outcomes are available after considerable time. When outcomes are made available, situations might have been changed thoroughly or problem for which research was made might have been solved automatically. Decision-maker needs information in time. But practically, it is not possible. Sometimes, time, money, and efforts contribute nothing.

3. High Cost: To conduct marketing research systematically is a luxury. A firm needs money for research design, data collection, data analysis, interpretation, and report preparation. Statisticians and computer experts charge heavy fees. When research is conducted regularly, a company has to maintain a separate well-equipped marketing research department. Marketing research has become costlier. So, it is difficult for medium and small companies to afford.

4. Dynamic Changes: Today's market is characterized by tremendous changes. Whatever is applicable or relevant today is out-dated tomorrow. Due to rapid changes, marketing research cannot serve the purpose. Research results or outcomes available after the specific time period seem irrelevant or meaningless.

5. Problem of Trust and Accuracy: Marketing research is based on trust and accuracy. Right from the identification of problem to the final outcomes, all depends on trust. Company has to trust on marketing research officer; research officer has to trust on field officer; and field officer has to rely on response of respondents. At any stage of marketing research, accuracy is vital issue. To the extent inaccuracy prevails, marketing research results suffer.

6. Biased in Nature: When human being is involved, a completely bias-free response or result is not possible. Effect of personal value, prejudice, attitudes, needs, and other socio-cultural factors affect the objectivity of research adversely. Subjectivity may lead to utter chaos.

7. Inherent Risks: In every economic decision, there exists risk and uncertainly. Marketing research cannot eliminate risk and uncertainty. It is an attempt to minimize degree of risk. So, heavy costs on marketing research don't guarantee safety and certainty.

8. Applicability: Contribution of research project depends not only on quality and reliability alone, but also the proper use of information. Many times, marketing research reports remain just a formality for top management. Recommendations are neither considered seriously nor implemented fully.

9. Differences of Opinions: Marketing research activity involves a number of people such as marketing manager, field officer, data analysts,

and finally decision-maker. All these people have different objectives, backgrounds, and perspectives. Consistency or parity among them is a vital issue. Unless high degree of integration and intimacy among them exit, one cannot expect a success. In fact, it is difficult.

10. Not Problem Solver: It is interesting and shocking to state that marketing research does not solve any problem directly. It is not a problem-solving technique but can assist to solve it. It is not a magic stick to solve marketing problems; it is a source of information. To the extent source is reliable and is used properly, it is useful. Even, an excellent research project is useless if outcomes are not considered.

11. Limited Scope: Marketing research solves many business-related problems. However, it cannot solve all business problems. It cannot solve problems related to consumer behaviour, income and expenditure relationship, etc. Thus, its scope is limited.

12. Limited Practical Value: Marketing research is only an academic exercise. It is mainly based on a hypothetical approach. It gives theoretical solutions. It does not give realistic solutions to real-life problems. Its solutions look good on paper but are harder to implement in a real sense. Thus, it has a limited practical value.

Marketing manager and those involved in marketing research activity must be aware of these limitations or practical problems. Note that these limiting factors cannot be completely eradicated. Attempts should be made to minimize adverse impact of these limiting factors. Careful plan, adequate budget, teamwork, accuracy, timeliness, proper use and implementation, etc., have a strong prospect to contribute in successful marketing research.

1.3 STEPS IN MARKETING RESEARCH

Marketing research exercise may take many forms but systematic enquiry is a feature common to all such forms. Being a systematic enquiry, it requires a careful planning of the orderly investigation process. Though it is not necessary that all research processes would invariably follow a given sequence, yet marketing research often follows a generalised pattern which can be broken down and studied as sequential stages.

1. Identifying and Defining Problem: The market research process begins with the identification "of a problem faced by the company. The clear-cut statement of problem may not be possible at the very outset of research process because often only the symptoms of the problems are apparent at that stage. Then, after some explanatory research, clear definition of the problem is of crucial importance in marketing research because such research is a costly process involving time, energy and money. Clear definition of the problem helps the researcher in all subsequent research efforts including setting of proper research objectives, the determination of the techniques to be used, and the extent of information to be collected.

It may be noted that the methods of explanatory research popularly in use aresurvey of secondary data, experience survey, or pilot studies, i.e., studies of a small initial sample. All this is also known as 'preliminary investigation'.

2. Statement of Research Objectives: After identifying and defining the problem with or without explanatory research, the researcher must take a formal statement of research objectives. Such objectives may be stated in qualitative or quantitative terms and expressed as research questions, statement or hypothesis. For example, the research objective, "To find out the extent to which sales promotion schemes affected the sales volume" is a research objective expressed as a statement.

On the other hand, a hypothesis is a statement that can be refuted or supported by empirical finding. The same research objective could be stated as, "To test the proposition that sales are positively affected by the sales promotion schemes undertaken this winter."

Example of another hypothesis may be: "The new packaging pattern has resulted in increase in sales and profits." Once the objectives or the hypotheses are developed, the researcher is ready to choose the research design.

3. Preparation of Research Design: After defining the research problem and deciding the objectives, the research design must be developed. A research design is a master plan specifying the procedure for collecting and analysing the needed information. It represents a framework for the research plan of action.

The objectives of the study are included in the research design to ensure that data collected are relevant to the objectives. At this stage, the researcher should also determine the type of sources of information needed, the data collection method (e.g., survey or interview), the sampling, methodology, and the timing and possible costs of research.

4. Planning for Sample: Sampling involves procedures that use a small number of items or parts of the 'population' (total items) to make conclusion regarding the 'population'. Important questions in this regard who are to be sampled as a rightly representative lot? Which is the target 'population'? What should be the sample size how large or how small? How to select the various units to make up the sample?

5. Data Collection: The collection of data relates to the gathering of facts to be used in solving the problem. Hence, methods of market research are essentially methods of data collection. Data can be secondary, i.e., collected from concerned reports, magazines and other periodicals, especially written articles, government publications, company publications, books, etc.

Data can be primary, i.e., collected from the original base through empirical research by means of various tools.
There can be broadly two types of sources

a. Internal sources: existing within the firm itself, such as accounting data, salesmen's reports, etc.

b. External sources: outside the firm.

6. Processing and Analysis of Data: Once data have been collected, these have to be converted into a format that will suggest answers to the initially identified and defined problem. Data processing begins with the editing of data and its coding. Editing involves inspecting the data-collection forms for omission, legibility, and consistency in classification. Before tabulation, responses need to be classified into meaningful categories.

The rules for categorizing, recording and transferring the data to 'data storage media' are called codes. This coding process facilitates the manual or computer tabulation. If computer analysis is being used, the data can be key punched and verified.

Analysis of data represents the application of logic to the understanding of data collected about the subject. In its simplest form analysis may involve determination of consistent patterns and summarising of appropriate details.

The appropriate analytical techniques chosen would depend upon informational requirements of the problem, characteristics of the research designs and the nature of the data gathered. The statistical analysis may range from simple immediate analysis to very complex multivariate analysis.

7. Formulating Conclusion: The final stage in the marketing research process is that of interpreting the information and drawing conclusion for use in managerial decision. The research report should clearly and effectively communicate the research findings and need not include complicated statement about the technical aspect of the study and research methods.

Often the management is not interested in details of research design and statistical analysis, but instead, in the concrete findings of the research. If need be, the researcher may bring out his appropriate recommendations or suggestions in the matter. Researchers must make the presentation technically accurate, understandable and useful.

1.3.1 Ethics in Marketing Research

A basic role for a marketing researcher is that of intermediary between the producer of a product and the marketplace. The marketing researcher

facilitates the flow of information from the market or customer to the producer of the good or service.

Such a situation, with three major players the producer, the customer and the market researcher often set the stage for conflicts of interest which can give rise to ethical problems. Given the inevitability of ethical dilemmas in marketing research, well-established ethical guidelines are critical.

For example, **Council of American Survey Research Organizations (CASRO)** has outlined some of the important dos and don'ts of ethical research:

- DO respect the rights of all research participants: confidentiality, transparency, and privacy. Ensure that all participants are voluntary, and that they have the right to withdraw their consent at any point during the research process. Respondents must also be informed if they are being filmed or recorded.

- DO be sure to cite the name of the firm that conducted the research, the purpose, and the dates of the study in any reports.

- DON'T cite any research in which the responses have been influenced or coerced.

- DON'T ask the researchers for confidential information about the respondents or their responses.

- DON'T dictate the methods used by the firm hired to conduct the research.

- DON'T ask for quantitative analytics from a qualitative study, and vice versa.

Marketing ethics is the area of applied ethics which deals with the moral principles behind the operation and regulation of marketing.

Ethics in Marketing research refers to moral principles or values that a researcher or research organization should consider.

1. **Privacy:** Privacy is a major concern for customers today, especially after the many scandals of companies misusing customer information. Informed consent and anonymity & confidentiality are three important elements involved in the right to privacy.

With companies having an unprecedented ability to collect and store massive amounts of customer data, the importance of ethics in marketing research has never been higher. The company must ensure privacy of the respondents.

2. **Rights and Obligations:** Everyone involved in the market research process, from clients and researchers to the public and respondents, has rights and obligations they expect to be met.
Paying attention to the ethical importance of meeting the rights and obligations of everyone involved is the best way to avoid any unethical concerns when it comes to market research methods.

3. **Confidentiality:** The researcher must ensure protection of data or confidentiality of data by following ways:

- Researcher or research organization should protect data properly.
- They should keep confidential data or information very safe and secure.
- Any client or outside person should not access confidential and important data from the organization.

4. **Deceptive Practice:** The importance of ethics in marketing research doesn't just apply to the way participants are treated but market research methods as well. Companies today have more access to customer data than ever before and this amount of access can easily lead to deceptive practices.

Practices, like misrepresenting research results and not disclosing to consumers that their data is being collected etc. are some of the deceptive practices in marketing research. Lying and deceiving customers to access and gather information is ethically wrong and could backfire in a devastating way.

5. **Use of Data:** Information or data collected from respondents should not be used for any other purpose or for any other research work. In this case, the researcher plays a crucial role and he can assure respondents about the security of the opinions and information given by the respondent.

6. **Compulsion to Respond:** The researcher should not force any respondent for answers. The researcher can explain the importance or necessity of answer to that question for research work, but he/she should not make compulsion or impel respondents to answer a particular question.

7. **Personal Questions:** In case of personal or sensitive questions, the researcher should give time to respondents to think about it, and refuse to participate in the study.

Researcher or trained staff of appropriate sex can be used to reduce embarrassment caused. For example, suppose questions are related to the female product, then it will be better to select female staff to do the research.

8. **Incomplete Reporting:** The researcher should not prepare incomplete report. The incomplete report includes:

- May not disclosing potentially damaging information about the product
- Leaving uninformed about undesirable features or characteristics of the product
- May hide or omit negative information or may avoid reporting situational details that are necessary

9. **Confirmation Bias:** Confirmation bias is the tendency to search for or favour information that is consistent and confirms one's existing beliefs. It is one of the most prevalent and long-recognized forms of bias present in market research. Failing to interpret information in an unbiased way can lead to misjudgements and inaccurate analysis. This results in a biased favoring, interpretation, and recall of information.

To combat confirmation bias, researchers must consider alternative hypotheses and avoid forming a hypothesis too early.

10. **Culture Bias:** Culture bias is the interpretation of situations, actions, or data based on the standards of one's own culture. This bias can also potentially lead to stigma and stereotyping based on assumptions. Thus, it is important to avoid generalizations when examining data.

Overall, it is difficult to conduct market research without bias. However, through understanding its potential threats, analysts can provide insightful, unbiased information to the client.

11. **Big Data and Privacy:** The term "big data" refers to data that is continuing to come at a higher velocity, volume, and variety than ever before. It is also more complex than traditional data. Sources of big data are also becoming more complex.

Big data is now being pulled from mobile devices, social media, and numerous other sources. Big data makes use of advanced technologies such as location-based technology, facial recognition, and autonomous sensors. This means large amounts of data are being collected independently of human action.

This allows market researchers to gather a wide variety of information to gain valuable insights. This data allows companies to access even more data while the consumer may have little or no awareness. However, using big data has also raised concerns regarding individual privacy and its implications.

1.4 SUMMARY

Marketing research is usually the first step in the marketing process, after ideas for products are conceived. Small companies conduct marketing research to obtain information from the marketplace. They use it to solve

problems, obtain information on competitors and determine the needs and wants of non-paying consumers and customers. Marketers then analyse the data and develop various marketing strategies. It's marketing's job to leverage research to reach the best possible solution based on the research available. Then, they must implement the solution, modify the solution, and successfully deliver that solution to the market.

Marketing research often focuses on understanding:

- The customer (purchasers, consumers, influencers)
- The company (product design, promotion, pricing, placement, service, sales)
- The competitors (and how their market offerings interact in the market environment)

Many types of marketing research studies can assist with this "Company-Customer-Competition" scope, such as:

- Monitoring customers and markets
- Measuring awareness, attitudes, and image
- Tracking product usage behaviour
- Diagnosing immediate business problems
- Supporting strategy development

Marketing research serves marketing management by providing information which is relevant to decision making. Marketing research does not itself make the decisions, nor does it guarantee success. Rather, marketing research helps to reduce the uncertainty surrounding the decisions to be made. In order to do so effectively, marketing research has to be systematic, objective and analytical.

1.5 EXERCISE

Fill in the Blanks

1. _____refers to a systematic design, collection, analysis and reporting of data and findings relevant to a specific marketing situation facing the company.
a) Marketing Mix b) Marketing Event c) Marketing Research d) Marketing Information
2. _____ data is the first-hand information collected by the researcher
a) Preliminary b) Present c) Prevalent d) Primary
3. _____ data refers to the data which is easily available.
a) Salient b) Secondary c) Scatter d) Seasonal
4. Marketing research might _____the decision-making process.
a) Delay b) Disqualify c) Prohibit d) Debar
5. Marketing research is only an ____ to decision making.
a) Obstruction b) Aid c) Hindrance d) Obstacle

Answers:

1. Marketing research
2. Primary
3. Secondary
4. Delay
5. Aid

Match the column

Column A	Column B
1. Applied research	A. Limitations of marketing research
2. Not pure science	B. Steps in marketing research
3. Assist in decision making	C. Feature of marketing research
4. Data collection	D. Ethics in marketing research
5. Right to privacy	E. Functions of marketing research

Answers:

1. C, 2. A, 3. E, 4. B, 5. D

True or False

1. Marketing research is a systematic process.
2. Cultural bias is a limitations of marketing research.
3. Managers cannot take effective decisions with the help of marketing research.
4. Marketing research is one time activity.
5. Other functional department in the organization does not benefit from marketing research.

Answers:

1. True
2. True
3. False
4. False
5. False

Shorts Notes

1. Characteristics of marketing research.
2. Functions of marketing research department.
3. Importance of marketing research.
4. Disadvantages of marketing research.
5. Ethics in the field of marketing research.

Answer in Brief

1. Define the term Marketing Research and Explain it features
2. Evaluate various functions performed by marketing researcher.
3. Discuss the significance of marketing research.
4. "Marketing Research play a crucial role in marketing decision making". Substantiate.
5. What is marketing research? Discuss it imitations.
6. Discuss in detail steps in marketing research process.
7. Critically evaluate ethics related to marketing research.

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2

INTRODUCTION TO MARKETING RESEARCH - II

Unit Structure

2.0 OBJECTIVE

After studying this unit, the students will be able to:

- Explore career options in the field of marketing research and essentials qualities required to become effective marketing research professionals.
- Understand Marketing Information System, its components, Decision Support System and Data mining

2.1 INTRODUCTION

Marketing research is dynamic in nature and continueschanges takes place in the world of marketing research. With the advancement of Information and technology, the various segments of marketing research have evolved significantly.

There is an ample of career options in the marketing research and there is an urgent need of well qualified, trained professionals in the various segments of marketing research. The managers can take effective decisions with the help of management information system. The well-defined decision support system reduces the work of managers drastically and it improves quality of decision making in the organization. The latest development of in the area of data mining is major boon for the marketing research.

2.2 CAREER OPTIONS IN MARKETING RESEARCH

The key responsibility of a market researcher is to help an organization draft a dynamic productprofile that captures the preferences of their consumers. This in turn helps the marketing and sales teams meet their objectives. Additionally, marketing researchers also analyse the past statistical sales data to predict the prospect of future sales. To do so, Market Research Analysts deploy various creative ways such as focus-group interviews, surveys and telephonic interviews to get the desired information from customers. The data collected is compiled and organized in a systematic manner and presented to clients to take business decisions accordingly.

Depending upon the role, position and experience of a candidate, the salary structure for Research professionals in a marketing research organization can vary from post to post, educational qualifications and work-experience. For instance, the starting salary of a field survey executive will be in the range of Rs.6,000 to Rs.7,000 per month and the salary of a Senior Manager is up to the Rs. 9,00,000 and Rs. 15, 00,000 per annum.

1. Research Director: This is the most senior position in marketingresearch and takes the entire responsibility for developing and delivering all the market research related projects on time.

2. Research Manager: Research Managers are responsible for designing, implementing and managing the respective research projects. They make sure that the research project is running flawlessly and for that matter liaises with the operational director. They act as a bridge between the company and its clients.

3. Research Executive: A Research Executive takes part in the initial development of projects and also works with the operational department of the firm. The executive closely works with the research manager and research analyst to develop the layout of research design and data collection. They are also involved in the preparation of the final research report.

4. Research Analyst: They look after the work of data analysis and data presentation. In addition, they also play an important role in testing the quality of questionnaire routing.

5. Operations Director: The position of operational director is full of responsibilities and considered the most crucial one in marketing research. They look after a number of departments that includes sampling, data preparation, data entry, questionnaire scripting, tabulations and the telephonic unit. They ensure the research project is delivered flawlessly and on time, meeting all the cost constraints and quality standards.

6. Fieldwork Managers: Thefieldwork managers look after all the recruitment, management, training and evaluation of face-to-face and telephonic interviews. Moreover, they have the responsibility of training, quality management and creation of relevant research samples.

7. Data Processing Professionals: They mainly focus on one or many core areas of data processing, which includes scripting of surveys, data processing tabulation, statistical sampling and market modelling.

There is no second opinion now that, through the help of proper marketing research projects any business company can know all the details regarding SWOT i.e Strengths, Weaknesses, Opportunities and Threats regarding its business beforehand and thus, it can take all the necessary and preventive steps in advance for its continuous business growth.

2.3 QUALITIES OF A GOOD MARKETING RESEARCH PROFESSIONAL

1. Analytical Skills: A marketing research professional should possess strong analytical skills. It is not only important to collect the data but also to give meaningful sense to it. The research professionals should analyse and translate this information into actionable insights for client's business.

2. Communication Skills: It is imperative for marketing research professionals to have good verbal and written communication skills. The researcher would be able to communicate finding of the research in simple and clear language to client. It will help in better understanding of the research which in turn facilitates effective decision-making process.

3. Pleasant Personality: A pleasant personality is one of the required traits of effective marketing research professional. Although, it is subjective in nature. It is not mere physical personality but more emphasis is on mental personality. As a marketing research professional, there is need to collect information from the responded. A good blending of heart and mind on part of research professional make good rapport with respondents. It facilitates research professionals to work with variety of respondents with different personality.

4. Open Minded: A marketing research professionals should have open mind. They should not have any preconceived notion about a particular client before working with them to reduce any potential risk of being biased. In addition, an effective market researcher will not ask questions that can directly affect the answers of its participants or subtly lead participants to give outdesired answers.

5. Understanding of Multiple Research Methods: A marketing research should be well versed with different types of research methods. The world of market research is composed of several research methodologies. Each one has its own corresponding benefit and

shortcoming. Marketing research professional need to distinguish when to use which method depending on a range of situations.

For instance, focus group discussions provide a detailed opinion from selected people in a social environment, whereas an in-depth interview is an opinion taken from specific individuals at a time. Diary and journal studies ensure in-the-moment reflections from individual participants while online research communities include a bigger set of respondents which allows for comparative analysis.

6. Client Focused: A marketing research professional must remember that every project is different. There is no such thing as a "one size fits all" solution in research. Marketing research professional must be able to assess client's problem first, understand where the gap is, and then determine the approach and the tools required for that particular project.

Furthermore, research professionals are not restricted for using just one research method; in fact, it is recognized that using multiple methods and tools can help achieve reliable results. Basically, a skilled researcher knows how to adapt based on their client's needs.

7. Presentation and Reporting Skills: The task of market researcher just doesn't end with interpreting the collected data. Whatever insight is drawn from the analysis phase should be well-documented, actionable, and be made into a visually understandable report that clients will have no problem understanding it.

As a market researcher, itis also expected to accurately present these data toclients and be ready for follow-up questions. This will act as a guiding light to help them make informed decisions. It is, therefore, really essential to possess reporting and presentation skills.

8. Management Skills: A marketing research professionals need to work with a number of people; colleagues, respondents, marketing people, the client. It is then imperative to have strong management skills because this work demands a strong group dynamic. They should be in position to manage people effectively and do always be open for receiving and providing feedback respectfully.

9. Spotting Trends: An effective market researcher is someone who is able to easily spot patterns and trends through data analysis and be able to identify meaningful events or insights from them. This refers to ability to formed sensible conclusions from various types of observations that will assist clients to make informed decisions.

10. Curiosity: A marketing research professional should always have the curiosity and the desire to learn and know more. It's important that researcher never stop asking why and figuring out the how's. They should have the passion to always dig deeper, look further, and see things from a

different perspective so they can come up with ideas that client wouldn't have thought of.

Great marketing research professionals will continuously look for ways to improve their knowledge of research methods and ways to innovate and drive the industry forward.

2.4 MARKETING INFORMATION SYSTEM

Marketing information systems are really the frameworks used for managing, processing and accessing data. They can be simply a sharing of information by key departments, but are more likely to be some form of integrated system based around information technology. The important issue is that the information from such a system is presented in a way that is useful to the marketing decisions.

The term 'marketing information system' or MIS is used to describe such a system. Such systems are generally discussed in the context of marketing information or marketing research.

2.4.1 Definition

Cundiff, Still and Govoni define MIS as, *"Marketing information system is an organised set of procedures, information handling routines and reporting techniques designed to provide the information required for making marketing decision."*

K. Cox and K. Gonod hold, *"MIS is a set of procedures and methods for the regular and planned collection, analysis and presentation of information in making marketing decisions."*

Professor Alder Lee opines *"Marketing information system is an interacting, continuing, future oriented structure of people, equipment and procedure designed to generate and process an information flow which can aid business executives in the management of their marketing programmes."*

2.4.2 Components of Marketing Research System

Marketing Information System (MIS) collects, analyses, and supplies relevant information to the marketing managers. It is a valuable tool for planning, implementing and controlling the marketing activities.

The role of MIS is to identify what sort of information is required by the marketing managers. It then collects and analyses the information. It supplies this information to the marketing manager at the right time. MIS collects the information through its subsystems. These subsystems are called components.

The four main components of Marketing Information System (MIS) are:

1. Internal Records
2. Marketing Intelligence

3. Marketing Research
4. Marketing Decision Support System

1. **Internal Records:** The first component of MIS is 'Internal Record'. Marketing managers get plenty of information from the internal-records of the company. These records provide current information about sales, costs, inventories, cash flows and account receivable and payable. Many companies maintain their computerized internal records.

The heart of the internal record system is the order-to-payment cycle. Customers send orders to the firms. The sales department prepares invoices and transmits copies to various departments. The billing department sends invoices as quickly as possible. This record becomes a vital source of information for analysis of sales, inventory levels, profit margins, credit policy to customers, etc.

2. **Marketing Intelligence:** The second component of MIS is 'Marketing Intelligence'. It collects information from external sources. It provides information about current marketing environment and changing conditions in the market. This information can be easily gathered from external sources like; magazines, trade journals, commercial press, so on. This information cannot be collected from the Annual Reports of the Trade Association and Chambers of Commerce, Annual Report of Companies, etc. The salesmen's report also contains information about market trends.

The information which is collected from the external sources cannot be used directly. It must be first evaluated and arranged in a proper order. It can be then used by the marketing manager for taking decisions and making policies about marketing. So, marketing intelligence is an important component of MIS.

3. **Marketing Research:** The third important component of MIS is 'Marketing Research'. Marketing research is conducted to solve specific marketing problems of the company. It collects data about the problem. This data is tabulated, analysed and conclusions are drawn. Then the recommendations are given for solving the problem. Marketing research also provides information to the marketing managers.

It acts as a tool for accurate decision-making in marketing. It is useful for studying and solving different marketing problems. Marketing research techniques are used by manufacturers, exporters, distributors and service organizations. Marketing research is an applied knowledge. Hence, it provides alternative solutions to deal with a specific problem.

However, this information is specific information. It can be used only for a particular purpose. Marketing Information System and Marketing research are not substitutes of each other. The scope of marketing information system is very wide. It includes marketing research. However, the scope of marketing research is very narrow.

4. **Marketing Decision Support System:** A growing number of organizations are using marketing decision support system to help the managers in taking better decisions. It is a system supported by software and hardware to gather information from business and environment.
It helps managers in providing evidence for the decisions taken by them. The current marketing software programs assist in designing marketing research studies, market segmentation, selling prices, budget, analysing media, and planning sales force activity.

The following are some examples of Marketing Information System

- **Transaction Processing System**, which processes the routine transactions associated with a business. For example, transactions include payroll processing, order processing, such as for an e-commerce business, and invoicing.

- **Management Support Systems**, which store and organize data, enabling end users to generate reports and analyse data to address business needs and inform planning. A data warehouse is an example of a Management Support System.

- **Decision Support Systems**, which analyse business data to assist managers with decision making. For example, a DSS could project revenue figures based on new product sales assumptions.

- Expert Systems, which provide managers with insights and advice, using artificial intelligence (AI) to simulate the expert knowledge of a human in a particular field.

2.4.3 Essentials of Good Marketing Information System (MIS)

1. **Unified and Centralized:** MIS must be unified and centralized. It collects and stores different types of market information. All of this information must be unified and centralized. All the marketing information must be brought together (unified) and kept at one central place (centralized). So, it must be at the central-office. This will result in easy access and quick reference. The managers will be able to find all the required information at one place.

2. **Assist Decision Making:** MIS must facilitate decision making. It must guide the marketing managers in decision making. It must provide required information to the managers to help in taking decisions. This information must be of a good quality. It must be relevant, reliable, and up-to-date. This will result in an accurate decision-making process. So, it must not only be a data bank. It must play a positive role in the decision-making process.

3. **Quick and Accurate:** The MIS should be user-oriented and also quick. The information flow should be done accurately and also with speed. This

is necessary as there is information flood in the field of business world. In addition, information should be made available quickly to managers. Information must move with speed as information supplied late to the department is not useful in the decision-making process. Even marketing opportunities are lost. This clearly suggests that MIS should be accurate and should move and operate with speed within the organization.

4. **Economical:** MIS should be economical as far as possible. This means the expenditure on running the system should be minimum as the system is not directly productive. It is a service and supporting function. For such economy in the MIS, the principle of selectivity should be introduced in the collection, processing, storing and supplying information in the system. The cost of MIS should not exceed its value. The expenditure of MIS should be minimum as far as possible. However, cost reduction should not be at the cost of quality and reliability of information.

5. **Selective:** MIS should collect information that is absolutely essential and useful in decision-making process. MIS should not be viewed as a mere courier service department. It should sort out the information that is really useful to the firm. This is essential when there is information flood due to the use of electronic media of communication. Thus, information needs of the organization should be assessed and the MIS should operate accordingly. This avoids wastage of time and money.

6. **Future oriented:** MIS must be forward looking i.e. future-oriented. It must not be a past-oriented one. It must give more importance to future-oriented information. It must provide information for solving problems, which may come up in the future. The company will be successful if their marketing managers are future-oriented. The marketing managers can be so only if the MIS is also future oriented.

7. **Regularity:** MIS must supply information regularly. The business environment is changing constantly. So, the marketing managers have to take marketing decisions continuously. Therefore, they require a regular and continuous flow of market information. This information must be provided by MIS. So, it must supply information regularly to the marketing managers.

8. **Use New Techniques:** Along with information explosion, information technology is also making rapid progress. New machines, methods and techniques are being introduced in the collection, processing and storage of information. New techniques bring speed, updating and accuracy in the MIS. Managers can use the MIS to the fullest extent only when the latest techniques such as computer technology and internet service are used in MIS itself. These newer techniques will increase the efficiency and accuracy of MIS. MIS will also become more economical by using new techniques.

9. **Flexibility:** The MIS introduced in an organization should be elastic or adjustable. It should not be rigid. When the system is flexible, new changes can be incorporated easily, quickly and smoothly. Moreover, modern techniques can be introduced for raising the efficiency and accuracy of the system. In brief, flexibility is one essential requisite of a good MIS.

10. **Compatible with Firm Culture:** MIS should be adjusted with the culture and level of sophistication attained by the business organization. The MIS required by a large firm would be different as compared to one required in a small firm even when both have to maintain their own MIS. The MIS should be understandable to the people who have to use the system frequently. In brief, the management should set up a MIS that will cater to the needs of an organization and also offer operational convenience.

2.4.4 Concept of Decision Support System (DSS)

According to Scott Morton,*"Decision support system (DSS) is interactive computer-based system, which helped decision-makers utilise data and models to solve unstructured problems".*

A decision support system (DSS) is an information system that aids a business in decision-making activities that require judgment, determination, and a sequence of actions.

A decision support system (DSS) is a computerized program used to support determinations, judgments, and courses of action in an organization or a business. A DSS sifts through and analyses massive amounts of data, compiling comprehensive information that can be used to solve problems and in decision-making.

The information system assists the mid- and high-level management of an organization by analysing huge volumes of unstructured data and accumulating information that can help to solve problems and help in decision-making. A DSS is either human-powered, automated, or a combination of both.

A decision support system produces detailed information reports by gathering and analysing data. Hence, a DSS is different from a normal operations application, whose goal is to collect data and not analyse it.

In an organization, a DSS is used by the planning departmentssuch as the operations departmentwhich collects data and creates a report that can be used by managers for decision-making. Mainly, a DSS is used in sales projection, for inventory and operations-related data, and to present information to customers in an easy-to-understand manner.

Theoretically, a DSS can be employed in various knowledge domains from an organization to forest management and the medical field. One of the main applications of a DSS in an organization is real-time reporting. It

can be very helpful for organizations that take part in just-in-time (JIT) inventory management.

In a JIT inventory system, the organization requires real-time data of their inventory levels to place orders "just in time" to prevent delays in production and cause a negative domino effect. Therefore, a DSS is more tailored to the individual or organization making the decision than a traditional system.

2.4.5 Components of Decision Support System (DSS)

Decision support system (DSS) is a specific class of MIS system that helps the manager at all stages of decision-making like problem identification, selection of relevant data, picking up the right approach and examining alternatives.

Decision support system is a mixture of computer applications and human component which can go through large amount of data and come up with solutions. Many companies have adopted DSS as a part of their daily operations activities instant of considering it is as a specialised part of business.

Many companies are constantly download and analysis data, budget sheet and forecasts to constantly update their strategy. This decision support system is static in business but its result is dynamic or constantly changing.

A system which supports the process of decision making is known as decision support system (DSS). This helps in supporting only and not automating the process of decision making. With the help of decision support system, decision maker can retrieve the information and find the alternate solutions in the process of problem solving.

DSS aids in quality decision based on model data. Correct decision making in business is usually dependent on quality and analysis of data and is used to find trends, which helps in creating solutions and strategies.

DSS's are designed for every manager to execute a specific managerial task or problem. Generally, they help managers to make semi-structured decisions, the solution to which can be arrived at logically. However, sometimes, they can also help in taking complex decisions.

A decision support system consists of three main components, namely database, software system and user interface.

1. **DSS Database:** It contains data from various sources, including internal data from the organization, the data generated by different applications, and the external data mined form the Internet, etc. The decision support systems database can be a small database or a standalone system or a huge data warehouse supporting the information needs of an organization. To avoid the interference of decision support system with the working of operational systems, the DSS database usually contains a copy of the production database.

2. **DSS Software System:** It consists of various mathematical and analytical models that are used to analyse the complex data, thereby producing the required information. A model predicts the output in the basis of different inputs or different conditions, or finds out the combination of conditions and input that is required to produce the desired output.

A decision support system may compromise different models where each model performs a specific function. The selection of models that must be included in a decision support system depends on user requirements and the purposes of DSS. Note that the DSS software contains the predefined models (or routines) using which new models can be built to support specific type of decisions.

3. **DSS User Interface:** It is an interactive graphical interface which makes the interaction easier between the DSS and its users. It displays the results (output) of the analysis in various forms, such as text, table, charts or graphics. The user can select the appropriate option to view the output according to his requirement.

A manager, for example, would like to view comparative sales data in tabular form whereas an architect creating a design plan would be more interested in viewing the result of analysis in a graphical format.

The present-day decision support system built using the Web-based interface provides its users some special capabilities like better interactivity, facility for customization and personalization, and more ease of use.

2.4.6 Importance of Decision Support System

1. Informed Decisions: DSS is often used by top and middle level management. Decision support systems are used to make actionable decisions, or produce multiple possible outcomes based on current and historical company data. At the same time, decision support systems can be used to produce reports for customers that are easily digestible and can be adjusted based on user specifications. A decision support system increases the speed and efficiency of decision-making activities. It is possible, as a DSS can collect and analyse real-time data.

2. Wider Scope: The scope of DSS is wider. It has its use in many industries ranging from medicine to agriculture.

For instance, a medical clinician may use a computerized decision support system for diagnostics and prescription. Combining clinician inputs and previous electronic health records, a decision support system may assist a doctor in diagnosing a patient.

3. Preparation of Reports: DSS assist managers in preparation of various types of reports. A decision support system analyses and synthesizes vast amounts of data to assist in decision-making. With this information, it produces reports that may project revenue, sales, or manage inventory. A DSS system is beneficial because it can be programmed to generate many types of reports, all based on user specifications.

For example, the DSS can generate information and output its information graphically, as in a bar chart that represents projected revenue or as a written report.

4. Departmental Use: DSS system is used by different department for their specific use. For instance, DSS is used by the planning departments such as the operations department which collects data and creates a report that can be used by managers for decision-making. Also, DSS is used in sales projection, for inventory and operations-related data, and to present information to customers in an easy-to-understand manner.

5. Model Management System: The model management system stores models that managers can use in their decision-making. The models are used in decision-making regarding the financial health of the organization and forecasting demand for a good or service.

6. Training and Development: DSS promotes training and development within organization. For instance, there is a need to conduct number training session on continuous basis for smooth function and implementation DSS within organization. The training sessions improves specific knowledge, attitude, skills required for effective use of DSS.

7. GPS Routing: GPS route planning is an example of a typical DSS. It compares different routes, taking into account factors such as distance, driving time and cost. The GPS navigating system also enables users to choose alternative routes, displaying them on a map and providing step-by-step instructions.

8. Clinical DSS: A clinical decision support system (CDSS) is a software program that uses advanced decision-making algorithms to help physicians make the best medical decisions. Healthcare professionals often use these to interpret patient records and test results, and to calculate the best treatment plan. CDSS in healthcare can help providers identify abnormalities during specific tests, as well as monitor patients after certain procedures to determine if they are having any adverse reactions.

9. Quick Decisions: Time plays a crucial role in decision making irrespective industry and level of management. All categories of decision support systems are intended towards simplifying things and saving time.

A DSS helps a business in quickly making an effective decision by analysing large volume of data. The time taken in studying data and

comparing the possible courses of actions is significantly reduced. The decision time cycle gets shorter, allowing businesses to act speedily in a given situation, ultimately reducing the time-to-market.

10. Accurate Data: An analysis and interpretation of data involves human bias. Since each evaluator thinks differently, there can never be a universal truth. A decision support system analyses data without any bias and presents it in its accurate form. This enhances the possibility of improved decision making.

11. Reduction of Cost: The deployment of a decision support system dramatically reduces the cost of gathering, sorting, processing and analysing data. In fact, the cost of information storage, hardware and computer and internet technology is falling considerably. This means the cost of distributing decision-making technology even to the lower levels of hierarchy is decreasing. The application of DSS will no longer be restricted to the certain departments or hierarchical levels. The faster decision making at all levels of management will help businesses to stand out in market.

2.4.7 Data Mining

Data mining is a process used by companies to turn raw data into useful information. By using software to look for patterns in large batches of data, businesses can learn more about their customers to develop more effective marketing strategies, increase sales and decrease costs.

Data mining is the process of sorting through large data sets to identify patterns and relationships that can help solve business problems through data analysis. Data mining techniques and tools enable enterprises to predict future trends and make more-informed business decisions.

In simple words, data mining is defined as a process used to extract usable data from a larger set of any raw data. It implies analysing data patterns in large batches of data using one or more software.

Data mining involves effective data collection and warehousing as well as computer processing. For segmenting the data and evaluating the probability of future events, data mining uses sophisticated mathematical algorithms. Data mining is also known as Knowledge Discovery in Data (KDD).

2.4.8 Importance of Data Mining

Data mining software is extensively valuable for business, because it helps to reveal hidden patters for personal usage. These patterns help to improve business relationships, because they are applied for making data analysis and predictions that open wider business opportunities.

Data mining concepts and techniques are beneficial for the variety of industries such as:

- Banking
- Insurance
- Education
- Retail
- Social Media

1. **Help in Research:** Data mining helps organization in conducting marketing research and survey. It is useful for product research, various surveys, market research and analysis which in turn facilitates in preparation of new marketing campaign and promotion strategies.

2. **Collection of Information:** Data mining facilitates firm in collectinglarge but relevant information related to various aspects of markets. For instance, with the help of scrapping process, it is possible to collect information investors, investment and funds by scraping through related websites and database.

3. **Opinions of Customers:** The opinions, views of customers are really significant for the business organization. It forms bases of many business decisions which in turn offer competitive advantage to the firm. The information can be readily be found on different forums, blogs and other resources where customers freely provide their views.

4. **Scanning of Data:** The collection of data and storing it simply will not have significant value unless it is properly scanned. The process of data scanning is important to identify the patterns and similarities contained in data entries.

5. **Marketing Strategies:** Data mining facilitates marketing managers in preparation of effective marketing strategies. For instance, a marketing department of any company can mine data on customers using special tools and datasets for data mining so that a company can build the most effective marketing campaign and become one of the most profitable and competitive in the respective business field.

6. **Planning and Forecasting:** Data mining improves planning and forecasting function of business organization. For instance, the retail industry can use authenticate data mining procedures for getting and analysing customer behaviour and previous sales patterns in order to decide what products and services to offer in future as well as what business direction to choose.

7. **Analysis of Competitor:** In today's competitive world, there is need to understand competitor and their position in the market. Business should know their strength and weaknesses. Their methods marketing and distribution can be mined. Such analysis of competitor brings competitive advantage to the firm.

8. Business Decisions: Data mining enables firm in taking effective business decisions. Data mining is used to discover patterns and relationships in the data in order to help make better business decisions. Data mining can help spot sales trends, develop smarter marketing campaigns, and accurately predict customer loyalty. Specific uses of data mining include:

- Market segmentation
- Customer churn
- Fraud detection
- Direct marketing
- Interactive marketing
- Market basket analysis
- Trend analysis

9. **Automated Prediction:** Data mining automates the process of finding predictive information in a large database. Questions that traditionally required extensive hands-on analysis can now be directly answered from the data.

A typical example of a predictive problem is targeted marketing. Data mining uses data on past promotional mailings to identify the targets most likely to maximize return on investment in future mailings.

Other predictive problems include forecasting bankruptcy and other forms of default, and identifying segments of a population likely to respond similarly to given events.

10. **Identify Hidden Pattern:** Data mining tools analyse large volume of databases and identify previously hidden patterns. An example of pattern discovery is the analysis of retail sales data to identify seemingly unrelated products that are often purchased together. Other pattern discovery problems include detecting fraudulent credit card transactions and identifying anomalous data that could represent data entry keying errors.

11. **All Pervasive:** Data mining is not only useful to commercial organization but also to non-commercialization. Many companies dig through volumes of data to discover patterns about their customers and products. AT&T, A.C. Nielson, and American Express are among the growing ranks of companies implementing data mining techniques for sales and marketing. These systems are scanning through terabytes of point-of-sale data to aid analysts in understanding consumer behaviour and promotional strategies.

For example, In US, grocery chains have found that when men go to a supermarket to buy diapers, they sometimes walk out with a six-pack of beer as well. Using that information, it's possible to lay out a store so that these items are closer.

Similarly, financial analysts are digging through vast sets of financial records, data feeds, and other information sources in order to make investment decisions. Health-care organizations are examining medical records to understand trends of the past so they can reduce costs in the future.

2.5 SUMMARY

Today many companies no longer think of marketing research in terms of only a single project. Through experience managers have learned that they need certain kinds of information at regular intervals of time in order to deal with recurring decisions. As a consequence, they have found it very helpful to use several regularly scheduled research projects that support or complement one another in providing managers with the appropriate information needed for those recurring decisions.

When a company begins to regularly schedule the coordination of findings from several research projects designed to assist in specific recurring decision situations, the company has begun to develop a marketing information system- MIS for short.

Data mining has applications in multiple fields, like science and research. As an application of data mining, businesses can learn more about their customers and develop more effective strategies related to various business functions and in turn leverage resources in a more optimal and insightful manner. This helps businesses be closer to their objective and make better decisions.

2.6 EXERCISE

Fill in the Blanks

1. _____is a component of MIS.
   a) Niche marketing b) Event marketing c) Marketing research d) Consumer behaviour

2. Data available from sources within the organization are called _____ sources.
   a) Independent b) Index c) Internal d) Indiscreet

3. _____ consists of people, equipment's and procedures to gather, sort, analyse, evaluate and distribute needed, timely and accurate information to marketing decision makers.
   a) Marketing Identification System b) Marketing Procedural System c) Marketing Research System d) Marketing Information System

4. _____is a co- ordinate collection of data, systems, tools and techniques with supporting software and hardware.

a) Marketing Price Support System b) Marketing Decision Support System c) Marketing Information Support System d) Marketing Dynamic Support System

5. MIS should be a ____ system.
   a) Uncordial b) Unified c) Unconvincing d) Uncommon

6. MIS should be _____ in nature.
   a) Flexible b) Stiff c) Rigid d) firms

7. A properly designed MIS supplies such information which helps in _____decision making. a) Quality b) Inferiority c) Weak d) Frails

8. A company needs efficient MIS to make use of ____ information.
   a) Vague b) Indistinct c) Latest d) Hazy

9. A ___ is a computer application used to support determinations, decisions, and courses of action in an organization or a business.
   a) Decision Support System (DSS) b) Transaction Process System c) Executive Support System c) Technical Support System

10. _____increases the speed and efficiency of decision-making activities, automates managerial processes and improves interpersonal communication within the organization.
    a) Decision Support System (DSS) b) Transaction Process System c) Executive Support System c) Technical Support System

11. _____ is actual discovery phase of knowledge.
    a) Data mining b) Data Discovery c) Data storage d) Data security

12. _____ is **used as a synonym for data mining.**
    a) Knowledge discoveryb) Data warehousing c) Regression analysis d) Parallel processing

Answers:

1. Marketing research
2. Internal
3. Marketing Information System
4. Marketing Decision Support System
5. Unified
6. Flexible
7. Quality
8. Lates
9. Decision Support System (DSS)
10. DSS
11. Data Mining
12. Knowledge discovery

Match the column

Column A	Column B
1. Analytical Skills	A. Career options in the field of marketing research
2. Research Analyst	B. Specific class of MIS
3. Internal records	C.Skills of effective marketing research professional
4. Decision Support System	D.Converting raw data into meaningful information
5. Data mining	E. Components of MIS

Answers:

1. C, 2. A, 3. E, 4. B, 5. D

True or False

1. A company does not need efficient MIS to make use of latest information.
2. A decision support system is a procedure that allows a manager to interact with data and method of analysis; to gather, analyse and interpret information.
3. An imperfectly designed MIS supplies such information which enables quality decision making.
4. Data available from sources within the organisation are called internal sources.
5. Data Mining is defined as the procedure of extracting information from huge sets of data
6. A Decision Support System (DSS) is an application for information systems that helps in decision making.
7. A decision support system differs from an ordinary operational application.
8. A DSS always responds quickly to decision makers to help in decision making.
9. The primary purpose of using a DSS is to present information to the customer in an easy-to-understand way.
10. Data transformation is also known as data mining.

Answers:

1. False
2. True
3. False
4. True
5. True
6. True
7. True

8. True
9. True
10. False

Shorts Notes

1. Traits of effective marketing research professionals.
2. Components of MIS.
3. Significance of Decision Support System.
4. Advantages of Data mining.
5. Career options in the field of marketing research.

Answer in Brief

1. What are the various career options in the field of marketing research? Explain.
2. Elaborate on qualities of a good marketing research professional.
3. Define Marketing Information System and discuss its components.
4. Explain in detail essentials of good marketing information system.
5. Discuss the concept of decision support system and also explain its various components.
6. Explain the importance of decision support system.
7. What is Data Mining? Explain the relevance of data mining in the present context of business environment of India.

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Module II

3

PLANNING RESEARCH - I

Unit structure

3.0 OBJECTIVE

1. To make students familiar with the art of using various data collection tools in Market

2. To make aware aboutresearch methodology to be used in research

3. To enable researcher to understand about sampling methods

3.1 INTRODUCTION

A research design is basically the arrangement of the condition for the collection and analysis of data in a format that focuses to combine relevance to the research purpose with economy procedure. A research design is the set of methods and process which is used in collecting and analyzing measures of the variables specified in the problem. Research design is the conceptual structure in which the research is conducted.In short it is a blue print of collection measurement and analysis of data. Research design helps to understand the process or the outline in which research will be carried out. It also helps to provide answers to the multiple questions like – what techniques will be used to collect the data? what kind of sampling will be done? How time and cost constraints be dealt with? etc. Essentials of research design are that the design should be an activity and time-based plan. It is always based on the research questions. It also helps in selection of sources and type of information. It also indicates the framework for specifying the relationship among the study variables. It outlines procedure for every research activity. It must be appropriate, efficient and economical. It should be flexible and it also must be adequate. So basically, research design refers to the framework of

market research method and techniques that are selected by a researcher under a research design between different type of research methods, experimental studies or quasi – experimental review study.Research design is the whole plan for studying the conceptual research problems. Research design is the process of collecting information studying it analyzing it and maintaining the proper structure to get the proper conclusion best research design helps best report writing.

First step in the research process is to define the problem then the second step is to decide the objectives of the research then the formulation of the hypothesis is done after the formulation of hypothesis then the ideal research design is selected. Once the research design is selected then the sampling is done proper sampling method is decided. After the sampling questionnaire is framed in order take the survey. After the survey all the accurate data is collected. Then the processing of data is done. After the processing the analysis and interpretation of data is done then hypothesis which is used is tested. After all this process then the report is made. It is called as a report writing. Reports are made after finding the conclusion which is obtain through research.

3.2 RESEARCH DESIGN

Research design can be considered as a format in which research is going to take place. It acts like a glue which brings all the parts of research project together. In short it is a plan of research work or a structure in which research is conducted.

3.2.1 Definition

According to the **J ahoda, Deutch & Cook** "A research design is the arrangement of condition for the collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy and procedure".

Research design is the process or the structured in which research is conducted and strategy and investigation is done to search question and control variance.

According to Kerlinger Research design is the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance.

According to Green and Tull A research is the specification of methods and procedures for acquiring the information needed.

Henry Manheim says the research design not only anticipates and specifies the seemingly countless decisions connected with carrying out data collection, processing and analysis but it presents a logical basis for these decisions.

In research design right information should be collected proper interpretation should be done with economy and procedure.

3.2.2 Importance of Research Design

- It helps the researcher to make correct decisions in each and every step of the study.
- It helps to identify the minor and major tasks of the study.
- Based on research design a researcher can easily frame the objectives of the research work.
- Research design makes the research study effective and interesting by providing minute details at each step of the research process.
- It helps the researcher to complete all the tasks even with limited resources in a better way
- A good research design helps the researcher to complete the objectives of the study in a given time and facilitates getting the best solution for the research problems.
- The main advantage of a good research design is that it provides accuracy, reliability, consistency, and legitimacy to the research
- It furnishes the minimum information required for planning the research project
- It enables the researcher to have a frame of reference and prevent the study from deviating.
- The research design furnishes a clear idea as to the activities that would need to be undertaken in order to achieve the research objective.

3.2.3 Types of research design

A researcher must have a clear understanding of the various type of research design to implement a study of research design which can be broadly classified into three categories.

1. Research design in case of explanatory research studies.
2. Research design in case of descriptive research studies
3. Research design in case of casual research studies.

Explanatory research design

Explanatory research design helps in formulating the problem for more accurate investigation or actual working on development of the hypothesis from an operational point of view.

The main emphasis is to discovery of ideas which should be flexible enough for providing opportunities for considering different aspects of the problem under studies.

It will help the researcher to answer the questions such as what is the problem

What is the aim of the study?

what topic could be studied?

To carry out this kind of research usually there is no prior research done the existing research would not able to answer all the problem precisely.

The most popular methods of explanatory research are:

- Literature research
- In-depth interview
- Focus groups
- Case studies

Descriptive Research

Descriptive design helps researcher in understand the research in a better way. Researcher is concerned in describing the situation or case under their research study. Descriptive research studies are precisely concerned with theory-based design method which is done by gathering, analyzing, and presenting collected data. In other words,descriptive research primarily focuses on narrating the nature of a demographic segment without focusing on why a certain phenomenon occurs. If the problem statement is not clear, one can conduct exploratory research. These research method design enables others to understand the actual importance of research.

Casual Research studies.

Experimental research design is used to establish a relationship between the cause and effect of a situation. It is a research design in which the effect caused by the independent variable is observed. It is very crucial for experimental research to create cause and effects of a phenomenon. The effects which are observed from an experiment are due to the cause.

There are various types of research designs the major types are descriptive research design, experimental research design, correlational researchdesign, diagnostic research design, and explanatory research design.

- **Correlational Research Design**

Correlational method reveals the direction of a connection between two or more than two variables. It helps the researcher to understand correlational research design and it looks into correlations between variables without allowing the researcher to control or manipulate any of them. Correlational study design might have either a positive, negative or zero.

Examples of correlation

In case of Positive correlation Both variables change in the same direction if the prices of petrol/Diesel increase, the fare of Taxi will increase too.

In case of Negative correlation, the variables change in opposite directions As Tea/coffee consumption increases, fatigue decreases.

In case of Zero correlation there is no relationship between the variables example, consumptionof Tea is not correlated with weight /Height of the person.

- **Diagnostic Research Design**

Diagnostic research design is a type of research design that tries to investigate the fundamental reason of a certain condition. This method assists a researcher more about the factors that contribute to certain difficulties or challenges that others may be experiencing. This design consists of three research stages

1- Inception of the issue
2- Diagnosis of the issue
3- Solution for the issue

Experimental design

Experimental design in simple words is the blueprint of the procedure that allows the researchers to control all the factors of the experiment. Experimental design is often used when there is a priority of time such as cause will always precede effect and when there is stability in a causal relationship such as a particular cause will always lead to the same effect and the degree of association is great.

Merits of using experimental design

1. It delivers a high level of evidence for research
2. Experimental design determines the cause of something to take place
3. Experimental design helps researchers to determine effects.

Demerits of experimental design

1. Experimental research may not fit all the time in practical world
2. The situations of the experiments may change the behavior of the subjects.
3. Experimental researches are costly, because it need special equipment and facilities.

4 There are a few types of problems which can't be experimented because of ethical
5 Sometimes technical reasons may bring problems in research.

Historical design

Research data from the past is collected in this method, evaluate and the hypothesis is defended based on the outcomes. To use this method a lot of resources like reports, records, logs, documents, notes, diaries, official records, archives, and no textual data like maps, images, drawings, audios) are used. The accuracy of result depends upon the authentic and authorized documents.

Merits of Historical research design

1. This method is useful for trend analysis.
2. It can provide a contextual background to understand a research problem in a better way.
3. There are no chances of emotional involvement of the researcher with the subject.
4. Historical resources can be used multiple times.

Demerits of Historical Research design

1. The success of research completely based on the quality of historical resources.
2. Research remains weak due to lack of control on external variables
3. Gaps are difficult to measure because of the missing pieces of historical resources.
4. Understanding of historical resources consumes a lot of time.

Observational research design

Observation research design is used to draw results by comparing subjects under research with a controlled group. Two types of observational studies are as follows.

In first caseyour subjects know that you are observing them and in the second type, you observe your subjects without letting them know. Observational research design let you get the insights of a particular phenomenon without getting into the trouble of setting up in case of large project.

Merits of observational research design

1. Observational research is a flexible type of research and doesn't require to stick to a hypothesis
2. In-depth information can be collected about the phenomenon.
3. Results can be generalized to real life events.
4. It can act as pre-research before starting any other experiment.
5. It accounts for the complexity of group behavior.

Demerits of observational research design

1 There are high chances for this research turned out to be biased because the researcher might notice what he wants to notice.
2 The outcome of this research is limited to a small group and can't be generalized.

3 Subjects might behave differently because of the presence of the researcher.

3.3 HYPOTHESIS

A hypothesis is very important for the entire procedure. In simple words it is a tentative statement about the relationship between two or more variables. Basically, hypothesis is the statement which researcher makes expectation or prediction about relationship among variables. The research is the process which begins and ends with hypothesis.

Hypothesis is nothing else but the heart of the research. In the research without hypothesis, research cannot service properly. The researcher identifies the questions to study the concepts might be related hypothesis is the predicted answer.

Three important factors in hypothesis are difference that we are trying to find out, relationship and the interactions. Results are statistically important as it plays the vitalrole.

A hypothesis ensures the entire research process remains scientific and reliable. Though hypothesis is very much essential during the research process it can produce complications with regards to probability, significance and errors.

Hence hypothesis is the prediction based on the observation. Hypothesis is usually a statement that introduces a research question and proposes an expected result.

It is important that forms the basics of scientific experiment. Therefore, it is very much needed to be careful while making hypothesis. A minor mistake in construction of the hypothesis could have the adverse effects on the experiment.

Research hypothesis is a specific testable prediction about the expected things to happen in a study. Good research is the result of good hypothesis.

Hypothesis is generally the prediction of the study that will help to find the empirical statement verified and based upon observation or experience. with the help of research studyfindings Hypothesis is testable whether it is true/false

3.3.1 Types of hypotheses

There are various types of hypotheses and they are simple hypothesis, complex hypothesis, directional hypothesis, non-directional hypothesis, null hypothesis, associate and casual hypothesis.

Simple hypothesis

This type of hypothesis showcases a relationship between dependent variable and a single independent variable. For example, if you eat more of vegetables will help you lose weight faster. Here eating vegetables in huge amount is the dependent variable.

Complex hypothesis

In this type it shows how the relationship between two or more dependent variables and also two or more of independent variable. In this hypothesis, the dependent and independent variables are more than two.For example, if you eat more of vegetables and fruits it will lead to weight loss, glowing skin, reduces the risk of many diseases such as heart disease, high blood pressure and some cancers.

Directional hypothesis

In this type of hypothesis, it represents how a researcher is committed to particular outcome. Relationship among the variables can also predict its nature. For example, children who four-year-old are eating moderate and adequate food over the five years of period are proven that having higher IQ level than children who are not having proper meal. This indicates the effect and the direction of the effect.

Non directional hypothesis

This type of hypothesis is used when the theory is not involved. In this type of hypothesis there is a statement that a relationship exists between two variables without doing prediction of the exact direction of the relationship.

Null hypothesis

This is the type of hypothesis which provides the statement that is contrary to the hypothesis. Basically, it's a negative kind of statement and there is not any relationship among independent and dependent variables. The symbol is denoted by "HO".

Associate and casual hypothesis

In this type of hypothesis, the associative hypothesis occurs when there is a change in one variable resulting in a change in change in the other variable also. On the other hand, casual hypothesis gets effected and there is cause and interaction effect among two or more variables.

3.3.2 Importance of hypothesis

To the point enquiry

It makes the research activity to the point and destination. **Research without hypothesis is like a sailor in the sea without compass**. So, research is to the point enquiry of problem due to the guidance of hypothesis.

Separating Relevant from Irrelevant Observation

A Researcher during study will take the observations and facts which are accordance to the condition and situation. While drop out the irrelevant facts from his study. This separation is due to hypothesis formulation which keeps away relevant observation from irrelevant.

Development of Research Techniques

There are **various types of social problems which are complex in nature**. For this research is very difficult. We cannot cover it with a single technique but it requires many techniques. These techniques are due to hypothesis provided to a researcher.

Acts as a Guide

Hypothesis gives new ways and direction to a researcher. It acts as a guide and a leader in various organizations or society. It is like the investigator's eye.

Selecting Required Facts

During study a **researcher come across many factors** but he confined himself to the selection of required facts through formulation of hypothesis. **Hypothesis helps him in selection of relevant facts regarding to the problematic situation**

Prevents Blind Research

Hypothesis provides lighting to the darkness of research. It gives difference b/w scientific and unscientific, false and true research. It prevents blind research and give accuracy.

Accuracy & Precision

Hypothesis provides accuracy and precision to a research activity. Accuracy and precision are the feature of scientific investigation which is possible due to hypothesis.

Save Time, Money & Energy

Hypothesis save time, money and energy of a researcher because it is a guide for him and help him in saving these basic things.

Proper Data Collection

Hypothesis provides the basis of **proper Data Collection Relevant and correct information collected by a researcher** is the main function of a good formulated hypothesis.

Proper Conclusion

A proper formulated hypothesis may lead to a good reasonable, utilized and proper conclusion. If the hypothesis is better than the conclusions drawn by a researcher would be better for solution of a problem.

Hypothesis is very much important in research because helps in many ways it helps to replicate the research, draw the logical conclusion and also helps to maintain the relation between the variables, it provides the statement deduced from theory, it helps to select the fact, it also provides the direction to the research.

Hypothesis are very important as it helps to ensure entire research methodologies which are scientific and completely valid.

It also helps to forecast the possibility of research failure and progress.

It also helps to narrate the whole research study in concrete terms rather than describing them in theoretical terms.

It also helps in providing the foundation and evidence to prove the validity of the research.

It also provides the link to the theories which are underlying and also to the specific research questions.

It plays a vital role in data analysis and also in measuring the validity of the research.

Hypothesis is very important as it helps to create efficient reports, it gives clarity, it also provides solution to various problems, it has the power of prediction and many more.

3.4 QUESTIONNAIRE

Questionnaire is a list of questions which are asked to the individual to obtain statistically useful information for the topic which is given. Questionnaire are mostly used in the research to collect information.

Questionnaire are usually used in the quantitative marketing and social research. When the questionnaire is frame in a proper order then it becomes a vital instrument through which statement can be made about specific groups or entire population.

It is the most valuable method of collecting data in wide range. For the success of the survey moderate construction of questionnaire is important. This kind of survey helps to collects the information in large number.

The definition of questionnaire is "A questionnaire is simply a list of mimeographed or printed questions that is completed by or for a respondent to give his opinion.

A questionnaire is very important source of collecting quantitative primary data. A questionnaire allows quantitative data to be collected in a standardized format so that data is consistent for analysis. Questionnaire should always have a purpose which is related to the objective of the research. It should be very clear, precise and accurate.

Questionnaires are used when the resources are limited, confidentiality should be maintained in order to get honest responses for the best results.

3.4.1 Types of Questionnaires

Questionnaire is classified in qualitative and quantitative method it usually depends upon the nature of the questions.

Questionnaire is the primary method of data collection. There are the following types of Questionnaires:

Characteristics of a good questionnaire

Data depends on the type of information researcher need to collect from respondents. In case of exploratory research Qualitative questionnaires are used by the researcher. Quantitative questionnaires are used to validate or test a previously generated hypothesis

Computer questionnaire

In this type of Questionnaire respondents are asked to answer the questions which are send by mail. The benefits of computer questionnaire are that it's inexpensive, it saves time and respondent also don't feel any kind of pressure as they can reply as pe their convenience so the answers are more reliable.

Telephone Questionnaire

In this type researcher prefers to call to the potential respondents with the objective of getting them to answer the questionnaire. The benefits of this are its very time convenient as it requires short amount of time to ask the questionnaire on telephone. However, many people don't feel to answer questionnaire over phone as they don't feel comfortable to do so.

In house survey

In this type of survey researcher visits directly to houses or workplaces of the respondent to conduct the survey. This kind of survey has lots of advantages are they are more focused towards the questions and it has higher chances of getting reliable responses.

Mail Questionnaire

In this type of questionnaire, the researcher sends the questionnaire through post often attaching paid envelop. It has the advantage of getting honest and accurate feedback as the respondents replies in their free time as per their convenience. This type of questionnaire is expensive in nature.

Open question questionnaire

Open questionnaire is very different from the other questionnaire in this the open questions may produce unexpected results. Which helps to make research more valuable and helpful.

Multiple choice Questions

In this type of questionnaire, the respondent is given multiple options from that they have to select as per their choices, this kind of survey is very helpful as it is not boring and time consuming as the respondent just have to select the options which makes easy for them to give feedback.

Dichotomous questions

These types of questions provide two options to the respondents that is yes or no to select from. It is the easiest type of questionnaire in terms of responding.

3.4.2 Steps in preparation of Questionnaire

Questionnaire is the instrument which is used in the research for the collection of the information through the survey it contains a series of questions for the respondent. The questionnaire is of various types hence there are certain steps which are taken in the preparation of questionnaire.

Identify a theme

It is a theme in which one can specify what kind of data needs to be collected and how to convert it in a question format.

- **Ask simple questions**

The questions in the questionnaire should be simple and easy to understand it should not be complex. It should be as specific as possible. All the respondent should able to answer each and every question without any difficulty.

- **Ask the same questions in different ways**

The same questions should be asking several times in different ways just to check that respondent is not taking the survey absentmindedly. Because survey should e reliable for those same questions should be ask in different ways.

- **Choose a delivery method.**

Selection of delivery method is very much important as it helps to reach the wide range of audience. If one wants to reach the large number of audience one can distribute the questionnaire through various social networks.

These are the steps which are used in the making of a Questionnaire.

3.5 SUMMARY

Research design is based on methodology and it should be prepared once the topic and the problem of research have been selected and formulated then objectives are properly framed and proper hypothesis should be made

Research design is a foundation of entire research process it is needed because it helps in the smooth conducting various research operations, thereby making research as efficient as possible yielding maximal information with minimal expenditure of Time, various efforts and money. Research design has a significant impact on the reliability of the results. Research design plays a very crucial role in facilitating and providing smooth functioning of the entire research process. A good research design gives good research output. It is needed for planning research activities considering time budget, human efforts, techniques, sampling etc. The validity of the research result is based on the format of the research design. Hence the research design has to be prepared very carefully and efficiently as it is the base of the whole research process that follows the characteristics of efficient research design hence research design should be properly understood at first.

Hypothesis may be proved or disproveddepends upon the data collected from respondents. It is not possible in case of behavioural sciences to test multiple hypotheses at a same time.

A hypothesis is very important for the entire procedure. In simple words it is a tentative statement about the relationship between two or more variables. Basically, hypothesis is the statement which researcher makes expectation or prediction about relationship among variables. The research is the process which begins and ends with hypothesis.

Hypothesis is nothing else but the heart of the research. In the research without hypothesis, research cannot service properly. The researcher identifies the questions to study the concepts might be related hypothesis is the predicted answer.

Three important factors in hypothesis are difference that we are trying to find out, relationship and the interactions. Results are statistically important as it plays the vital role

Hypothesis is very much important in research because helps in many ways it helps to replicate the research, draw the logical conclusion, to maintain the relation between the variables, it provides the statement

deduced from theory, it helps to select the fact, it also provides the direction to the research. Hypothesis plays a vital role in research. Hypothesis are very important as it helps to ensure entire research methodologies which are scientific and completely valid.It also helps to forecast the possibility of research failure and progress.It also helps to narrate the whole research study in concrete terms rather than describing them in theoretical terms It also helps in providing the foundation and evidence to prove the validity of the research.It also provides the link to the theories which are underlying and also to the specific research questions.It plays a vital role in data analysis and also in measuring the validity of the research.Hypothesis is very important as it helps to create efficient reports, it gives clarity, it also provides solution to various problems, it has the power of prediction and many more.

Questionnaire is a list of questions which are asked to the individual to obtain statistically useful information for the topic which is given. Questionnaire are mostly used in the research to collect information. Questionnaire are usually used in the quantitative marketing and social research. When the questionnaire is frame in a proper order then it becomes a vital instrument through which statement can be made about specific groups or entire population. It is the most valuable method of collecting data in wide range. For the success of the survey moderate construction of questionnaire is important. This kind of survey helps to collects the information in large number. The definition of questionnaire is "A questionnaire is simply a list of mimeographed or printed questions that is completed by or for a respondent to give his opinion. A questionnaire is very important source of collecting quantitative primary data. A questionnaire allows quantitative data to be collected in a standardized format so that data is consistent for analysis. Questionnaire should always have a purpose which is related to the objective of the research. It should be very clear, precise and accurate Questionnaires are used when the resources are limited, confidentiality should be maintained in order to get honest responses for the best results.

3.6 EXERCISE

Fill in the blanks

1.Researchdesign helps the researcher to identify and task of study.

A. Research designs B. Data Collection C. Variables D. Sampling

2. Researchdesign helps researcher to make in each and every step of study.

A. **Research designs** B. Data Collection methods C. Independent Variables D. Sampling Techniques

3. _____should always have a purpose which is related to the objective of the researcher

A. **Questionnaire** B. Primary Data C. Secondary Data D. Hypothesis

4. A _____allows quantitative data to be collected in a standardized format.

A. Primary Data B. Secondary Data C. Hypothesis **D. Questionnaire**

5. _____ may be proved or disproved depends upon the data collected from respondents**.**

A. Primary Data B. Secondary Data C. **Hypothesis** D. Test

True or False

1. Based on research design a researcher can easily frame subject of research work.

A True

2. Research design does not help the researcher to make correct decisions in each and every step of study.

A False

3. Hypothesis does not act as guide.

A False

4. Hypothesis plays a vital role inresearch.

A True

5. Hypothesis does not give to the point enquiry.

A False

Match the column

1. Research	a) Finding solution for immediate problem
2. Applied Research	b) Search for knowledge
3. Questionnaire	c) Heart of Research
4. Hypothesis	d) Data from past is collected
5. Historical Design	e) Primary Data

Answers: 1- B 2 -A 3 -E 4 -C 5 -D

Shorts Notes

1. Demerits of observational research design
2. 7 phases of research design.
3. Elements of research design.
4. Advantages of research design.
5. Need of research design.

Answer in Brief

1. Write importance of research design.
2. In which format is research design conducted?
3. What is explanatory research design?
4. What is historical design? Write its merit and demerits.
5. Write types of hypotheses

4

PLANNING RESEARCH - II

Unit Structure

4.0 OBJECTIVE

1. To make students aware about different tools used in research

2. To make aware aboutresearch planningto be used in research

3. To enable researcher to understand about questionnaire and sampling methods

4.1 INTRODUCTION

A historically important area of planning research, although one that has received less attention more recently, is the role of learning. The Prodigy system in particular is associated with this direction of research. Learning can play a useful role in several stages of planning. Researchers have considered several subjects here, including acquisition of operators and domain models, learning intelligent behaviour scripts to reduce future planning demands, learning intelligent planning strategies and learning strategies for plan repair. Cognitive science can play a valuable role in helping researchers to understand the role of learning in human problem solving.

Research in planning and cognitive sciences have been on diverging paths over recent years. However, developments in planning appear to offer the possibility of significant new insights into relationships between human and artificial planning and for these insights to contribute to the future of both disciplines.

4.2 ESSENTIALS OF GOOD QUESTIONNAIRE

- It helps the researcher in what is to be measured – Having a clear picture and understanding of what data needs to be collected contributes to the quality of data collection.

  Questionnaire should be neutral and should not be leading it should be taken care of.

- Emphasis on right word/phrase should be kept in mind – The language should be clear so that the required data can be received. It willmake the question and the requirement of survey easy to understand and thus help in getting a better response.

- Define and qualify terms – This is most essential when a technical survey or a field specific survey is being done. This will increase the quality and decrease the bounce rate or number of questions which were left unanswered.

- Sufficient or adequate alternatives should be provided

- Multiple questions in question should be avoided – One question should have one answer. If more than one question needs to be asked than it should be made a separate question to improve clarity of questions.

- Word requiring emphasis should be emphasized – It helps in making a point and question clear

- options like good/bad/fair/average should be quantified through photographs or other mean – These are very vague terms and interpretations of these varies from person to person

- Unwanted assumptions should be avoided – A survey is about getting factual data and assumptions should be avoided.

- The length of the questionnaire should be ideal.
- The language which is to be used in the questionnaire should be easy, simple and understandable.
- All the terms should be explained clear and proper.
- All the questions should be in a logicalformat.
- The questions should be in an analytical form.
- Difficult questions should be broken into filter questions.
- All the questions should be explained correctly and moderately.
- The questions should be structured for the specific period of time.
- The answers should be short and simple.
- All answers should be relevant to the problem.
- Answers should be understood able to each and every respondent.

Hence questionnaire should be precise, short and simple, use of easy language, accurate answers, there should be a logical format these are the essentials of the good questionnaire.

4.3 SAMPLING

Sampling is a process which is used in the analysis of states in which number of observations are taken from the larger group such as population. The method of the sample of larger population upon the sample of larger population and analysis which is to be done. Most commonly sampling method includes random sampling or systematic sampling. Basically, sampling is used in the selection of a group of the population of interest in a research study. In huge research the participation of a whole population of interest is not possible, so a smaller group depends upon for a collection.

Sampling helps in taking a portion of few materials or protect to test chemical analysis the main purpose of quality control and identification. Sampling usually gives permission to researchers to obtain sufficient date a to answer the research question.

The sampling generally describes the minimum sampling rate at which a continuous time signal needs to be uniformly sampled so that the original signal can be completely recovered.

4.3.1 Sampling

In research methodology sampling is known as the process of selecting the smaller number of elements from the larger group to collect the information.

Definition: a sample is defined as a smaller set of data that a researcher chooses or selects from a larger population by using a pre-defined selection method.

Sampling is basically the selection of the subset of individual units from a wide group such as population to estimate feature of the entire population.

Statisticians usually try to collect samples that represents the population in questions. Sampling helps to reduce cost and increase data collection that measuring the whole population that can provide in cases where it's not possible to sample whole population every observation counts one more properly. In survey sampling factors such as weights can be applied to the data for the sample design.

4.3.2 Terms in sampling

Population

A *population* is the total group of people about who you are researching and about which you want to draw conclusions. Researcher must frame sample design for study and must plan how a sample shole be selected and what size like a sample would be.

It is common for variables in the population being denoted by Greek letters and for those in the sample to be shown by Latin letters. For example, standard deviation of the population is often shown with s

(sigma), whilst of a sample is 's'. Sometimes as an alternative, capital letters are used for the population.

Sample frame

The list of people from whom you draw your sample, such as a phone book or 'people shopping in town today', may well be less than the entire population and is called a *sample frame*. This must be representative of the population otherwise bias will be introduced.

Sample frames are usually much larger than the sample. They are used because of convenience and the difficulty of accessing people outside this frame (for example those without a telephone).

Sample

When the population is large or generally inaccessible then the approach used is to measure a subset or *sample.*

Unit

A unit is the thing being studied. Usually in social research this is people. There may also be additional selection criteria used to choose the units to study, such as 'people who have been police officers for at least five years.'

Sample size

In order to be representative of the population, the sample must be large enough. There are calculations to help you determine this. The required sample size depends on the homogeneity of the population, as well as its total size.

Generalizing

After sampling researcher generalize data in order to make conclusions about the rest of the population.

Validity

Validity is about truth and accuracy. A valid sample is representative of the population and will allow you to generalize to valid conclusions. This aligns with *external validity*. sample deign should be reliable and correct.

A valid sample is both big enough and is selected without bias so it is representative of the population.

Bias

Bias, a distortion of results, is the bugbear of all research and it can be introduced by taking a sample that does not truly represent the population and hence is not valid.

Assignment

Having drawn the sample, these may be assigned to different groups.

A common grouping is an experimental group which receive the treatment under study and a *control* group that gives a standard against which experimental results can be compared. To sustain internal validity, this is usually *random assignment*. Non-random assignment is sometimes ok, for example where two school classes are selected as coherent groups and one chosen as the control.

Sampling fraction

When there a sample of n people are selected from a population of N, then the sampling fraction is calculated as n/N. This may be expressed as a number (e.g., 0.10) or a percentage (e.g., 10%).

Sampling distribution

If the sample is described as a histogram (a bar chart showing numbers in different measurement ranges) it will have a particular shape. Multiple samples should have similar shapes, although random variation means each may be slightly different. The larger the sample size, the more similar sample distributions will be.

Sampling error

This is the standard error for the sample distribution and measures the variation across different samples. It is based on the standard deviation of the sample and the gap between this and the standard deviation of the population. Larger sample sizes will lead to a smaller sampling error.

Systematic error

A systematic error is one caused by human error during the design or implementation of the experiment.

Strata

Strata (singular: stratum) are sub-groups within a population or sample frame. These can be random groups, but often are natural groupings, such as men and women or age-range groups. Stratification helps reduce error. See stratified random sampling for usage.

Oversampling - Oversampling occurs when you study the same person twice. For example, if you selected people by their telephone number and someone had two phone numbers, then you could end up calling them twice. This can cause bias.

The art of sampling involves the two major terms subsample and representative sample.

Sampling is the method used in statistical analysis so these various terms are used. Bulkmaterial, sample increment, sample, test portion, subsample, backup sample, representative sample, homogenous material, heterogeneous material, contiguous sampling, intermittent sampling, bias, random sampling.

Sample is the amount of material which is send for testing. In test portion a small portion is need for specific test. In subsample is as same as the test portion in this also part of the sample is used for testing. In backup sample a subsample is taken as insurance in case the sample needs to be tested for other reasons.

In representative sample, sample that is same in all the ways to large bulk it was derived from homogeneous material is the materials of similar composition and hence it is easy to sample. In heterogeneous material the material of non-uniform composition and hence it is very difficult to sample. Continuous sampling is the sampling where small sample increments are removed at regular intervals.

Intermittent sampling is usually associates with batch production where the taken from the batch.

In bias in this term any situation where a representative sample.

Random sampling is a sampling where a number of increments are taken in a random manner.

4.3.3 Techniques of sampling

A- Simple random sample

Simple random sampling is defined as a sampling technique where every item in the population has an even chance and likelihood of being selected in the sample. Here the selection of items entirely depends on luck or probability, and therefore this sampling technique is also sometimes known as a method of chances.

Simple random sampling is a fundamental sampling method and can easily be a component of a more complex sampling method. The main attribute of this sampling method is that every sample has the same probability of being chosen.

For example, if you randomly select 1000 people from a town with a population of 100,000 residents, each person has a 1000/100000 = 0.01 probability. That's a simple calculation requiring no additional knowledge about the population's composition. Hence, simple random sampling.

Advantages of simple random sampling

1. It is a fair method of sampling, and if applied appropriately, it helps to reduce any bias involved compared to any other sampling method involved.

2. Since it involves a large sample frame, it is usually easy to pick a smaller sample size from the existing larger population.

3. The person conducting the research doesn't need to have prior knowledge of the data he/ she is collecting. One can ask a question to gather the researcher need not be a subject expert.

4. This sampling method is a fundamental method of collecting the data. You don't need any technical knowledge. You only require essential listening and recording skills.

5. Since the population size is vast in this type of sampling method, there is no restriction on the sample size that the researcher needs to create. From a larger population, you can get a small sample quite quickly.

6. The data collected through this sampling method is well informed; more the samples better is the quality of the data.

B- Stratified simple random sample

Stratified simple random sampling is a variation of simple random sampling in which the population is partitioned into relatively homogeneous groups called strata and a simple random sample is selected from each stratum. The results from the strata are then aggregated to make inferences about the population. A side benefit of this method is that inferences about the subpopulation represented by each stratum can also be made.

Cluster sampling involves partitioning the population into separate groups called clusters. Unlike in the case of stratified simple random sampling, it is desirable for the clusters to be composed of heterogeneous units. In single-stage cluster sampling, a simple random sample of clusters is selected, and data are collected from every unit in the sampled clusters. In two-stage cluster sampling, a simple random sample of clusters is selected and then a simple random sample is selected from the units in each sampled cluster. One of the primary applications of cluster sampling is called area sampling, where the clusters are counties, townships, city blocks, or other well-defined geographic sections of the population.

C - Convenience sampling

Convenience sampling is the most common form of non-probabilistic sampling, mostly because it is misused. **Conveniencesampling** is a method of collecting samples by taking samples that are conveniently located around a location or Internet service. We have all seen studies that leverage students in the computer science classes. This is convenience sampling improperly used. A proper use of convenience sampling would be sampling of craigslist, the Silk Road, or other black-market services to study cyber-crime communication. Selecting a set of found communications would adequately represent other criminal communication where computer science students do not represent the general public very well.

For example, standing at a mall or a grocery store and asking people to answer questions would be an example of a convenience sample.

D - Sampling systematic

Systematic sampling is a statistical method that researchers use to zero down on the desired population they want to research. Researchers

calculate the sampling interval by dividing the entire population size by the desired sample size. Systematic sampling is an extended implementation of probability sampling in which each member of the group is selected at regular periods to form a sample.

Systematic sampling is defined as a probability sampling method where the researcher chooses elements from a target population by selecting a random starting point and selects sample members after a fixed 'sampling interval.'

For example, in school, while selecting the captain of a sports team, most of our coaches asked us to call out numbers such as 1-5 (1-n) and the students with a random number decided by the coach. For instance, three would be called out to be the captains of different teams. It is a non-stressful selection process for both the coach and the players. There's an equal opportunity for every member of a population to be selected using this sampling technique.

E - Quota sampling

Quota sampling is a two-stage non-probability sampling method that assigns quotas to the population in order to ensure that when elements of the population are selected, the sample group is representative of the population's characteristics. After quotas are assigned, researchers choose elements from the subgroups using convenience or judgment.

Quota sampling is a type of non-probability sampling method. This means that elements from the population are chosen on a non-random basis and all members of the population do not have an equal chance of being selected to be a part of the sample group.

In this method of sampling, researchers typically use market research software to create two stages to acquire their sample group. First, they list relevant control characteristics and their distribution in the target population. This is done to ensure that the composition of the selected sample group is representative of the composition of the target population (in regard to the listed control characteristics). These "control characteristics" can be variables such as age, race, and sex. Researchers create these groups based on their own judgement.

The second stage is to select elements for the sample group based on convenience and/or judgement of the researcher. This is what differentiates quota sampling from stratified sampling, as stratified sampling uses SRS (simple random sampling) or other probability sampling methods to choose elements for the sample group once the strata are divided.

Example of Quota Sampling

Let's assume that a researcher wants to study the buying habits of the people in Mumbai depending on their gender and employment status. In this example, gender and employment status will be the "relevant control characteristics", using which the quotas will be decided.

Researchers will then use this information to reflect similar proportions of male/female and employed/unemployed in their sample group.

For this study, let's say a sample size of 100 people is decided upon. Researchers will use market research tools which have quotas to decide how many males and females are chosen in regard to their employment status. Therefore, they may choose to include 60 females and 40 males, 10 of which are unemployed. These elements will be chosen by the researcher on the basis of convenience or judgement.

Under quota sampling method, the researcher forms a sample that involves the individuals to represent the population based on specific traits or qualities. The researcher chooses the sample subsets that bring the useful collection of data that generalizes the entire population.

Merits

1. If quotas are allocated objectively and properly it provides satisfactory results.

2. Each part of the population gets representation.

3. Satisfactory results are expected under this method

Demerits

1. This method is subjected to personal bias may possible under this method

2. If the interviewers are properly trained than only satisfactorily results can achieve.

F- Snowball sampling

Snowball sampling is a recruitment technique in which research participants are asked to assist researchers in identifying other potential subjects. The use of currently enrolled research participants to recruit additional research participants it sometimes referred to as "the snowball sampling. The method is used to minimizes risk. **Snowball Sampling**

In this method, the samples have traits that are difficult to find. So, each identified member of a population is asked to find the other sampling units. Snowball sampling is also known as a chain-referral sampling technique. Those sampling units also belong to the same targeted population.

G- Purposive sampling: Purposive sampling, also known as judgmental, **selective** or **subjective** sampling, is a type of **non-probability sampling technique**. Non-probability sampling focuses on sampling techniques where the **units** that are investigated are based on the **judgement**. There are a number of different **types** of purposive sampling, each with different goals. This article explains what purposive sampling is, the eight of the different types of purposive sampling, how to create a purposive sample, and the broad advantages and disadvantages of purposive sampling.Unlike the various sampling techniques that can be

used under **probability sampling** (e.g., simple random sampling, stratified random sampling, etc.), the goal of purposive sampling is not to **randomly** select units from a **population** to create a **sample** with the intention of making **generalisations** (i.e., **statistical inferences**) from that sample to the population of interest. This is the general intent of research that is guided by a **quantitative research design**. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable you to answer your research questions. The sample being studied is not representative of the population, but for researchers pursuing **qualitative** or **mixed methods research designs**, this is not considered to be a weakness. Rather, it is a choice, the purpose of which varies depending on the **type** of purposing sampling technique that is used. For example, in **homogeneous sampling**, units are selected based on their having similar characteristics because such characteristics are of particular interested to the researcher. By contrast, **critical case sampling** is frequently used in **exploratory**. During the course of a **qualitative** or **mixed methods research design**, more than one type of purposive sampling technique may be used.

H - Voluntary sampling

A voluntary response sample can be defined as a sample made up of participants who have voluntarily chosen to participate as a part of the sample group.

Participants in a voluntary response sample usually choose to respond to surveys because they have a strong opinion on the subject of the survey. This is why voluntary response samples tend to give rise to significantly biased results, as most of those who participate will have a strong opinion about a topic in either direction. Another reason why people participate is due to the convenience of joining the survey.

Voluntary response sampling is considered a type of non-probability sampling technique because participants are self-chosen, and not selected by the researcher on a random basis.

An example of a voluntary response sample is when TV show hosts of competitions, such as the Indian Idol, ask their viewers to send in their responses for who they think should win the competition. Only viewers who have strong opinions on who should win will send in their votes. Viewers who are indifferent toward the show and its competitors will not send in their votes.

I - **Consecutive sampling**

Consecutive sampling is also known as total enumerative sampling, consecutive sampling is the process of conducting research including all the people who meet the inclusion criteria and are conveniently available, as part of the sample. The researchers conduct research one after the other until they reach a conclusive result, thus, the prefix consecutive. Here, the sample is selected based on their easy availability, research is conducted, results are obtained and analysed and then the researcher moves on to the next

J - Purposeful sampling

Purposeful sampling is widely used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest. Although there are several different purposeful sampling strategies, criterion sampling appears to be used most commonly in implementation research. However, combining sampling strategies may be more appropriate to the aims of implementation research and more consistent with recent developments in quantitative methods. This paper reviews the principles and practice of purposeful sampling in implementation research, summarizes types and categories of purposeful sampling strategies and provides a set of recommendations for use of single strategy or multistage strategy designs, particularly for state implementation research.

K - Probability sampling: Probability sampling methods is the method which includes simple random sampling, systematic, stratified sampling. In non-probability sampling the sample are selected on the basis of non-random criteria. And not every member of the population has the opportunity of being included. Probability sampling is also called as the random sampling or it is also called as representative sampling. The probabilities can be assigned to every unit of the population objectively.

These techniques are needed to be very much precise to defined. These are the techniques which cannot be used for the population that is too general category found almost everywhere.

For example, if our target population is defined as college student. It means person studying at any college of the world is an element of population.

In certain scenarios probability sampling can be done as the population is precisely defined and limited to an infinite number of elements.

The advantages of probability sampling techniques are that the sampling techniques are that the sampling techniques reduces the chance of systematic errors. This method minimizes the chance of sampling biases.

A better representative sample is produced by using probability sampling techniques.

L -Non-probability sampling: non-probability sampling is called as judgement or non-random sampling each and every unit of population does not get an equal opportunity of the participation in the investigation.

These techniques need not population to be very precisely defined. Non-probability techniques make, if possible, to take a sample of the population elements which are in numbers.

Non-probability sample is very much suited for explore to research intended to generate new ideas that will be systematically tested later.

Probability sampling is best option for research that is intended to develop the under and of a population

The advantages of this techniques are that they need less efforts. It requires less time to get the task complete. They are not very much expensive.

The disadvantages of the sampling techniques are that they are systematic error and sampling basic.

The sample cannot be claimed to be a good representative of the population.

4.3.4 The main type of probability sampling are as follows.

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

1. **Simple random sampling**:

As sample size is large it should choose randomly It is a type of sampling in which each and every element must be mutually exclusive i.e., it should be able to distinguish from one another and does not have any over lapping characteristics.

For Example:

Suppose researcher try to select a simple random sample of 100 students from a college. Researcher will assign a number to every student in the college database from 1 to 200 and use a random number generator to select a sample of 100 numbers.

2. Systematic random sampling

In this type of sampling is also used in homogeneous population it means selection is done from the targeted sample this method is bit different from random sampling.

In such kind of sampling the elements are selected on the regular intervals. The interval may be in terms of time space or order. The list of elements may or may not be required before taking the research or before conducting it .

Thus, this regularity and uniformity in selection makes the sampling systematic. It is calculated by dividing the total population size by the desired population size.

Example:

Suppose the names of 200 students of a university are sorted in the reverse alphabetical order. To select a sample in a systematic sampling method, we have to choose some 25 students by randomly selecting a starting

number, say 5. From number 5 onwards, will select every 15th person from the sorted list. Finally, we can end up with a sample of some students.

3. Stratified random sampling

This type of sampling method is used when population is heterogeneous i.e., every element of population that does not matches all the characteristics of predefined criteriaInstead of element differ from one another on characteristics.

The sub groups are formed they are called as single stratum. The topic and nature of the investigation tells on what criteria the strata are to be made.

This formation of strata can also be called a mini reproduction of population as each stratum consist of elements that are different from other element in some characteristics.

For the investigation the young adults are taken in account, so this population may need to be divided into sub groups like male young adults and female young adults, educated young adults etc. in this way each stratum is a different population.

There are basically two techniques that are used to allocate sample from strata a proportional allocation technique the sample size of a stratum is made proportional to the number of elements in each of stratum.

For example, there are four bags (A, B C and D), each with different balls. Bag A has 50 balls, bag B has 100 balls, bag C has 150 balls and D has 200 balls. We have to choose a sample of balls from each bag proportionally. Suppose 5 balls from bag A, 10 balls from bag B ,20 balls from bag C and 25 balls from D.

4. Cluster sampling

Cluster sampling is the group of elements residing in one geographical region is called as cluster. And sampling of clusters is also known as cluster sampling. This sampling is techniques is used when the elements of the population which are spread over a wide geographical area.

The population is divided into sub groups called as clusters on the basis of their geographical allocation. Usually, this division of population is similar to what the standard of division has been used get.

The clusters ought to be homogenous among them on the characteristic's variable of the research.

5) Multistage sampling

It is a sampling technique where two or more probability technique are combined it is also used when the elements of population are spread over a wide geographical region and it is not possible to obtain a representative sample with only one a for mentioned technique.

It can be described as sampling within the sample.

Probability sampling vs Non-probability Sampling Methods

4.3.5 Differences between probability sampling methods and non-probability sampling methods.

Probability Sampling Methods	Non-probability Sampling Methods
It is a sampling technique in which samples taken from a larger population are chosen based on probability theory.	It is a technique in which the researcher chooses samples based on subjective judgment, preferably random selection.
These are also called as Random sampling methods.	These are also known as non-random sampling methods.
These are used for research which is conclusive.	These are used for research which is exploratory.
This method takes long time to get the data.	This method is easy to collect the data quickly.
There is an underlying hypothesis in probability sampling before the research work starts and objective of this method is to validate the defined hypothesis.	The hypothesis is derived later by conducting the research study in the case of non-probability sampling.

4.3.6 Essentials of good sampling

1. To obtain reliable information about the population.
2. To test the reliability and validity of difference between the sample estimates and population parameters
3. *Representativeness* –Researcher must select the sample in a manner which represents the universe in its truest sense. Further, if you fail to do so, then you might get misleading results.
4. *Adequacy* – Researcher should also select the size of the sample adequately which represents the parametric characteristics of the population.
5. *Homogeneity* – This is another important element of a sample investigation. Homogeneity means that there is no basic difference in the nature of the units in the sample and the universe.

In order to take a right conclusion, the sample must possess the following essential characteristics.

1. Representative

The sample should truly present the features of the verse. For this investigator should be free from bias and the method of collection should be free from bias and the method of collection should be appropriate. All the samples which are selected should be true then only the results will be reliable otherwise it will be misleading. Random method of selection should be used to ensure representativeness.

2. Adequacy

Adequacy is very much essentials for good sampling the size of the sample should be adequate that is should not be too big not small but adequate with the size of the population. All the size should be adequate or the results will not be accurate in the nature. In order to have exact result all the sample should be moderate.

3. Homogeneity

There should be homogeneity in the nature of all the units selects for the sample. Theunits of the sample one of the heterogeneous. Character it will impossible to make a comparative study with them.

4. Independent ability

The method of selection of the sample. Should be such that the items of the sample are selected in an independent manner. This means that selection of one item should not influencers. The selection of another item in any manner a that each item should be selected on the basis of its own merit. All the items should have the equal opportunity of being selected. This influences the probability of selection.

Sampling is done to understand the consumer wants and what satisfy them hence researcher collects lots of sample from market to collect the information.

Sample selected should be the representative of the whole population and it can be obtained through the random sampling. Size of sample should also be adequate. More the size of sample more the result will be perfect. All the units should get the chance of getting selected decision should not be bias or judgmental. There should not be any discrimination in the units all the units in the whole universe should get the equal opportunity.

The advantages of essential sampling are that they are not time consuming as it considers only the selected area of population. It is inexpensive in nature as their limited number of respondents. With the help of good sampling the result of the sample study might be more accurate as it considers smaller units so it helps them to study the whole thing in detail. Because of that result is more accurate in nature. In order to get more detailed and reliable information respondent need to be interviewed. For some specific studies only sample method also can be used.

If the number of populations is greater in the size and the size of sample should also be greater. If the money and the time are limited then the research should be done by taking the smaller portion. If one needs the higher accuracy large number of samples should be taken small units may not be sufficient. If the samples are the random samples, then the size required for the sampling is large. On the other hand, one is using stratified random sample then the small size is also sufficient. For the detailed study of the unit small size is usually convenient.

Using the sampling method in the research samples helps to save the money and time. It is most suitable strategy which can be used to gather the accurate information.

Every researcher knows the important of essentials of sampling in the research projects as helps to know through limited sources of resources. Samples helps to gather accurate information it just that it should be representative, adequate, reliable and it should have independent ability.

4.4 SUMMARY

Sampling is a process which is used in the analysis of states in which number of observations are taken from the larger group such as population. The method of the sample of larger population upon the sample of larger population and analysis which is to be done. Most commonly sampling method includes random sampling or systematic sampling. Basically, sampling is used in the selection of a group of the population of interest in a research study. In huge research the participation of a whole population of interest is not possible, so a smaller group depends upon for a collection.

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Terms of sampling – Population, Sample, frame, Sample, Unit, Sample size, Generalizing, Validity, Bias etc.

Techniques of sampling

Simple random sampling, stratified simple random sampling, convenience sampling, sampling systematic, quota sampling, snowball sampling, purposive sampling, voluntary sampling, consecutivesampling, purposeful sampling.

The method of selection of the sample. Should be such that the items of the sample are selected in an independent manner. This means that selection of one item should not influencers. The selection of another item in any manner a that each item should be selected on the basis of its own merit. All the items should have the equal opportunity of being selected. This influences the probability of selection.

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Every researcher knows the important of essentials of sampling in the research projects as helps to know through limited sources of resources. Samples helps to gather accurate information it just that it should be representative, adequate, reliable and it should have independent ability.

4.5 EXERCISE

Fill in the blanks

Fill in the blanks

1 _____ is a probability method?

(a) Judgement (b) Quota (c) **Simple random (**d) Convenience

2. Which of the following is not a type of non-probability sampling?

(a) Quota sampling (b) Convenience sampling (c) Snowball sampling

(d) **Stratified random sampling**

3. Sample is regarded as a subset of?

(a) Data (b) Set (c) Distribution (d) **Population**

4. Among these, which sampling is based on equal probability?

(a) **Simple random sampling** (b) Stratified random sampling (c) Systematic sampling (d) Probability sampling

5. Wrong questionnaire is an example of _____

(a) **Primary data collection problem** (b) Secondary collection problem

(c) a and b both (d) None of the above

6. Questionnaire is filled by …….

(a) **Respondent** (b) Everybody (c) Enumerator (d) None of the above

7. Identifying causes of a problem and possible solution to a problem is

(a) Field Study (b) **Diagnosis tic study** (c) Action study (d) Pilot study

8. A formal document that presents the research objectives, design of achieving these objectives, and the expected outcomes/deliverables of the study is called

(a) Research design (b) **Research proposal (**c) Research hypothesis (d) Research report

9. Which technique is generally followed when the population is finite?

(a) **Systematic Sampling Technique (**b) Purposive Sampling Technique

(c) Area Sampling Technique (d) None of the above

10. Cluster sampling, stratified sampling and systematic sampling are types of _____

(a) Direct sampling (b) Indirect sampling (c) Random sampling

(d) **Non-random sampling**

11. _____research is based on the measurement of quantity or amount.

(a) Qualitative (b) Descriptive (c) **Quantitative (**d) Numerical

12. In the _____research, the researcher has to use facts or information already available**.**

(a) **Analytical (**b) Descriptive (c) Applied (d) Distinctive

13._____ research is concerned with qualitative phenomena.

(a) **Qualitative (**b) Descriptive (c) Quantitative (d) Numerical

14. _____ is data-based, coming up with conclusions that are capable of being verified, by observation or by experiment.

(a) Contextual research (b) Conceptual research (c) Ideal research (d) **Empirical research**

15. A _____ refers to some difficulty that a researcher experiences in either a theoretical or practical situation

(a) Research hypothesis (b) Research experience
(c) **Research problem (**d) Research crisis

16. _____ as a testable statement of a potential relationship between two or more variables.

(a) **Research hypothesis (**b) Research experience
(c) Research problem (d) Research crisis

17. Research design is a _____for conducting the marketing research project

(a) strategy (b) framework (c) blueprint (d) **both B &**C

True or False

1. Quantitative data is data in the form of numbers

True

2. Positivist prefer qualitative data

False

3. Stratified random sampling is where we choose participants as they are easy to access

False

4. Questionnaires are time consuming and expensive

False

5. Unstructured interviews are time consuming

True

6. Unstructured interviews are not flexible

False

7. Questionnaire mode of approach is qualitative research

False

8. Surveys and questionnaires are primarily used for collecting information from a largenumber of users.

True

9. Sample is a representative unit of the population

True

10. Research can never be without any non-sampling errors, but sampling errors can always be avoided.

False

11. The final product of all the research activity is the report

True

12. Design of research must be a blueprint for the general collection

True

13. The method of selection of sample should be such that items of sample are selected in dependent manner.

True

14. Every researcher knows importance of essential sampling.

True

15. Using the sampling method in the research samples helps to save the money and time

True

16. Purposeful sampling is widely used in qualitative research

True

17. A sample is defined as a larger set of data

False

Match the following

1 Design of Research	**a)** qualitative research
2 Purposeful sampling	**b)** Blueprint
3 sampling method	**c)** Samples taken from a larger population
4Final Product of the Research	**d)** save the money and time
5Probability Samling	**e)** Report

Answers: 1-B 2 -A 3 - D 4-E 5-C

Shorts Notes

Purposeful sampling – Sampling - Voluntary sampling - Snowball sampling - Population - Snowball Sampling - Cluster sampling - Multistage sampling

Answers the following

1. Write techniques of sampling.
2. What are essentials of good sampling?
3. Write differences between probability sampling methods and non-probability sampling methods
4. Differences between probability sampling methods and non-probability sampling methods.

18. Explain the phases of Research design
19. Explain the Concept and techniques of sampling
20. Discuss the various type of probability sampling

8 Advantages and Disadvantages of quota sampling

4.6 REFERENCES

https://www.bing.com/search?q=questionnaire

https://www.bing.com/search?q=sample+questions+on+research+design

https://www.bing.com/search?q=research+design+meaning

Below is the list of marketing research books recommended by the top university in India.

Boyd, Harper W. Jr., Westfall, Ralph and Stasch, Stanley, Marketing Research: Text and Cases, Richard D. Irwin Inc., Homewood, Illinois.

Green, P. E. and Tull, D. S., Research for Marketing Decisions, 5th edition, Prentice-Hall of India, New Delhi.

Luck D. J., Wales, H.G., Taylor, D. A. and Rubin R. S., Marketing Research, 7th Edition, Prentice-Hall of India, New Delhi.

Tull, D. S. and Hawkins D. I., Marketing Research : Measurement and Method, 6th Edition, Prentice-Hall of India, New Delhi.

❖❖❖❖

5

DATA COLLECTION - I

Unit Structure:

5.1. OBJECTIVE:

i. To understand the concept of data collection.

ii. To explain the various data collection methods used in research.

iii. To comprehend the primary data concept.

iv. To comprehend the secondary data concept.

5.2. INTRODUCTION:

According to the research design, the researchers must collect all relevant information about his research problem from different sources. Researcher can carry out by using both primary and secondary data. The data serve as the base material for analysis. Without an analysis of factual data, no specific conclusions can be drawn on the questions. The relevance, adequacy and reliability of data determine the quality of the findings of a study. While collecting data researchers must ensure that the information collected is relevant and unbiased. The data must be complete in every way and it must be relevant to the research problem. This chapter deals with data collection process for the same.

5.3. PRIMARY DATA:

The collection of data is very crucial in statistical analysis. The method of collecting data is divided into two categoriesi.e., primary and secondary data. The primary data in this process is data that is being collected for the first time, whereas the secondary data is data that has already been collected by others.

The term "primary data" refers to data that has never been used before. Relevant respondents are surveyed for primary data and data can be collected in a variety of ways, including surveys, observational experiments and so on. Before conclusions primary data must be processed and analysed. Data form the basis for testing the hypothesis formulated in a study. For performing research on the literacy level, the primary and secondary sources of data can be used very effectively.

5.3.1. Definition and concept of Primary Data:

Definition:

Primary research is defined as "**a methodology that researchers use to collect data directly rather than relying on data from previous studies**."

Primary data is information gathered for the first time, usually through personal experiences or evidence and is used in research. It's also known as unprocessed data or first-hand data. Primary research is conducted exclusively to address a specific problem that needs in-depth interpretation. In case of primary data researcher is technically "owner" of the data.

5.3.2. Meritsof Primary Data :

i. More authentic:
Researchers conduct primary data research and development by giving personal attention to each of the questions they wish to survey. Researchers more often rely on primary data they collected than relying on secondary sources or other's data. As a result, data becomes more reliable and accurate. It can be more trustworthy than secondary data.

ii. Collection of relevant data
The primary data which is generated is first-hand data. No one else's data has been used to develop primary data that keeps the data relevant and people rely on such data that is more updated. Primary data is typically collected through a questionnaire or personal contact, ensuring that the data collected is accurate and relevant.

iii. Greater data control:
The researcher, conducting the survey can manage the data through questionnaires or other methods, because he has complete control over the primary data. To make the data more relevant, researcher can modify or make changes to it. The researchers may also have difficulty in collection of primary data because the target group may not easily understand the purpose of the survey therefore a little modification can help them obtain accurate data.

iv. Data privacy is protected:
The researchers who conduct survey work also ensures data confidentiality. When a small group of people is in charge of the entire

survey there is a high level of secrecy among them. Furthermore, the feedback they receive are always private to researchers.

v. The targeted problem is addressed:
Data collectors prepare questionnaires and conduct interviews with the targeted group to obtain information. Also, the issue is addressed so that it can be brought to light and settled after receiving proper responses. In this way, the research can be made more constructive and difficulties can be dealt with more easily.

vi. Primary data is easier to process:
Primary data collected through various methods is made simple and easy to understand so that anyone interested in data can understand it at a quick look. It's also more effective if the feedback researcher collected is accurate and reliable.

vii. Data is easier to understand :
Primary data collected through various designs and methods is simple and easy to understand so that anyone interested in data can understand it at a glance. It's also more effective for the feedback as researcher get it accurate and reliable.

viii. Others can use it as secondary data :
Researcher benefited from the data as he collected as a primary data, but it also helps other researchers as secondary data.

ix. Specific and particular :

The most important part of primary data is it caters to the requirement of specific purpose. Since secondary data is collected and stored for someone else's requirement and filtering it for a particular objective would be difficult.

x. Flexible nature:
It is possible to record the transformation of a situation over time. As a result, primary data is flexible, which is beneficial to researchers. Data can be modified to fit the current situation and futuristic perspectives can be included. As a result of the findings a better data collection method will be developed.

5.3.3 Demerits of Primary Data :

i. Costly data :
Compared to secondary data, primary data collection methods are more costly. It needs the hiring and training of personnel to collect data through interviews, surveys and observation. Experiments must also be conducted with specialized technology. Researchers are required to travel and use expensive equipment. Also, after receiving feedback, proper documentation is required which is time-consuming and expensive to maintain. When a researcher uses secondary data however, such costs are not necessary.

ii. Time-consuming data:
Collecting data from primary sources takes time because it takes time to collect information from each respondent, observe the sample and conduct an experiment. Because it takes time, it can cause a delay in addressing the issue. If researchers use secondary data to gather information from other sources it will saves time of researcher.

iii. Required more workforce :
More workforce is required in the case of primary data because only one person cannot conduct a survey or collect primary data on their own. Furthermore, the number of personals required is greater and they must be paid after their work is completed.

iv. The questionnaire must be simple and easy to understand:
Only if the questionnaire is simple and easy to understand then only the researchers will receive accurate and valid feedback. If the researchers do not create a set of sample questionnaires in such a way or technique that allows people to easily interpret them, the feedback produced will be incorrect or inaccurate.

v. Bias collection of data :
Due to the researcher's or respondent's biases the authenticity of primary data may be affected. Respondents may give the researcher incorrect information about serious subjects. It's also possible that the researcher did not make sufficient efforts to obtain data from respondents. It may be produced biased primary data.

vi. Data processing :
The data collected from respondents must be edited, coded, classified and tabulated before analysis. Only after the data has been properly analysed can useful. Data processing is very complex work in case of primary data.

vii. Sampling Error :
It is possible that information from all of the universe respondents will not be possible to collect. The researcher may be required to collect data from a sample i.e., a subset of the population. However, sample selection could be incorrect, resulting in the collection of incorrect data and incorrect conclusions.

viii. Experts required for the interpretation:
Only an expert can make the entire research meaningful by providing genuine facts and information, so the method for collecting data, technique and analysis must all be done by an expert.

ix. Difficult to administer :
Despite the fact that it is first-hand data collected by the researcher, the primary data has the drawback of being complicated to administrate. In the case of data collection via questionnaire, respondents frequently either do not respond all of the questions or answer them in poor handwriting. It is difficult to researcher to administer and manage in both cases.

5.3.4. Methods of Collecting Primary Data :

There are various methods of data collection. A method id different from a tool. While a method refers to the way or mode of gathering data, a tool is an instrument used for the method. Researchers collect primary data directly by interacting with or observing respondent. Primary data can be collected using a variety of methods like surveys, interviews, observation and experimentation etc. they are discussed below.

A. Survey Method :

The survey method is a data collection technique that involves asking questions to respondent who are believed to have the information needed. This data is comprehensive information about a particular topic collected from a targeted group in order to conduct research. A census or a sample survey are two types of surveys.

Census : When conducting a census, the entire universe is contacted to gather data.

Sample Survey : In a sample survey, data is collected from a subset of the universe's respondents.

Methods of Survey:

The researcher can use various survey methods depending on the research problem, i.e., the number of respondents from whom data must be collected, the time available to the researcher and his budget constraints etc. The following are various survey methods.

i. Interview :
In this method, the researcher needs to meet the respondents in person and asks them questions about his research problem and gathers relevant data. This method of data collection is the most traditional, expensive and but effective.

ii. Telephonic Survey:
This method does not require the researcher to meet with respondents in person. The survey on the other hand is conducted over the phone. On the phone, the researcher asks the respondents a series of questions in order to gather the necessary data.

iii. Mail Survey:
This method of survey is commonly used when the number of respondents are large and the researcher faces a geographic challenge. In this method, a questionnaire is created and mailed to respondents or it can be advertised in newspapers and magazines and respondents are asked to complete the questionnaire and return it to the researcher.

iv. Online Surveys:

This method of collecting information is growing rapidly these days, due to high penetration of internet access. In this method, the researcher can collect information from respondents by sending a Google Form or Microsoft Form via email or other communication applications such as WhatsApp or telegram etc.

v. Pilot Survey :

It is survey on small scale. Every research project costs money, time and effort, therefore conducting pilot study prior to beginning the process will be extremely beneficial, especially when a large number of sample size involved. Survey testing takes a long time and requires a lot of resources. A pilot survey is a technique for evaluating or testing a questionnaire with a smaller sample size than the intended sample size. A small group of sample population can help researcher to improve research quality.

It provides the information on the following aspects.

a. It enables the researcher to have proper knowledge of the universe to be sampled.
b. The adequacy of the sample design for survey.
c. It also tests the efficiency of briefing provide to staff
d. It also provides the probable test of the main survey to be conducted.

B. Interview Method :

In an interview method, the researcher needs to meet the respondent and interacts with him or her individually. The researcher and the respondent interact with each other face to face in this method. It's also known as a one-on-one interview. In this method, the interviewer asks the respondent questions and collects data from the responses.

Following are the variety of formats of interviews.

i. Structured Interview :

The interviewer uses a set of predetermined questions and highly standardised recording techniques in this type of interview. Closed-ended questions or questions that respondents can answer with "yes" or "no" are common in structured interviews. The interviewer usually asks each interviewee the same questions in the same order. Structured interviews can often be completed quickly because they follow a standard format that is easy to recreate.

ii. Unstructured Interview :

In this method, the interviewer does not use a system of predetermined questions or standardised techniques for recording information, instead depend on entirely on flexibility and criteria. An unstructured interview also known as an informal interview. In unstructured interviews, the interviewer does not ask each interviewee the same set of questions. Unstructured interviews, on the other hand, rely on open-ended questions. The interviewer can ask follow-up questions and allow interviewees to

elaborate on their responses in unstructured interviews. As a result, an unstructured interview characterizes a natural conversation.

iii. Clinical Interview :
This type of interview focuses on a person's broad underlying feelings or motivations as well as the course of their life.

iv. Non-directive Interview:
In this type of interview, the interviewer simply encourages the respondent to talk about the topic with as little direct questioning as possible.

v. Focused Interview :
Conducting a focus group interview which involves interviewing a group of respondents at the same time is a popular research interview method. Focus group moderators usually encourage respondents to respond with each other while also observing the group to gain an understanding of real perceptions. Respondents in focus groups are more likely to respond spontaneously and confidently than in other interview settings because the group setting feels more realistic. In this type of interview, the interviewer's goal is to keep the respondent focused on a specific experience and its consequences.

vi. Interview in person :
A personal interview is a one-on-one interaction between an interviewer and an interviewee that takes place in person. If researcher wants to respond directly to respondent and customize questions to them, personal interviews are suitable. Also, researcher can ask follow-up questions to produce more information. Personal interviews typically have higher response rates than other interview methods, making them ideal for gathering large amounts of precise data.

vii. Online conversation :
Another type of research interview is an online interview. Surveys or video chat applications can be used in online interviews. These days, video conferencing platforms like Zoom, Google Meet and Microsoft Teams can be used to conduct such interviews. Interviewers and interviewees do not have to be in the same place at the same time when using this method. This can help researcher to quick collection of data from a large number of people.

C. Observation Method :

This is altogether a different method of collecting data in which the researcher does not ask the respondent any questions but instead observes their behavioural patterns. Observation is defined as **"**Observation is a technique that involves systematically selecting, watching, listening, reading, touching and recording behaviour and characteristics of living beings, objects or phenomena**."**

Types of Observations :

i. Structured Observations :

Structured observations are most commonly used in studies that are intended to describe a problem or test a causal hypothesis. Structured observation procedures assume that the researcher understands which aspects of the problem under investigation are relevant to his research goals and is thus able to plan the recording of observations before beginning data collection.

ii. Unstructured Observations :

In practice, it is rarely possible to plan out the 'observation' process long in advance. The researcher may not have enough hints to structure his observations, which may require changes in what he observes, especially in exploratory studies. The unstructured observations are flexible, changes in the focus can be made as needed if and can be justify it.

iii. Participative Observation :

Participant observation is an attempt to bring the observer and the observed closer together by making the observer a member of the group, allowing him to experience what they do and work within their framework. The researcher, in particular, becomes a member of the community he is studying. In participative observation natural behaviour of group is recorded and truth of information can be assessed. But in participative observation researcher may lose the objectivity with emotional participation with the group due to alertness of group.

iv. Non-participant Observations :

Non-participant observation, is the observer's lack of involvement in the life of the group that the researcher is studying. In other words, in non-participant observations, the observer plays a disconnected role and collect data without making any effort to connect with the group under observation.

D. Experimentation Method :

In the field of science, the experimentation method of data collection is commonly used. Through experiments, this method of research, researcher investigates the cause-and-effect relationship between two or more variables. An experiment is a well-structured study in which researchers try to figure out causes, effects and processes are involved in specific research. The researcher usually controls this data collection method, deciding which subjects are used, how they are grouped and how they are treated.

An experiment is a data collection method in which researcher change some independent variables and observe their effects on dependent variables. Independent variables are those that researcher can manipulate, while dependent variables are those that change as a result of modification.

The most significant benefit of conducting an experiment is that it allows researcher to investigate causal relationships that an observational study cannot. Experimental research can also be applied to a variety of fields including medical research, agriculture, sociology and psychology. Experiments, also have the disadvantage of being costly and time-consuming.

E. Schedules :

While collecting data from interviews or observations, the researcher may use a schedule. A schedule is a tool for gathering information from respondents. Questions and statements are included in the schedule. It provides respondents with blank spaces or tables to fill in their responses. The schedule is important because it serves rationality by informing the researcher of the various aspects to be observed.

Following are various types of schedules.

i. Rating Schedules:
A rating schedule is a list of positive and negative statements about a concept. Respondents are asked to share their opinion, preferences and other feelings about the topic under study and a schedule is used to keep track of their responses.

ii. Documents Schedules:
These are used to gather data and information from recorded evidence.

iii. Survey Schedules:
Survey schedules are similar to questionnaires in that they are a list of questions that respondents must answer.

iv. Observation Schedules:
When using the observational method of data collection, observation schedules are used.

5.4. SECONDARY DATA

Researchers can access secondary data easily. It can be found in newspapers, magazines, research journals and research papers etc. In general, any researcher tries to collect data from secondary source first and if secondary data is insufficient or useless the researcher attempt to collect primary data.

Secondary data is used in research to increase the sample size as well as for the speed and consistency that comes with working with an existing resource. Secondary data is useful in large research projects where multiple research teams are collecting secondary data together. After that, the principal investigator can focus on primary research or specific areas of interest. This division of work allows researchers to learn more in less time. A researcher may have gathered data for a specific project and then made it available to other researchers. In the case of the national census,

the data may have been collected for general use rather than for specific research purposes.

5.4.1 Definition and concept of secondary data:

Secondary data is information that has already been compiled from primary sources and made accessible to other researchers for their own research. It is a type of information that has already been compiled.

"Data collected by party other than the researcher is referred to as secondary data."

Data from secondary sources has already been gathered. As a result, it's possible that it's less reliable than primary data. When investigation time is limited and the accuracy of the research can be determined to some extentsecondary data is typically used.

5.4.2 Merits of Secondary Data :

The following are some of the benefits of secondary data.

i. Secondary data is easily accessible:
Secondary data is collected from both published and unpublished sources. Internal or external sources provides secondary data. Other researchers have already collected, processedand published it.

ii. Convenient to collect:
Due to readily availability of secondary data, it is simple to collect. In comparison to primary data secondary data is much easier to collect.

iii. Less time and money consuming :
Secondary data is simple to collect because it is readily available, so it can be done in less time. Collecting secondary data is also less expensive. The majority of secondary sources are either free or very inexpensive to use. It not only saves researchers money but it also saves time.

iv. Quantitative data is provided by secondary data :
The amount of information available through secondary data is enormous. Almost all subjects have secondary data available.

v. Significance:
For almost all subjects, secondary data can be found. But even so, secondary data may or may not be related to the research topic, therefore researcher must assess and process the available secondary data.

vi. Less Data Processing :
Secondary data has already been processed; this requires less data processing. It is simple for researchers to use secondary data in their studies.

vii. Economical :
Collecting secondary data is economical. The researcher has access to secondary data via internal or secondary sources. The researcher does not need to hire or staff to collect data, conduct surveys or experiments. Thus, secondary data is economical in its nature.

viii. Supplementary to primary data :
Secondary data is information gathered and processed by other researchers for a different purpose therefore it may or may not be completely relevant to the research problem. But secondary data can be used to supplement primary data in this situation.

viii. Time saving :
Secondary data is readily available to the researcher through a variety of internal and external sources; therefore, the researcher can collect secondary data quickly and efficiently.

ix. No sampling errors :
Because there is no need for sampling when collectingsecondary data, there is no risk of sampling error in secondary data.

5.4.3. Demerits of Secondary Data :

i. Inappropriate :
Secondary data may or may not be appropriate for all types of research. Secondary data is insufficient and the researcher must collect primary data in order to solve the research problem. Secondary data isn't collected to the researcher's needs because it was gathered for a different purpose in the past as per his/her objectives. As a result, secondary data may be unreliable for researchers' requirements. Secondary data sources can provide a lot of information but quantity does not always imply suitability.

ii. Correctness :
Secondary data isn't always reliable. Secondary data available to researchers may not be authentic, resulting in poor secondary data quality. When choosing secondary data to use in his research the researcher must be cautious.

iii. Irrelevant Data :
Secondary data is information gathered by another researcher for a different research project. Therefore, secondary data as mentioned above may or may not be relevant to the research.

iv. Biased Data :
The quality of secondary data is beyond the researcher's control. Secondary data may be contaminated by the researcher's and respondents' biases at the time it was collected. Secondary data is typically biased in favour of the researcher who collected it because it was collected by someone other than researcher. This may not meet researchers' requirements.

v. Appropriateness :

The secondary data that is available may not be sufficient for the researcher. Secondary data is publicly available information that was not gathered specifically for the purpose of research problem. In this case, the researcher cannot rely solely on secondary data, he must also collect primary data.

vi. Data quality is uncertain:

Secondary data may be of poor quality. The information's source may be questionable, especially if it was collectedfrom the internet. If researcher is using secondary data to make data-driven decisions, then researcher need to assess the information's reliability by learning how it was gathered and examined.

vii. Not timely:

Secondary data were collected in the past, so it may be out of date. Many variables and their values get change over the period of time. This problem can be critical in a number of contexts of research.

viii. Inaccurate Information :

Some of the data sources are out of date and no new data is available to replace them. The national census for example is not usually updated on a yearly basis.

ix. No control over data and validity :

Secondary data isn't usually collected specifically for researchers. Instead, many businesses and individuals can access it for free or for a small fee. So, for researcher this isn't exactly a significant advantage. It is due to, secondary data is in controlled by others.

5.4.4. Sources of Secondary data :

Books, personal sources, journals, newspapers, websites, and government records are all examples of secondary data sources. When compared to primary data, secondary data is known to be more easily accessible. If researchers use these resources, then they require very little research and workforce too.

A. Major sources of secondary data can be classified are as follows:

i. Published sources :

The majority of secondary data is obtained from published sources. The following are a few major sources of published information :

- Official statements and publications of governments
- Statistical synopses, census records and other reports issued by various government agencies
- Publications and reports from chambers of commerce, financial institutions, trade associations and other institutions
- Magazines, journals and periodicals

- Publications from government agencies such as the Central Statistical Organization (CSO) and the National Sample Survey Organization (NSSO)
- Reports from research scholars, bureaus, economists and other experts.

ii. Unpublished sources :

Statistical data can also be found in a number of unpublished sources. In comparison to published sources, this may not be readily available and accessible. They are only accessible if the researcher shares them with another researcher who is not permitted to reveal them with anyone else. The following are some of the major unpublished sources from which secondary data can be collected.

- The records kept by individual and commercial enterprises
- The research conducted by teachers, professors and professionals
- Statistical data compiled by various departments and agencies of the federal and state governments, as well as undertakings, corporations and other entities.

iii. Internal Sources :

Internal sources refer to data available within the organisation through its own records. An organisation generates huge data which could be useful for decision making. Various internal sources of secondary data are purchase and sales records, financial statements etc.

iv. External Sources :

External sources of secondary data include information collected from various published sources such as books, magazines, newspapers reports, research paper online sources etc. Like government publications , private organisations and general publications etc.

B. Broad classification of sources of secondary data

i. Books :

Books are one of the oldest methods of data collection. Books on almost any subject are now available. When conducting research, researchers must first search for books on the subject and then select books from the library's collection in that subject area. If researchers are carefully chosen as an authentic source of authentic data, books can be useful in preparing a literature review.

ii. Published Sources :

There are numerous published resources available for a variety of research topics. The uniqueness of the data obtained from these sources of information is largely determined by the author and publication company. Published sources can be printed or electronic, depending on the situation.

iii. Journal :

Journals are gradually becoming more important than other books when it comes to data collection. This is due to the fact that journals are updated on a regular basis as new published articles are providing current and relevant information. Journals are usually more specific than research papers.

iv. Newspapers :

In most situations, data obtained from a newspaper is extremely trustworthy. As a result, it is one of the most reliable sources of secondary data. But newspapers typically publish data that is more political, economic and educational than scientific. As a result, newspapers might not be the best source of scientific information.

v. Websites :

The information shared on websites is generally unregulated and as a result it is less trustworthy than information obtained from other sources. There are, however, some regulated websites that only share authentic data and can be relied upon. The majority of these websites are paid data collectors either government or private.

v. Blogs :

Blogs are one of the most popular online data sources and they may be less reliable than websites. Almost everyone has a blog these days and many people use them to earn money through paid advertisements. As a result they can't be trusted all of the time.

vi. Government Documents :

Government records are a valuable and reliable secondary data source. They include data that can be used in marketing, management, humanities and social science studies.

Census data, health records, education institute records and so on are examples of these records. They're usually gathered to help with proper planning, budgeting and project prioritization.

vii. Podcasts :

Podcasts are gradually becoming more popular and many people listen to them instead of listening to the radio. They function similarly to online radio stations and are gaining in popularity. During podcasts, data is commonly shared and listeners can use it to collect data.

viii. Other sources of secondary data :

- Letters
- Public radio stations
- Records from the public sector

5.5. SUMMARY

In this chapter we have learnt about the various methods of data collection. The research process has been thoroughly discussed in this unit as well as primary data, its features, advantages and disadvantages. Data collected about situation, phenomenon issue or group of people can come from either primary sources or secondary sources. This topic also goes over multiple methods used to collect primary data in depth along with its limitations. Even so, a researcher may be required to use secondary data in addition to primary data.

Data that is classified as secondary in one study may be considered primary in another. When data is reused, it becomes primary data for the first research and secondary data for the second research. Primary and secondary data has flaws that may negatively impact the research's outcome, but also has their own some advantages. It all depends on the circumstances, the researcher, and the type of research being conducted.

5.6. EXERCISE

Q. 1 . Fill in the blanks :

i. Primary data is information gathered for the ……time.
(**First**, second, third, many)

ii. In case of primary data researcher is technically …… of the data.
(**Owner**, borrower, customer, buyer)

iii. in ……. method the researcher needs to meet the respondents in person. (**Interview,** Telephonic Survey, Mail Survey, Online Surveys)

iv. The interviewer uses a set of predetermined questions and highly standardised recording techniques ……type of interview.
(**Structured Interview ,** Unstructured Interview, Clinical Interview, Non-directive Interview)

v. …….is a technique that involves systematically selecting, watching, listening, reading, touching, and recording behaviour and characteristics of living beings, objects or phenomena.
(**Observation,** Interview, Survey, None of the above)

vi. Through ……. method of researcher investigates the cause-and-effect relationship.
(**Experimentation,** Observation**,** Interview, Survey)

vii. Data collected by party other than the researcher is referred to as ……data.
(Primary, **secondary**, Prime, First hand)

viii. …….. also provides the probable test of the main survey to be conducted.
(**Pilot Survey**, Interview, Observation,)

Q.2. Match the column:

Sr. no	**A**	**B**
i	Online Surveys	Lack of involvement researcher in group
ii	Structured Interview	Online data sources
iii	Non-participant observations	Google Form
iv	Official statements and publications of governments	Published source of data
v	Blogs	Set of predetermined questions
vi	Podcasts	People listen to them

(Answer : i. Google Form, ii. set of predetermined questions, iii. lack of involvement of researcher in group, iv. Published source of data, v. online data sources, vi. people listen to them)

Q.3.True or False :

i. A methodology that researchers use to collect data directly rather than relying on data from previous studies is known as primary data.
ii. Secondary data also known as unprocessed data or first-hand data.
iii. Observation is a technique that involves systematically selecting, watching, listening, reading, touching and recording behaviour and characteristics of living beings, objects or phenomena.
iv. In an interview method, the researcher needs to meet the respondent and interacts with him or her individually.
v. In non-participative observation the researcher, becomes a member of the community he is studying.
vi. In the field of science, the experimentation method of data collection is commonly used.
vii. An observation schedule is a list of positive and negative statements about a concept.
viii. Secondary data is information that has already been compiled from primary sources and made accessible to other researchers for their own research.
ix. Newspapers typically publish data that is more political, economic and educational than scientific.

(Answer : i. True, ii. False, iii.True, iv. True, v. False, vi. True, vii. False, viii. True, ix. True)

Q.4. Write Short Notes :

i. Define primarily data and explain its concepts.

ii. Write note on Experimentation Method.

iii. Schedule method of primary data.

iv. Schedule

v. Major sources of secondary data

Q.5. Answer in Brief :

i. Explain the merits of primary data.
ii. Explain the demerits / limitations of primary data.
iii. Explain methods of survey.
iv. Which are the formats of interviews ?
v. Explain observation method primary data collection.
vi. Explain the merits of secondary data
vii. Which are the sources of secondary data.
viii. What are the demerits of secondary data?

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6

DATA COLLECTION – II

Unit Structure

6.1. OBJECTIVE

i. To know the concept of qualitative research.

ii. To know the concept of quantitative research.

iii. To differentiate between qualitative and quantitative research.

iv. Elaboration of integrating technology in data collection.

6.2. INTRODUCTION

To solve research questions researcher must collect, analyse and interpret data when have research problem. The type of data researcher will collect and the data collection method determined by the research problem researcher are investigating. In this topic we will look at different types of research methods and the benefits and drawbacks of each. Purpose of this is topic is to give a good understanding of qualitative and quantitative research and when to use each of the data collection methods.

6.3. QUALITATIVE RESEARCH AND QUANTITATIVE RESEARCH

The most generally adopted method to validate the data is the research. There are two traditional approaches of doing research in the fields of marketing, industry, sociology, psychology, science & technology, economics etc. and they are qualitative research and quantitative research. While qualitative research depends on verbal narratives such as spoken or

handwritten material to form conclusions, whereas quantitative research depends on reasoning or statistical facts. Qualitative research can be used to learn how a person subjectively considers and interprets their social environment. Qualitative research is exploratory and refers to factors that can be observed but not tested such as language. Quantitative data is information about quantities, and thus numbers.

6.3.1. Concept of Qualitative Research :

Qualitative research is used to get a better knowledge of human behaviour, intentions, attitudes, experiences and other factors based on people's observations and interpretations. It's an unstructured, exploratory method of dealing with very complicated events that can't be explained. This type of study is typically conducted in order to gain an in-depth understanding of the subject. It is done by conducting an interview with open-ended questions, observations that are written down and so forth. Qualitative case study is a research methodology that helps in exploration of a phenomenon within some particular context through various data sources, and it undertakes the exploration through variety of lenses in order to reveal multiple facets of the phenomenon

When historical data is unavailable, qualitative methods are particularly useful. And there are no numbers or mathematical calculations required. Words, sounds, feelings, emotions, colors, and other non-quantifiable aspects are essential to qualitative research. These methods are based on intellect, guesswork, emotion, and other factors.

Non-numerical data, such as text, video, photographs or audio recordings, is referred to as qualitative data. This type of information can be gathered through diaries or in-depth interviews, and analysed through grounded theory or thematic analysis. Examples of Qualitative research are Case study, Ethnographic research, etc.

Definition :

" Qualitative research is a type of research that focuses on gathering information through open-ended and conversational discussion."

Qualitative methods produce in-depth understandings of how individuals interpret their social realities and, as a result, how they behave in that community.

6.3.2. Features of qualitative research :

i. **Based on a natural setting:**
Qualitative research is frequently based on real-life situations and it is intended to occur naturally without outside interference. They should not be manipulated because of manipulation of qualitative research results from research also get manipulated.

ii. Adapting to the findings :

When conducting qualitative research, the researcher should accept the findings that arises from research that may lead to additional research findings.The researcher is assumed to think outside the box and track the findings without interference.Rather than rejecting the results the researcher should reshape and adapt to them. This also gives the researcher a better understanding of the problem and in some cases aids in its resolution.

iii. Resourceful and purposeful:

Qualitative analysis is carried out on a variety of organizations, cultures, communities, people and events. The sample was chosen because it contains a wide range of information and is regarded as knowledgeable. The sampling is done because it provided deep inside information about the problem.

iv. Full informative data :

Qualitative research document is known to be rich in information that provides a knowledge of the subject. Interviews and direct quotations from respondents are examples of data collection methods that provide direct information about respondent's personal views and an in-depth understanding of the subject matter.

v. Individual response to unique cases :

The researcher is expected to remain responsive to the results that emerges from qualitative research rather than reframe the results. This highlights that the results should not hampered by any predetermined limits because every individual response in unique in its nature.

vi. Dynamics of Research :

In most qualitative research methodologies data is collected on the field, where the participants are encountering challenges or problems. These are real-time data and participants are rarely required to leave their physical areas in order to acquire data.

vii. Rather than relying on a single data source qualitative researchers typically collect many types of data, such as interviews, observations and records.

viii. This research technique aims to solve difficult problems by putting them down into understandable inferences that can be read and understood by everyone.

ix. People can create trust in the researcher because it is a more communicative strategy and the information acquired is raw and unfiltered.

6.3.3. Types of qualitative research methods :

Qualitative research describes either explicitly or implicitly the purpose of the qualitative research, the role of the researcher, the stages of research and the method of data analysis. Accordingly, there are wide variety of methods are common in qualitative research. The following are the qualitative research methods that are frequently used.

i. One-on-one interview:

Qualitative research involves direct interaction between the researcher and the respondent;therefore, this method is also known as unstructured interviewing. One of the most prevalent qualitative research methodologies is arranging in-depth interviews. It is a one-on-one interview conducted with one respondent at a time. This is purely a conversational method that allows researcher to extract more information from the respondent. One of the benefits of this method is that it allows the collection of exact data regarding respondent's beliefs and intentions. If the researcher is skilled, by using the proper questions can fetch useful data. If further information is required, the researchers should ask follow-up questions. In several ways, this method differs from traditional structured interviews. Although the researcher may have some preliminary set of questions and there are no formal structured tools. Also, the researcher is free to change the topic in any manner that satisfy his or her interest.

ii. Focus groups:

A focus group is another one of the most used qualitative research techniques for data collection. A focus group normally consists of a small number of participants say like 6 to 10, from target sample. The primary goal of the focus group is to obtain answers to the questions why, what, and how.

iii. Ethnographic research:

The most comprehensive observational method for studying people in their natural environment is ethnographic research. This strategy requires the researchers' adaptability to the target respondents surroundings. The purpose of this research is to learn about different cultures, challenges, motivations and contexts. Ethnography is a research method used to learn about the lives of others. It allows researchers to understand how and why people behave in various societies and cultures. Ethnographic research is the process of gathering information about a group of people. It is frequently used by anthropologists, sociologists and others who study human behaviour.

iv. Case study research:

The case study method has gained importance as a qualitative research method in recent years. It is used to describe an organization or entity.

This research method is used in a variety of fields, such as education and social sciences. This method necessitates a thorough examination and understanding of research techniques as well as data inference. A case study investigates a real-time phenomenon in its natural setting with the understanding that context matters.

A case study is the best research methodology for obtaining concrete, situational, in-depth knowledge about a specific subject. It allows researchers to look into the case's key characteristics, definitions and potential impact. Case studies are frequently used in a thesis or dissertation. When researchers don't have the time or money to conduct extensive research, they keep focused on case study. Researcher could initiate multiple case studies to evaluate and highlight key facets of research problem or could use just one complex case study to explore a single subject in depth.

v. Record keeping :

As a source of data, this strategy uses already existing trustworthy documents and similar sources of information. This information can be used in future studies. Therefore, one can go through books and other reference materials to gather information that will be useful in the research.

6.4. QUANTITATIVE RESEARCH

The quantitative research approach is based on scientific methods for collection of factual data and statistical data. It uses a variety of mathematical and statistical methodologies to determine the cause-and-effect relationship between two variables. This technique is also known as "Empirical Research" since the outcomes are accurately and precisely measured. Surveys, experiments and other methods are commonly used in quantitative research.

Quantitative research highlights the use of mathematical tools to analyse numerical data. The numbers in statistical analysis come from objective measurement scales for the units of analysis known as variables. There are four different types of measurement scales: nominal, ordinal, ratio and interval. Surveys can thus be used to collect data that will serve as the foundation for clarifying a concept. Tools that require numerical inputs are used in such surveys.

Definition :

“Quantitative research is a systematic analysis of research problems through the collection of measurable data and the application of statistical, mathematical or technological methods.”

Quantitative research methods are those that use numbers as a foundation for making broad conclusions about a concept.

6.4.1. Features of Quantitative research :

Some distinctive characteristics of quantitative research are:

i. Structured tools :
Quantitative data is collected using structured techniques such as surveys, pre tested tools, polls and questionnaires. Structural tools help in the collection of detailed and valid data from survey participants. Pre-testing enables the identification of areas in the research that needs attention. It ensures that respondents provide the predicted responses or the researcher's purpose to fulfil the research objectives.

ii. Sample size :
Quantitative research is conducted on a large sample size that is representative of the target data. To strengthen the study purpose, appropriate sampling strategies must be employed when generating the sample.

iii. Closed-ended questions :
Closed ended questions, such as "yes/no" or multiple-choice questions, require respondents to choose from a limited set of pre-defined responses. Closed-ended questions are developed in accordance with the research's goal. These questions are frequently used in quantitative research since they assist in the collection of quantitative data.

iv. Prior research :
Before collecting data from respondents many elements connected to the research issue are investigated in prior research.

v. Simple to analyse:
Quantitative data is usually displayed in the form of tables, charts, graphs etc. This makes it simple to analyse the data collected .

vi. Results generalisation :
The findings of this research approach can be applied to the entire population in order to adopt appropriate remedial actions.

vii. Contain measurable variables :
Data collection tools include items that generates measurable study of population. The variables of the study are measurable characteristics such as age, the number of children, educational status and economic status etc.

viii. Assume a normal population distribution :
A normal population distribution curve is preferred over a non-normal distribution for more accurate data analysis of quantitative data. This usually requires a large population, the size of which is determined by the population's characteristics. This requires the use of random sampling to avoid researcher bias in analysing the results, which would overcome the purpose of the study.

ix. Present data in tables, graphs, or figures :

Tables, graphs and figures that integrate large amounts of data to show trends, relationships and differences among variables are used to arrange data, obtained through quantitative methods. This helps in the interpretation of the research inquiry.

x. Use measuring devices :

To evaluate or collect quantitative data from the field, advanced digital or electronic tools are used. When the tools are adjusted, they guaranteed the complete and reliable data collection. Adjustment means that the measurements of the researcher's tools match those of a reference instrument that serves as a guideline.

6.4.2. Methods of Quantitative Research :

Quantitative methods are often more relevant for some research topics since quantitative research offers more objective findings as they are based on more reliable numeric data. Quantitative research can be carried out in two ways. They are as follows:

A. Primary quantitative research methods
B. Secondary quantitative research methods

A. Primary quantitative research methods :

Primary research differs from secondary research. In primary research the researcher collects data directly rather than relying on data from prior studies. The primary quantitative research design can be categorised as follows :

i. Survey Research:

The most basic tool for all quantitative research is survey research. Online polls, online surveys, questionnaires, web-intercept surveys and other types of surveys are used to collect data. This type of study can be conducted with a specific targeted sample group with comparative study. The sample of respondents must be randomly selected which is a requirement for this research. Because a large variety of respondents will be addressed using random selection a researcher can easily maintain the accuracy of the conclusions.

ii. Correlational research:

Correlation research is used to identify a connectivity between two variables, as well as how one influences the other and what changes are observed as a result. This quantitative research method is used to assign value to naturally occurring relationships and it requires the participation of at least two different variables to be effective.

Researchers use this quantitative research design to correlate two or more variables. Patterns, relationships and trends between variables are concluded in the same way that they were set up in the beginning.

iii. Causal-comparative research:

This research technique is basically based on the comparison criterion. This quantitative research method also known as quasi-experimental research is used by researchers to determine the cause-effect relation between two or more variables in which one variable is dependent on the other independent variable. The independent variable is set up but not changed and the effect it has on the dependent variable is measured. These variables must be formed in the same way that they occur in reality. Causal-comparative research is not limited to statistical analysis of two variables, but also includes examining how various variables or phenomena interact to each other.

iv. Experimental research :

True experimentation also identified as experimental research is a research method that is based on a hypothesis. Experimental research is usually based on one or more theories. An analysis is carried out in experimental research to prove or disprove the statement. In natural sciences, this research method is used. In experimental research, there can be multiple theories. A statement that can be verified or disproved is referred to as a theory.

B. Secondary quantitative research methods :

Secondary quantitative research is a type of research that relies on secondary data. To improve the overall effectiveness of research, current data is summarized and compiled. This method of research entails collecting quantitative data from existing data sources such as the internet, government resources, libraries, and research reports, among others. Secondary quantitative research aids in validating data collected through primary quantitative research, as well as improving or dismissing collected data.

The following are some of the most commonly used secondary quantitative research techniques:

i. Internet-based information :

With the widespread use of the internet and mobile devices, conducting quantitative research on the internet has now become increasingly simple. Most research topic information is available online, which helps to validate primary quantitative data and establish the relevance of collected data.

ii. Government and non-government sources:

Government and non-government sources that engage with research reports can also be used to undertake secondary quantitative research. This data is extremely trustworthy and comprehensive, so it can be used to improve the authenticity of quantitative research designs.

iii. Public libraries:

Although they are now a rarely used method of conducting quantitative research, they are still a credible source of data. Public libraries have copies of important studies conducted in the past. They are a source of important data and documents from which data can be obtained.

iv. Educational institutions:

Educational institutions undertake in-depth research on a variety of subjects and the findings that they publicly release a valuable source of quantitative research verification.

v. Commercial information sources :

Local newspapers, journals, magazines, radio stations and television stations are excellent sources of data for secondary quantitative research. These commercial information sources really provide first-hand information on economic trends, political interests, market analysis, demographic segmentation and other topics.

6.4.3. Data collection methodologies in quantitative research :

Collection of data is the most important part of conducting primary research method. Sampling methods and data collection through surveys and polls are two types of data collection methods.

Data collection methodologies : Sampling methods .

For quantitative research, there are two main sampling methods:

a. probability sampling and

b. non-probability sampling.

Probability sampling :

In probability sampling a theory of probability is used to search individuals from a population and create samples. Random selection methods are used to select participants from a sample. Every member of the target population has an equal chance of being chosen for the sample. It's mostly used in quantitative studies. Probability sampling techniques are the best option for producing results that are representative of the entire population.

Sample vs. population :

We must understand the difference between a population and a sample, as well as identify research's target population.

Population : The population refers to the entire group about which researcher wish to draw conclusions. Geographic location, age, income and a variety of other characteristics can all be used to define the population.

Sample : The sample is the group of people from whom researcher will collect information.

It's absolutely essential to carefully define target population in view of researcher's research objectives and practical aspects.

It may be difficult to obtain a representative sample if the population is very large, demographically diverse and widely scattered.

There are four main types of probability sampling :

i. Simple random sampling :

When the sample population is significantly larger, this sampling technique is used.

Example : Researcher want to choose a simple random sample of 100 from Company X employees. Researcher assign a number from 1 to 1000 to each employee in the company database and choose 100 numbers using a random number generator.

ii. Stratified random sampling :

In this method, a large population is divided into groups i.e., strata and units of a sample are selected at random from the strata.

Example : There are 800 female employees and 200 male employees at the company. Researcher categorise the population into two strata based on gender to ensure that the sample needs to reflect the company's gender balance. Then researcher select 80 women and 20 men at random from each group, giving a representative sample of 100 people.

iii. Cluster sampling :

Cluster sampling is a probability sampling method in which the main segment into clusters, typically based on geographic and demographic categorization criteria. Example:The firm has offices in ten different cities across the country (all with roughly the same number of employees in similar roles). Researcher don't have the resources to visit every office to collect data, therefore researcher will use random sampling to select three offices as clusters (groups) .

iv. Systematic sampling :

Systematic sampling is a technique in which the sample's starting point is chosen at random and all other elements are chosen at a predeterminedinterval.

Example: All of the company's employees are listed alphabetically. Researcher choose a starting point at random from the first ten numbers: i.e.,number 6. Every tenth person on the list is chosen from number 6 onwards (6, 16, 26, 36, and so on), resulting in a sample of 100 people.

Non-probability sampling :

Researchers used this sampling method for knowledge and experience. Because of the researcher's intervention not every member of a target population has the same chance of being chosen to be a part of a sample. This sample is less expensive and easier to obtain, but it has a higher risk of sampling bias. As a result, the researcher's ability to make population inferences is limited compared to probability samples and conclusions may be limited. A non-probability sample should still be made as representative of the population as possible. Non-probability sampling techniques are frequently used in exploratory and qualitative research. Rather than testing a hypothesis about a large population, the goal of this type of research is to develop an initial understanding of a small or under-researched population.

There are five different types of non-probability sampling models.

i. Convenience sampling :

In convenience sampling, sample are selected purely on the basis of proximity to the researcher. Because this sampling is quick and simple to incorporate. This is a quick and low-cost way to collect preliminary data, but there's no way to know if the sample is representative of the population, so the results aren't generally applicable.

Example : If a researcher is conducting research into student support services at the university where he or she is pursuing a degree, the researcher asks classmates to fill out a survey on the topic after each class. Although this is a convenient method of gathering data, the sample does not represent all students at the researchers' university. Because the researcher only surveyed students who were in the same classes and at the same stage as the researcher.

ii. Voluntary response sampling :

A voluntary response sample, like a convenience sample, is primarily based on accessibility. People volunteer themselves rather than the researcher selecting and directly contacting them . due to some people are inherently more likely to volunteer than others, voluntary response samples are always skewed.

Example : Researcher distribute the survey to all students at its university, and many of them choose to participate. Although this can provide some insight into the topic, the people who responded are more likely to be those who have strong opinions about student support services, so researcher can't be certain that their views are representative of all students.

iii. Consecutive sampling :

Consecutive sampling is similar to convenience sampling, except that researcher can choose a single sample or a group of samples and conduct

research on them for a long time and also repeat the process with different samples.

iv. Quota sampling :

Quota sampling allows researchers to develop strata by selecting samples based on their knowledge of target attributes. According to the researcher's perception, members of various strata can then be chosen to be a part of the sample.

v. Snowball sampling :

Snowball sampling is used to reach out to difficult-to-reach target population and obtain information. Snowball sampling can be used to recruit participants via other participants if the population is difficult to reach. It's common in conditions where assembling a research target audience is difficult.

Example : If a researcher searching into homelessness in the city. Because there is no list of all homeless people in the city, probability sampling is impossible. After meeting one person who agrees to participate in the study, the researcher is introduced to other homeless people in the area.

vi. Judgmental sampling :

Judgmental sampling is a non-probability sampling method in which samples are formed purely on the basis of the researcher's knowledge and expertise. This type of sampling, also known as purposive sampling, requires the researcher using their knowledge to choose a sample that is most useful to the research's objectives.

It's frequently used in qualitative research, especially when the researcher wants to learn more about a specific phenomenon rather than making statistical inferences, or when the population is small and specific. A good purposive sample should have clear inclusion criteria and rationale.

Example:

If research is about disabled students' perspectives and experiences at researchers university, so researcher purposefully select a group of students with varying support needs in order to collect a diverse set of data on their interactions with student services.

6.5. QUALITATIVE RESEARCH V/S QUANTITATIVE RESEARCH

Quantitative methods do not reveal the motivation behind participants' responses, rarely reach minoritized populations and collect data over long periods of time. Hence, it is best to combine quantitative methods with qualitative methods. The distinctions between qualitative and quantitative research can be drawn on the basis of the following factors:

QualitativeResearch	Quantitative Research
1. Qualitative research aims to discover how people think and feel in the human and social sciences	1. Whereas quantitative research is a scientific and empirical research method that employs statistical, logical and mathematical techniques to produce numerical data.
2. Qualitative research is more comprehensive.	2. Quantitative researchis more specific or scientific.
3.Qualitative research takes a subjective approach because the researcher is involved directly.	3. Quantitative research takes an objective approach because the researcher is indifferent and tries to identify the observations and evaluation on the topic to address questions.
4. Qualitative research is a type of experimental studies.	4. Quantitative research is conclusive.
5.The reasoning used to summarise data in qualitative researchconceptual.	5. Reasoning in quantitative research the is scientifically rigorous.
6. Purposive sampling is used in qualitative research to select a small sample size in order to gain a thorough understanding of a particular theory.	6.Quantitative research is based on random sampling in which a large sample is selected in order to interpret the findings to the entire population.
7. In qualitative research, interpersonal data is collected.	7. Quantitative research collects quantifiable data.
8. Words, pictures and objects are used in qualitative research analysis.	8. Numerical data is used in quantitative research analysis.
9. The goal of qualitative research is to explore and discover ideas that are used in existing practices.	9. In quantitative research, the goal is to investigate the cause-and-effect relationship between the variables.
10. Qualitative research employs in-depth interviews, focus groups and other techniques.	10. Structured interviews and observations are used in quantitative research.

6.6. INTEGRATING TECHNOLOGY IN DATA COLLECTION

Data integration is the process of combining data from multiple applications to create a unified conclusion about of data. Data integration is very critical process since data comes from multiple sources. Data integration would be useful to consolidate data from various databases and for reporting and analysis.

A - Methods of Data Integration:

When data comes in the form of a variety of internal and external sources then data integration initiatives become necessary. Depending on the discrepancies, ambiguity and number of data sources involved, following are the different types of data integration techniques.

B - Surveys &Polls:

Once the sample size has been decided, surveys or polls can be used to collect data for quantitative research. Among the most significant methods for conducting quantitative outcome research is survey because of the ease with which it can reach a large number of respondents depending on the research time and objective.

"A survey is a research method for gathering data from a pre-determined sample of respondents in order to obtain data."

There are several methods for surveys. The following are some of the most commonly used methods :

i. **Email :**
The most widely used and most effective method of survey is sending a survey via email. This method has a high response rate since respondent is used to this method. Researcher can send and collect survey responses using the emails.

ii. **Incorporate a survey on a website :**
Incorporating a survey on a website increases response rates because the respondent can have access to survey anytime and from anywhere.

iii. **Social distribution :**
Distributing the survey via social media increases the number of responses from people who are familiar with it.

iv. **QR code :**
The URL for the survey is stored in QR codes. This code can be printed or published in magazines, on signs or on almost any other object or medium.

v. **SMS survey :**
An SMS survey is a quick and time-effective way to conduct a survey and collect a large number of responses.

C - Hand held devices for data collection:

In the social sciences, researchers have generally collected data using paper-based devices, which have significant drawbacks and challenges. Between the field and at the office data is at risk. Along with this such data must be coded and analysed and need to be cross checked for accuracy, which is expensive. Handheld devices are being used in research to resolve such problems.

Handheld devices are any portable devices that can be carried and held in one's palm. A handheld computer or electronic device is one that can be held in one or both hands and operated. Although a handheld may include cellular communication, this category can also include other computing devices. A handheld device is primarily intended to provide a set of computing, communication, and informational tools in a device. Small computing devices with a display screen and or a miniature keyboard are known as handheld device technologies. These devices are usually extremely lightweight and can be kept in a pocket and used while still in your hand.

Following are some handled devices used in data collection.

- Cell phone
- iPad
- iPod
- Blackberry
- PDA
- Handheld Computers

The handheld devices mentioned above are data collection devices and data can be digitally recorded on the devices at the point of data collection. It minimizes the need for entry of data after the data has been collected. Data collection with handheld devices is more productive and makes sure quality of the data. Furthermore, data validation and a reduction in manual input help to reduce errors and save time.

Because the data collected by handheld devices is automatically synced between device and user, researchers can upgrade and make modifications at any time and from anywhere. The ability to evaluate collected data in real time and monitor projects is assisted by handled device data collection.

D - Limitations of handheld devices in collecting data :

i. **Problems with connectivity** :

Some areas do not have internet access, while others have a weak signal which results slow downloading.

ii. **Issues with data synchronization** :

iii. **Geographical and Climate Conditions** like rain, mountains, remote areas limit the data collection via handled devices.

iv. **Incorrect Clicks :**

v. Researchers click links and buttons on touch devices with their fingers, which reduces click accuracy significantly. This is also known as the "fat finger problem."

vi. **Less Context :**

Handheld touch devices have smaller screens which results context may be lost. This makes it more difficult for the researcher to get an understanding of the page, compare alternatives, and recall past information.

E -Text messages:

Compared to traditional data collection methods, researchers use text messages to collect data because it collects data in real time. Small, simple, prompts answer options should be included in text messages. If respondents do not answer back, researchers should decide whether and when to send notifications, as well as when and how often to communicate directly them for incomplete data. Messages are sent, received and stored by data collection portals. They have the ability to validate responses and send out error messages. To improve consistency in data handling, researchers should establish a procedure for adding new and correcting data. Researchers can ensure that participants can receive and reply to messages at the time of enrolment. Issues about secrecy must be addressed by researchers.

F - Importance of Text messages in data collection :

i. Increase the response rate

ii. Enables a wider demographic to be reached

iii. Simplify the screening process and sample group management.

iv. Make research more cost-effective.

vii. Easily follow up with participants

G- Social Networking in data collection :

Any information collected from social media platforms give insights into the actions of users on the platform. Any type of data that can be collected though the social media is referred to as social media data. Data collected from information people post publicly on social media is also referred to as social media data. Social networking tools can be used to collect this type of social media data.

Every social media platform relies on user's input to provide the best possible outcome. Metrics such as the number of likes, increase in followers, number of shares, engagement duration and more are included in the social networking data. Social networking data is a type of big data obtained from a respondent's profile on social media platforms such as YouTube, Snapchat, LinkedIn, Instagram, Facebook and Twitter.

H. Importance of social media in data collection :

i. Customising social media strategy :
Collecting data via social media can assist researchers in customising social media strategies for each social network. Even more precisely researchers can customise their approach based on their location or demographics.

ii. Collection of data in real-time :
The ability to gather data in real-time is one of social media's biggest benefit. Within a few hours, social media data can help researchers to assess the outcome.

iii. Important information about respondents :
Social media data provides important information about respondents. Researchers can learn what types of message respondents prefer, when they want to see it and where they spend their online time etc.

iv. Understanding of respondents :
By using tools and data extraction techniques of social media researcher understand how respondents are relate to subjects. Researchers can now accumulate data from social media, the web, forums, news and blogs relating to specific events, topics or within a specific audience group.

v. Understanding of communication and behaviour trends :
Social media has evolved at a fast rate and it's essential to analyse and comprehend how humans use it to communicate. It helps in understanding communication and behaviour trends in general. Academic research is beginning to address and utilize social media but this is still a developing field.

vi. Availability of large respondents :
Social media provides a large respondent for research. Respondents and researchers can connect on social media. Social media may be researcher first and last chance of data collection.

vii. Access to personal information of respondents :
Social media sites give researchers access to personal information of respondents. Because social media pages are written in the first person and it's relatively simple to create own online persona. For many researchers these personas in their research field helps in gaining credibility .

viii. The technology solutions and methods used to monitor social media, including social conversations and emerging trends, which is known as social intelligence and Social Media Listening. By using this these platforms, the collected data can be analysed and used to create valuable content and make research conclusions.

I. Different sources for collecting social media data :

i. **Twitter :**
Twitter Analytics is excellent for analysing because it lets researcher to see the best and worst posts from any month and can download data on likes, replies, retweets and other metrics among other things. To get a sense of how respondents think and feel about a topic, researchers can search for keywords on Twitter at a more detailed level over specific time periods and in specific locations also.

ii. **Facebook :**
Facebook analytics tab also includes detailed downloadable statistics. Researchers can see demographic characteristics of the respondents who like Facebook Pages, as well as the number of views on posts and videos.

iii. Instagram :
Instagram tools currently connects to some Facebook-provided Instagram analytic tools directly. The analytics provide a lot of information on both Instagram timeline and Instagram Stories posts, from viewership, connect and engagement to days of the week and a breakdown of locations by city and age groups. Although it is possible to look into hashtag usage which can be useful. But it is difficult and complex to get more detailed information on the images themselves without using a specialist tool like Pulsar which provides vertical AI image analysis.

iv. YouTube :
In YouTube's analytics section, researchers can look at a variety of metrics, such as video watch times, traffic sources to see where viewers are coming from, and demographic characteristic reports. Other options for social media research on YouTube include looking at the YouTube Trending page and studying the view counts and comments on videos, but these are difficult to aggregate without a specialist tool. YouTube Creators Academy is an excellent resource for learning about YouTube analytics.

v. Forums :
Trying to figure out what forum participants are saying about social trends is a great way to learn about them. Respondents will either elaborate on a topic or seek advice, so if a researcher can decode publicly posted forum topics, they can gain insight into the various topics and themes, which could be useful for social media research.

vi. News and blogs :
It's also important to keep track of what's being discussed in the news and on blogs, as this can influence social media research – for example, a dramatic headline in the news changes the course of a social media

conversation. The researcher typically conducts this research, but tools such as Google News and Pulsar can be used to search for news and blogs.

vii. Trends on Google :

Researchers can search volumes for various trends dating back to 2002 and compare multiple trends in a volume over time graph using Google's free trends service. The researcher can also see the most popular topics of the day and find related search queries that are commonly used in relation to the researcher's topic. This is especially useful when comparing trend in research from search and social media.

6.7. SUMMERY

We discussed quantitative, qualitative, primary, and secondary data, as well as the benefits and drawbacks of each. We also looked at the advantages and disadvantages of various data collection methods. After reading this topic, you should be able to choose the most suitable data collection method for your research question. The evidence you use to solve your research problem is called data. You get the right data to solve your research problem when you use the proper data collection method. A perfect study is one that incorporates both data collection methods. Although some areas only require one type of research data. The information required by the researcher is the most important factor. Qualitative research is more abstract than quantitative research.

6.8. EXERCISE

Q. 1. Fill in the blanks :

i. ……research is a type of research that focuses on gathering information through open-ended and conversational discussion.
(**Qualitative,** Quantitative, Numerical, Quantifiable)

ii. …… research is a systematic analysis of research problems through the collection of measurable data and the application of statistical, mathematical or technological methods.
(Qualitative**, Quantitative**, Ethnographic, all the above)

iii. The purpose of ……research is to learn about different cultures, challenges, motivations and contexts.
(**Ethnographic,** Case study, Record keeping, none of the above)

iv. …….technique is also known as "Empirical Research" since the outcomes are accurately and precisely measured.
(Qualitative**, Quantitative**, Ethnographic, all the above)

v. ……questions are those that require respondents to select from a limited set of pre-defined responses.
(Open ended, **closed ended,** both the above,none of the above)

vi. …… research is used to identify a connectivity between two variables.
(Causal-comparative, Experimental, Survey, **Correlation)**

vii. In …….sampling a theory of probability is used to search individuals from a population and create samples.
(Convenience, Voluntary response, non- probability ,**probability)**

viii. The …….is the group of people from whom researcher will collect information.
(**Sample,** survey **,** population, mean)

ix. …….sampling is used to reach out to difficult-to-reach target population and obtain information.
(Snowball, Quota, Judgmental, Consecutive)

x. In ……. sampling method samples are formed purely on the basis of the researcher's knowledge and expertise.
(Snowball, Quota, **Judgmental,** Consecutive)

Q.2.Match the Column :

	A	**B**
i	Closed ended questions	Quasi-experimental research
ii	Causal-comparative research	Secondary quantitative research
iii	Internet-based information	large population is divided into groups
iv	Stratified random sampling	People volunteer themselves
v	Voluntary response sampling	Yes/NO
vi	Judgmental sampling	purposive sampling

(Answers : i. Yes/No, ii. quasi-experimental research, iii. Secondary quantitative research, iv. large population is divided into groups, v. People volunteer themselves, vi. purposive sampling)

Q3. True or False :

i. One-on-one interview method is also known as unstructured interviewing method.
ii. A case study investigates a real-time phenomenon in its natural setting with the understanding that context matters.
iii. Quantitative data is collected using structured techniques such as surveys, pre tested tools, polls and questionnaires.

iv. In secondary research the researcher collects data directly rather than relying on data from prior studies.
v. Secondary quantitative research aids in validating data collected through primary quantitative research.
vi. The sample refers to the entire group about which researcher wish to draw conclusions.
vii. In convenience sampling, sample are selected purely on the basis of proximity to the researcher.

(Answers : i. True, ii. Ture, iii. True, iv. False, v. Ture vi. False, vii. True,

Q.4. Short Notes :

i. Explain the concept of qualitative data.
ii. Define and explain the concept of quantitative data.
iii. Types of Probability sampling
iv. Survey and poll
v. Hand held devices for data collection
vi. Write note on text messages as a data collection tool.

Q.5. Answer in Brief :

i. Explain the features of qualitative data.
ii. Explain the types of qualitative data.
iii. Explain the features of quantitative research.
iv. Explain the primary method of quantitative research.
v. Explain the secondary method of quantitative research.
vi. Elaborate types of non-probability sampling method.
vii. What are the glaring differences between qualitative and quantitative research ?
viii. Explain the importance of social media in data collection.
ix. Explain the sources of social media in data collection.

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7

DATA PROCESSING, ANALYSIS, REPORTING – I

Unit Structure

7.0 OBJECTIVE

1. To understand the role of data processing in business research.
2. To acquire the importance of data processing in business research.
3. To develop knowledge about various methods of data processing in business research.
4. To understand concept of Data Analysis
5. To learn various data analysis tools used by researcher

7.1 INTRODUCTION

Research in the social sciences is conducted by adopting a battery of diverse methods. This is because the social sciences represent a wide variety of disciplines, including (but not limited to) psychology, sociology, political science, anthropology, communication, education, management, and economics. Further, within each discipline, researchers can use several different methods to conduct research. These methods can include unobtrusive observation, participant observation, case studies, interviews, focus groups, surveys, ex post facto studies, laboratory experiments, and field experiments.

Despite this diversity in methods used and topics investigated, most social science research still shares several common characteristics. Regardless of field, most research involves an investigator gathering data and performing analyses. Analysis of data requires data processing, it involves different techniques such as editing, classification, coding and tabulation. The purpose of this chapter is to explain some of the fundamental concepts and terms that are shared across the research in social sciences.

7.2 STAGES IN DATA PROCESSING

Application of data processing by use of various statistical techniques not only improves the accuracy of the data but the inference for the purpose of managerial decisions is more perfect and precise. Processing of data includes removing unwanted, incomplete and irrelevant data and retaining useful, correct and reliable data.

There are many modern sources used for data collection and processing.

After the invention of the internet, pen and paper-based research is losing its glamour and all the activities of data collection are mostly conducted by using modern methods like google forms. The use of automation makes the data collection process smooth and better, but it also loads a lot of additional requirements for data processing.

There are two methods adopted for data processing when computerised-enabled research is conducted, for data processing those are

1 Batch processing and

2 Real-time data processing.

Batch Processing: In batch processing the raw data is collected and further processed in specific batches, it is used for large quantities of data sources such as payroll systems.

Real Time Processing: Sometimes the required data is needed to be captured during the processing like we need to capture the data when the customer is using the ATM to understand the usage behaviour, such transaction-based data needs to be captured within seconds as soon as the process starts. A huge transactional data is essential for making the analysis more applicable and meaningful, only real-time data processing is suitable for such a method.

Data processing is supplemented by the following activities:

7.2.1 Editing

Usually, business research is conducted through some type of survey. Such data collected from the field activity should be processed and systematically analyzed as pre-decided in the research plan. Editing is the process of improving the quality of data. It is concerned with removing unwanted and irrelevant data, rectifying errors and filling in missing data.

Definition:

According to Luck Wales and Taylor, “Editing is the process of inspecting, correcting, and modifying the information submitted on each questionnaire so that it is stated correctly, adequately and on a basis common to all similar categories of reply.

7.2.2 Objectives of Editing

1. Accuracy of Data: The primary objective of editing is to ensure accuracy of data collected to find out the answer to the research problem. Editing removes irrelevant and extra data and retains accurate data which is helpful in further processing. It also removes clerical or other errors from the collected data.

2. Consistency: Editing ensures consistency of data. It is highly important to have consistency in data for effective data analysis and correct results. Editing involves checking of data to remove any inconsistency, ambiguity and errors to ensure its consistency.

3. Complete: Editing includes evaluation of data for its completeness. Editing requires filling of missing data to make it complete. A complete data is helpful in obtaining desired result from data analysis

4. Facilitates Coding: Once editing is done it is important to codify data for further processing. Proper editing helps in easy and proper codification of data. Proper codification of data helps in further processing of data.

5. Acceptable for tabulation: Tabulation is an important step in data analysis. It is an important objective of editing that the data should be acceptable for tabulation. A good editing ensures the same and avoids rejection.

7.2.3 Types of Editing

Editing is an important part of data processing. If a researcher wishes to have accurate results for his study, he needs to ensure accurate data is processed. Editing plays an important role by taking care of accuracy of data used for processing and interpretation. Editing can be done either at the time of collecting data or after collection of data is over. Based on when data is edited there are two types of editing, a) Field Editing and b) Central Editing

A - Field Editing:

This type of data editing is conducted immediately after the respondent returns the data collection tool as a continuous process of review by the person who had administered the tool of data collection. It is immediately conducted as soon as the data collection instrument has been returned by the respondents. Filed data edition has the process of matching the respondent's intention to the actual responses given.

This form of editing eliminates the potential troubles arising due to discrepancies arising in view of the writing of individuals, which vary from person to person and are sometimes difficult for the tabulator to understand. This sort of editing should be undertaken as soon as possible and immediately after the interview, as it may be possible sometimes to recall the memory. While doing the field data editing, care must be taken so that the investigator does not correct the detected errors in the forms of

omission, by simple guesswork and imaginary facts about estimation about what would be the respondent had answered if the question had been answered by the respondent.

B- Central Editing:

Central editing is also called office editing, it is carried out after the return of all the data collection forms to the research office.

In a small field study, all the forms are thoroughly edited by a single person (most suitably by the editor). And by a small group of persons in case of a large-scale field study. The editor is expected to correct the obvious errors, such as an entry in the wrong place, responses might be recorded in slang terms where they should have been recorded in specific units.

Sometimes, there can be some chances of responses may be inappropriate, or some might be missing replies. The editor in such cases can do the necessary correction by critically reviewing the other information recorded in the data form. If necessary, the respondent may be contacted for clarification. All the incorrect replies, which are obvious, must be deleted from the data form. The editor must be familiar with the instructions used by the data collectors in the field at the time of data collection and the codes used during the editing. Care should be taken when any new (corrected) entry is made by the editor it should be in some distinctive form and should be unique, and it must be initiated by the editor. The timeline i.e., the date of editing may also be recorded on the data form so that it may be helpful in any future references.

7.2.4 Coding

Once data is edited the next step is coding of data. It is essential for analysis of data as it helps in managing the data. In the process of coding some symbolic value either alphabetical or numerals or both were assigned to the responses so that the responses can be mathematically processed by recording them into a suitable and meaningful number of classes or categories. The researcher needs to ensure that the classes justify the appropriateness to the research problem proposed to be studied. These classes must be exhaustive and should be mutually exclusive so that the responses can be placed in one and only one cell in each category, without any ambiguity. Further, every class must be perfectly defined in terms of only one concept. The perfect coding ensures the efficient analysis of data.

7.2.5 Guidelines for Coding of Data:

1. Use of Symbols and Alphabets: It is necessary to use symbols and alphabets in coding, so it helps in data processing.

2. Appointment of Experienced Person: It is necessary to appoint a person for coding who has experience in interviewing for collection of

data. This helps in development of codes to be assigned for collected data as well as framing of questionnaires.

3. Use of Appropriate Questions in Questionnaires: It is easy to codify closed ended questions but it is highly difficult to code open ended questions. Care needs to be taken to avoid such questions, however if use of open-ended questions is inevitable then proper care has to be taken while coding responses of such questions.

4. Use of Precoding: The coding decisions should usually be taken at the very early stage of research designing and need to be incorporated in the questionnaire itself so that the likely responses to the questions can be suitably pre-coded.

5. Use of Categories: Coding involves deciding the categories to be used. Categories should be mutually exclusive but should include all variables. This should support the computer tabulation of the data for further analysis.

6. Identification of Respondents and Responses : It is necessary to identify responses and respondents, for this a unique alphabet or number could be assigned to the respondents or the key information asked in the questionnaire as well as responses received for the questionnaire. This will be helpful in further processing of data.

7. Periodical Review: It is necessary to conduct regular check on application of coding to ensure consistency, uniformity of data which is helpful in further processing.

7.2.6 Classification

Meaning: In most of the social and business research studies, voluminous raw data is collected through the field surveys. For any meaningful analysis such data needs to be reduced into specific homogeneous groups. This is conducted through a process called classification of data.

Definition: It is a process of grouping of data in the basis of certain criterion such as age, sex, income etc.

In simple terms it is the process by which the data is arranged in-to groups represented by classes based on some specific characteristics. The process of classification leads for condensation of the data and facilitates comparisons; it also helps to study the relationships and accommodates various statistical treatments on the data. To ensure the meaningful analysis of the data it is needed that the data classification should be conducted in an unambiguous and mutually exclusive and collectively exhaustive manner. Further, it should not only be flexible but also suitable for the research purpose prescribed and it should address the purpose for which it is sought.' The system of classification can either be according to the data attributes or by assigning the simple numerical characteristics to the data.

7.2.7 Methods of Data Classification:

Data can be classified on the basis of similarity of attributes of data. Following are different methods of classification of data.

1. Geographical Classification: Under this method data can be classified on the basis of area or geographical area. For economic data such as Income Level, Sales, Expenditure can be classified on the basis of city, state, country etc.

2. Periodic Classification: This method of data classification is focused on period or time. Data can be classified on the basis of time for eg. monthly sale, weekly sale, yearly profit etc.

3. Qualitative Classification: This method of classification is based on unique feature of data collected. For example data can be classified on the basis of Sex, Age, Income etc.

4. Quantitative Classification: This type of classification is focused on attributes of data which could be measured in numbers. Data can be classified on the basis of height, weight, income, profit or loss etc.

Classification of data can be done alternatively as follows.

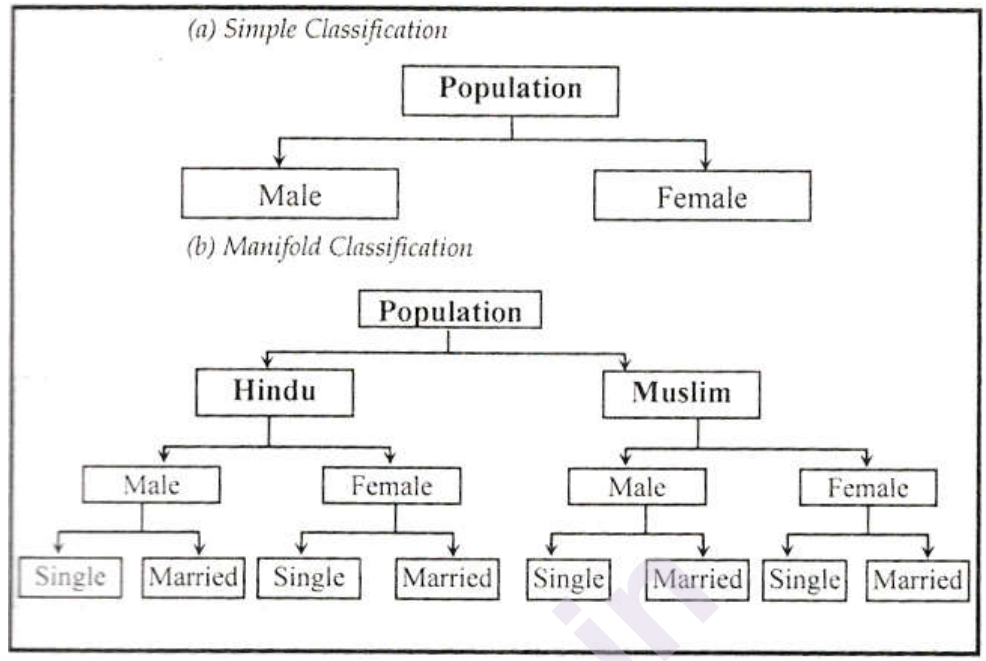
Classification by the data attributes:

In this classification the descriptive characteristics of data attributes were used such as gender, education, family size, residential location etc. These descriptive characters are usually those which cannot be measured in quantitative units. Hence, those characteristics can only be described to show in terms of either its presence or absence in a data pointer. The classification according to attributes may be conducted in two types.

i) **Simple Classification:** Under thesimple classification each class is divided into two subclasses and only one attribute is studied e.g., the characteristics such as married or unmarried, employed, or unemployed etc.

ii) **Manifold Classification:** In the case of manifold classification more than one attribute of the same respondent are captured for in-depth studies. For example, the respondents in a survey may be classified according to their residential location as rural and urban buyers of a particular brand of product. Both rural and urban users were further classified under categories as user and non-user; it can be further classified into male and female. Further it can classify male and female into two categories such as below 20 years of age and 20 and above years of age. The same respondent can further be classified as professionals and non-professionals. This way the researcher can keep on adding more attributes. This is shown in Figure – 9.1 below. However, the addition of any attribute (in the process of sub-classification) only depends upon the basic research objective and purpose for which the classification is carried out. The researcher must clearly spelt out the objectives of such manifold classification.

Figure – Manifold Classification



(Source: Primary Data)

Classification by the numerical characteristics:

The Classificationby the numerical characteristics is perfect to represent the numerical data such as sales, profits, height, weight, income, marks. Such data can be easily classified into the class intervals. For example, the respondent whose monthly income is between Rs. 5,001 and Rs. 9,999 may be classified under one group, those whose income is within Rs. 10,000 and Rs. 10,999 may form another (next) group, and so on. In this manner, the entire data can be divided into a specific number of 'groins or classes, which are usually called class-intervals.

The number of such items following in such classes is called the Frequency of the class. Every class has two boundaries also called the limits such as an upper limit and a lower limit, which are known as class limits. The numerical difference between these two limits is called the magnitude of the class or the width of the class interval.

The class intervals may be designed by using inclusive and exclusive methods. Suppose in class intervals with class limits such as 10 - 15, 16 - 21, 22 - 27 etc. the class interval is an example of inclusive method because the data represented by both the lower and upper limit are included in the specific class only. If a variable 'X' falls in the first-class interval, it can take values like 10< X >/=15. But if the class intervals were designed like 10 - 15, 15 - 20, 20 - 25 etc. it forms an example of exclusive class interval, because in this method the lower limit is included whereas the upper limit is excluded from the specific class interval, e.g., the variable 'X' if falling in the first-class interval, would take values as 10<X < 15. As an illustration of how the data can be classified into class

intervals using inclusive and exclusive methods, the following example may be self-explanatory.

7.2.8 Tabulation

Next step in data processing is Tabulation of Data. The process of data tabulation is carried out by a specialist person and the act of tabulation is very important. The process of tabulation serves two purposes i.e., the summarization and the condensation of data.

Data Tabulation aids in analysis of relationships in the two data characteristics. Tabulation if conducted with respect to 'time' it may provide trends and other formats of the summarization of the given data.

Definition: The Process of tabulation involves numerical processing of classified data which summarises the data by counting or totalling the responses within each category of data.

The tabulation can be simple or complex. Simple tabulation is conducted by adoption of a one-way table; it can be used to answer those questions related to only one characteristic of the data. The complex tabulation usually needs to be used a two-way table, it gives information about two characteristics of the data; by projecting the inter-relationships in the defined data characteristics, a three-way table which can give information about three interrelated characteristics of the data; and in this manner still higher order tables may be formatted, which has a capacity to project information about several interrelated and complex characteristics of data.

7.2.9 Methods of Tabulation:

There are two methods of tabulation 1) Hand or Manual Tabulation and 2) Machine Tabulation

1. **Hand / Manual Tabulation:** It is a traditionalmethod of tabulation. It is simple to follow and execute. It is suitable for small data. In this method sorting, numbering and counting of questionnaire / responses is done manually. Tally marks are used for counting of data which enable speedy data processing.

2. **Machine Tabulation:** This is an advanced method of tabulation and is quite useful when a researcher is handling huge data. It includes use of machines such as computers for sorting, counting of responses. This method is a costly method of tabulation as it requires machines to be purchased. However these machines do not help only in tabulation but could be used in entire data processing operations.

7.3 DATA ANALYSIS

Data analysis is an attempt by the researcher to summarize the data collected in a meaningful manner to support the research objective or purpose. It is the presentation of the findings of the study. Depending on the nature of the data the tools of interpretation are required. Data analysis and interpretation are the critical stages in the research process that

requires the researcher to apply knowledge of the data and its meaning by establishing the relationships between the dependent and the independent variables.

Meaning: Data Analysis is the process of systematically describing and illustrating the meaning possessed by the data, by applying relevant and suitable statistical and/or logical techniques.

Definition: Data analysis can be defined as the process of transforming collected data into useful information helping in drawing conclusions and assisting in decision making.

While data analysis in qualitative research can include statistical procedures, many times analysis becomes an ongoing iterative process where data is continuously collected and analyzed almost simultaneously. Indeed, researchers generally analyze patterns in observations through the entire data collection phase. The form of the analysis is determined by the specific qualitative approach taken (field study, ethnography content analysis, oral history, biography, unobtrusive research) and the form of the data (field notes, documents, audiotape, videotape). An essential component of ensuring data integrity is the accurate and appropriate analysis of research findings. Improper statistical analyses distort scientific findings, mislead casual readers, and may negatively influence the public perception of research. Integrity issues are just as relevant to analysis of non-statistical data as well.

7.3.1 Steps in Data Analysis

Data Analysis is a systematic and scientific procedure to be followed by researchers to obtain accurate results of his study. A researcher must follow all steps of data analysis given below to obtain the proper result.

There following 5 Steps used in the Data Analysis

Step One:Asking the right questions: Accurate data is needed for data analysis hence asking the right questions to the respondents is needed to get a correct response. A good researcher should avoid asking leading, misleading and double meaning questions to obtain a proper response from respondents

Step Two:Relevant data collection: For proper data analysis data collection should be relevant and related to the research problem. A researcher should not get fascinated by the irrelevant data as far as possible one must stick to the scope of the research only.

Step Three:Data cleaning: Collected data needs to be cleaned for data analysis. There may be unwanted elements in the form of outliers that are extreme exceptions in the data. These types of elements create skew in the data, hence should be avoided, or eliminated by a process called haircut.

Step Four:Analyzing the data: Once data is obtained, edited, coded, classified and tabulated the researcher can go ahead with data analysis for

this he needs to use appropriate, logical and statistical tools so that relations between different variables of data can be revealed.

Step Five:Interpreting the results: Once data is analysed and results are obtained it needs to be interpreted. The output of data analysis is in the form of numbers and numbers can not talk about themselves. The role of a researcher is to apply the logic and meaningful frame to reveal the meaning.

7.3.2 Use of Statistical Tools in Data Analysis

A. SPSS:

It is one of the popular software used in branches of business and social research. Its abbreviation SPSS stands for Statistical Package for the Social Sciences. It's most preferred software since it has a better user interface and has a capacity to address all the data analysis related queries that can be handled without knowledge of syntax writing skills. Basically, it is user friendly and multiple data collected from the respondents can be entered in one raw and can be used selectively as per the situation of demand. Graphical representation of data analysis results is possible in this software. This program gives an extensive range of basic to most advanced statistical functions such as, frequencies, cross-tabulation, bivariate analysis etc.

Data files stored in other software formats like MINITAB, EXCEL, SAS, R can be easily explored in-to SPSS without any chances of data loss is the superior feature of this software. It is now a day more advanced with added add-ons such as AMOS for structural Equation Modelling (SEM).

Features of SPSS:

1. In SPSS the data is stored in file extension ".sav" format. This makes the process of manipulating, analyzing, and pulling data very simple.
2. SPSS allows a user- defined set of variables in research models.
3. The tools of data management and data editing are very handy.
4. SPSS allows the researchers to design, plotting, reporting and presenting in a very simple manner.
5. SPSS has a huge inventory of a number of predictive models with ease of operations.

B. SAS:

The full name of SAS is Statistical Analysis Systems. It's a powerful programming language. The components used for analysis are called procedures. Each such procedure is designed to perform a unique activity of data analysis such as data analysis, data management functions some features are dedicated for different types of output either text based, or graphical presentation of the data processed. It can access the data from both the internal and the external database sources. It can manage and

retrieve the data from various sources. It can format and convert the data in required formats easily. It uses tools like forecasting & modelling; descriptive statistical analysis is possible where multiple variants are operative in a model. It supports various computing environments.

Features of SAS:

1. Robust ability of data analysis it has a range of simple to advanced analysis.
2. It has its own inbuilt libraries, supports analyzing and reporting the data analysis
3. SAS syntax is easy to learn; the codes on which it operates are like simple statements.
4. SAS has reduced the burden of coding for the common researchers.
5. SAS has an interactive log-window which keep the user instructing about possible errors
6. SAS has a wide variety of studios which can be accessed from any device connected with any browser.

C. MS-EXCEL:

Excel by Microsoft is a spreadsheet program used for recording and analysing numerical data by applying various statistical tools. It is component of Microsoft office suite. Excel was formerly code-named Odyssey through development. It builds data in columns and rows. Every spreadsheet of Excel is a collaboration of rows and columns that creates a space called a cell. Each cell has a unique identification assigned with alphabetical letter and numerical value each such cell may contain a single piece of data in any format such as text, value, or formula. Each cell address comprises the column by alphabetical characteristics and number symbolising the row. It fits with multiple operating Systems (OS) like Windows, Mac-OS, Android and IOS.

Features of MS-Excel:

1. Excel has a simple but robust password protection that allows the user to protect the data stored in the workbook.
2. Excel allows the user to conduct the data filtering in the manner the data manager expects.
3. There are two specific commands for data filtering, such as auto filtering and advanced filtering for addressing the needs of simple criteria and complex criteria.
4. Excel has an inbuilt feature of data sorting by using some logical order either in ascending or descending manner
5. Excel has a huge inventory of built-in formulas.

6. Excel has an additional data analysis tool called pivot table; it allows you to get the data in any manner for the purpose of analysis.

D. MINITAB:

It is developed keeping in focus the specific need of the requirements of data analysis of the SIX SIGMA professionals. The data input is simplified so that it can be used for any type of statistical interpretation. The managerial problems are provided solutions in an easy and faster manner by the Minitab. It mainly helps in identifying the trends and data-based patterns.

Features of Minitab:

1. Drawing the Pareto chart is very easily available in Minitab.
2. Each worksheet has a project manager feature which makes the data user friendly.
3. Minitab opens with three windows such as A) session window, B) Worksheet window and C) Graphics window simultaneously.
4. The graphical window opens when the graphics are asked to plot such as Scatterplot, histograms etc.
5. It has MSA i.e., Measurement System Analysis it determines the amount of variation mathematically.
6. It has a built-in ability to design research experimentations.
7. It covers support for three major data types such as numerical, text and data and time.

7.4 SUMMARY

In the business research process, data analysis is very important and needs to be conducted in a scientific manner. There are several steps designed especially when the researcher is conducting quantitative research, since it is full of numerical data. The researcher must understand the research area and scope comprehensively and do the required processing, analysis and finally interpretation with the help of various techniques and tools of analysis depending upon the nature, scope and aims of the research being conducted.

7.5 EXERCISE

Fill in the Blank

1. The main objective of …… studies to acquire knowledge.

   A. Exploratory B. Descriptive C. Diagnostic D. Descriptive and Diagnostic

2. …… is concerned with discovering and testing certain variables with respect to their association or disassociation

   A. Exploratory B. Descriptive C. Diagnostic D. Descriptive and diagnostic

3. Tabulation can be done by ……

   A. hand B. machineC. Hand and Machine both D. None of these

4. Editing done at the back office is called: ……

   A. Field Editing B. Central Editing C. Physical Editing
   D. Back Editing

5. By coding the transformation of the raw data is converted into…….

   A. Symbols B. Letters C. Signs D. All of these

6. The primary use of a table is for …….

   A. Tabulating data B. Interpretation of data C. Classification of data D. Coding of data

7. …….. describes the table's contents.

   A. Title B. Body C. Stub D. Footnote

8. Summarization and condensation of data is served by…….

   A. Tabulation B. Classification C. Coding D. Title to the data

9. …….. classification is suitable for capturing multiple attributes of the same respondent.

   A. Multiple B. Simple C. Layered D. Composite

10. The …. decisions should usually be taken at the very early stage of research designing.

    A. Coding B. Classification C. Data Security D. Tabulation

Key:

Q. No.	1	2	3	4	5	6	7	8	9	10
Key	A	A	C	B	D	A	B	A	A	A

Match the Column

A-Group	B-Group
1. A systematic arrangement of the data	a. Prior to Coding
2. Data may deceive the decision maker if it has	b. Data processing
3. Data Editing	c. Subjective elements
4. One variable description	d. Column of Table
5. Caption	e. Simple Tabulation

(Key: 1-b, 2-c, 3-a, 4-e, 5-d)

Short Notes

1. Types of Tabulation of Data
2. Methods of Data Classification
3. Central Editing
4. Stages in Data Processing
5. SPSS
6. MINITAB

Review Questions

1) Describe the stage s involved in processing data

2) What is editing? Why is it undertaken?

3) Explain two major types of data editing generally used in business research.

4) What is Filed editing? How and when it is conducted?

5) What is Central editing? How and when it is conducted?

6) What do you mean by coding of data in research? Explain its guidelines

7) What do you understand by classification of data?

8) Explain the commonly used data classification methods in business research.

9) What is simple and manifold classification? In which specific type of situations these methods are suitable?

10) Explain the important characteristics of a table.

11) What is data tabulation?

12) What is simple and complex tabulation?

13) What is Data Analysis? Explain steps in data analysis

8

DATA PROCESSING, ANALYSIS, REPORTING - II

Unit Structure

8.0 OBJECTIVE

1. To understand the role of data interpretation.
2. To understand the importance of data interpretation.
3. To understand concept of report writing
4. To develop knowledge about different types and content of reports.

8.1 INTRODUCTION

Data interpretation is the next step after data analysis. Data analysis includes application of statistical tools however results derived from analysis provide us numbers. Researchers need to find meaning from these numbers; it is done through data interpretation. It is a process of drawing inferences from the processed data.

Meaning:

The numbers do not speak for themselves. Interpretation is a process by which a meaning is attached to the data. Hence, interpretation needs to be fair and needs to be done in a careful manner by applying judicious judgement. The interpretation depends on the understanding of the intellect and exposure of the researcher. Hence, it is always better to involve more than one interpreter.

The process of interpretation of data is a complex process and it involves cognitive and technical skills. However, it is a human effort driven activity and involves contextual and affective aspects. This view is confirmed with research on affectivity and cognition. While the affective aspects of interpretation are recognized as important for the interpretation of data, they were not sufficiently discussed in the literature. Data interpretation is the process of assigning meaning to the collected information, and it provides the conclusions, significance, and implications of the findings.

Interpretation of the data involves two parts:

1) presenting the result(s) of the analysis; and

2) providing additional information that will allow others to understand the meaning of the results.

In other words, it means placing the results in a context of relevant information. Obviously, the process of interpretation involves both decisions making and the use of good judgments. The use of the term results to refer to any information obtained from using analysis procedures. In this way the term findings refer to the results which have been agreed because of research objectives.

8.1.1 Importance of Data Interpretation

Data interpretation refers to the process of using diverse analytical methods to review data and arrive at relevant conclusions. The interpretation of data helps researchers to categories, manipulate, and summaries the information to answer critical questions. Following are some of the points which summarizes the importance of data interpretation.

1. Creative Process: DataInterpretation is a creative process which can be used to judge knowledge, experience and ability of the researcher. Different conclusions can be drawn by different researchers by interpretation of the same data.

2. Connecting Link: Analysis of data itself does not provide any logical answer to the problem. Data interpretation is the connecting link between data analysis and report. Interpretation of analysed data helps to draw conclusion which can be included in the report

3. Logical Reasoning: Interpretation of analysed data provides logical reasoning and helps to arrive at definite conclusion and recommendations for the research

4. Provides Knowledge: Interpretation of data is helpful in providing knowledge of the research subject, this is helpful in further research studies.

5. Makes findings more meaningful: Data interpretation helps inmaking findings more meaningful and ready for implementation.

8.1.2 Steps of Data Interpretation:

Data Interpretation has four steps as follows:

1) Assemble the essential information,

The researcher must ensure that all the information that is relevant and essential for data interpretation, is available. Such important information to have available should include:

A. À list of the dependent and independent variables under study.

B. classification of the sample in suitable segments.

C. The framework of sample used during the data collection

D. À researcher should ensure that a correct unit of measurement is adopted in the data tables and graphs.

E. À general observations, such as habitat and weather information for each sampling

F. date and site.

The researcher can select to put all the information in easy-to-read tables, graphs, or maps to be available to the readers.

2) Develop findings:

Findings are observations about the data used in the research. Findings should be in the form of the statements that summarise the important points. Findings will help the researcher to reach conclusions, because findings will help in forming a more thorough and accurate interpretation. The researcher should look at the data and try to explain it only after thoroughly observing and summarising the trends, patterns, or lack of patterns.

Developing findings is a process in which the researcher is expected to compare the actual and analysed results with the known standards benchmarks or guidelines within the data set with the other data sets.

3) Develop conclusions:

Conclusions are researcher's explanation about, why the data look a specific way? The conclusions should relate back to the questions the researcher had explored by asking in the beginning of the monitoring program – those must be the same as the study questions.

4) Develop recommendations.

Recommendations are based on the research findings and conclusions. They can take two forms: action that should be taken and further information that should be gathered, to address the future requirement in the research topic or area.

8.2 REPORT WRITING

Research report is a systematic document describing the research carried out by elaborating about the procedure used and method adopted. It is defined as, "It is the systematic presentation of the research objectives, methods and procedure followed in the research work in a systematic and universally acceptable written form". In report researcher provides his analysis, findings, interpretation, conclusion and recommendations for the research problem

For both the business and for the research firms it is essential to describe the findings derived by the research work. A well-documented report saves time, energy and addresses all resources such as money, and it brings general acceptance about the problem statement.

8.2.1 Characteristics / Essentials of a good report:

Every good report has certain characteristics some of the ideal report possesses following features:

1. A good report should be made in proper format. It should be clear, concise, accurate and well organised with appropriate sections dedicated to each area.

2. Every new area should carry separate and precise headings.

3. A good report should be easy for the target audience for their understanding.

4. The goodness of a report dependents on its quality of presentation, as is a key element of a successful report.

5. A good report must be designed with proper formatting, suitable revising and accurate proofreading are some of the important process stages to make a good report.

6. A good report should have an executive summary that presents all the essential elements of the report from the introduction through to the recommendations and outcomes.

7. A good report should be visually appealing and easy to read.

8. A good report must have proper and self-explanatory diagrams, figures, charts, tables, and graphs which can add interest and grab the attention of the readers to a report.

8.2.2 Types of Report

Almost all reports in business are derived according to specific situations to help the decision making and explore the possible outcomes in a complex situation. There are different reports such as Sales Activity Report, Personal Evaluation Report, Financial Report, Feasibility Report, Progress Report, Credit Report. All these research reports are typically the collection and presentation of the collected data to expedite the decision making in a more scientific manner by providing the interpretation of data by applying statistical tools. All these reports can be classified in-to three groups:

1. Analytical Reports

2. Recommendation Reports

3. Informational Reports

Analytical Reports:

This type of reports is also called a "specialised report" and they are prepared to address the quarries like why or how something happened and then to explain what it means in the given context. Analytical reports attempt to explain, what is the cause behind a problem, or a typical situation faced by a business or an organisation. These reports are generally conducted to find out the potential results if a particular course of action is undertaken. They sometimes attempt to suggest which option, action, or procedure is best. These reports attempt to describe the analytical facts and reports with estimated results, and draw conclusions based on those results.

Recommendation Reports:

These types of reports are prepared to advocate a specific course of action to a company or an organisation or department of a company. This type of reports is identical next to the analytical report. This usually presents the best option based on the analytical report, considering the internal and external business situation in which the organisation operates. Organisations generally find it difficult why they should follow a certain course of action or there might be many options hence, selection of the most suitable option can be a biassed decision to avoid the recommendation, report helps it to arrive at the proper course. Since these reports are prepared at specific occasions they are also known as "accidental reports."

Information Reports:

Informational reporting is also called "narrative report", it is designed to present a description of the situation so that the readers can understand a particular problem or situation thoroughly. This type of reports is built by collecting all the facts and relevant data, without deciding the situation into a typical type. Generally business managers who handle a wide and variety of business operations for them the complexity of scope of operation does not permit to be aware about all challenges faced by the business hence for any situation which deviates beyond the bench marked level an informational report is prepared. It presents an update of the operation in a business division. Or it may explain how the organisation or division does something. These are usually desk research and rarely they are the results of a questionnaire or field research.

8.2.3 Contents of Report

1. **Title page:** It should include the title, the name of the preparator, and the name of the authority to whom it is designed to be submitted. This page also contains other details such as, the date of submission, the name of the department, the logo of the organisation etc.

2. **Acknowledgements:** It is a list of individuals and certain people belonging to organisations who have helped in the compilation of reports and other related work. A reference is made to recognize the contributors.

3. Contents page: It is an index of all the sections and subsections contained in the report. The index should be designed with page numbers, and one should ensure that pagination be marked correctly. There can be a separate index for figures and tables, depending on the volume of these elements in the report.

4. Abstract: It is also called "executive summary". It is a summary of the major points, conclusions, and recommendations should be written to give a general overview of the report. Ideally it should not be too long.

5. Introduction: It is the first page of the report, which needs to have an introduction of the topic. The researcher is expected to explain the problem and show the reader clearly why the report is being made. Specifically, the research objectives need to be mentioned at the very beginning.

6. Body: This is the main section of the report. There needs to be several sections, with each having a title and subtitle. Among the various sections it may include Review of Literature, data sources and research methods used and the results.

7. Methodology: This topic with the research method and research framework and the sampling method adopted, more specifically it should explain the method used for data collection. And the time of data collection from the field. Methodology should explain the sample selection criterions also.

8. A discussion section: This section will summarise and explain at the end of the body to go over by findings and their significance.

9. Conclusion: A conclusion should draw out the implications of the research findings. It may be based on the deductions based on the facts described in the main body of the report. The significance and relevance of the study is discussed in this section.

10. Appendix: Is a part which contains the additional details of the data, maps of the sample collected site/ market location. It is basically a part where all detailed supportive documents such as questionnaire, tables, mathematical calculations are compiled and given a specific index number, which inside the description is mentioned with a specific reference no.

11. References: This is a list showing the full details of all the information sources to which the researcher has referred within the text.

8.2.4 Use of Audio-Visual Aids in Research Report

A picture speaks for a thousand words. This line itself elaborates the importance of visuals. Inclusion of visual aids in the report increases effectiveness of the report. A graphical illustration helps the reader to understand the point easily and effectively.

According to Ruben and Stewart (2006), AV (Visual Aids) function to add interest to a presentation (in this case, a report) by giving the audience (readers) something to judge by allowing them to examine (easily). They may also clarify what the sender is saying (writing) by providing a visual illustration to the specific points described in the report.

There are four types of visual aid that help the readers to convey the meaning to common and specific audiences:

1. The actual objective or rationale behind the discussion; the presenter uses some suitable graphical object to make the understanding better.

2. The presenter may use a model so the model explains about the object being discussed.

3. Meditation by suitable objects, such as pictures or illustrations.

4. Meditation by tools such as charts, graphs, and diagrams.

Advantages of Visual Aids:

Visual aids are the tools that help the presenters to clarify, establish, and co-ordinate precise conceptions, understandings and appreciations and support so as to make the understanding more real, active, motivating, encouraging, significant and glowing.

1. Every individual has the tendency to forget. Proper use of visual aids helps to retain more concepts permanently.
2. An individual can study well when the inspiration is properly provided through different visual aids.
3. Visual aids grow the accurate image when the individual sees and imagines it properly.
4. Visual aids provide complete examples for conceptual clarity as it allows cognitive thinking.
5. Visual aids create the environment of interest for the stakeholders.
6. Visual aids help to increase the vocabulary and enriches the readers.
7. Visual aids help the readers to get the information by learning it permanently.
8. Visual aids provide direct experience to the readers.

Graphic Formats

Many different graphic formats can be used to support the text's main ideas. However, the ideal graphic format depends on the type of data being presented.

1. Tables:

The table presents large amounts of data in a simple, brief, and clear linear format. The same data in prose would be bulky, confusing, and inaccessible. Tables allow the reader to grasp relationships that might be invisible in its prose format. Also, the tables allow the writer to focus attention on specific pieces of data while retaining a clear presentation of the whole idea to be described.

2. Graphs and Charts

Graphs are pictures that help the readers in understanding the data. There are many kinds of graphs, each has a special purpose. Charts illustrate generally for the comparison purpose, usually among several sets of information. Many other sorts of chats are possible as described below:

1) **Circle Graph:** A circle graph is shaped like a circle. It is divided into fractions that look like pieces of pie, so sometimes a circle graph is called a pie graph. Many times, the fractional parts are different colours, and a key explains the colours.

2) **Bar Graph:** A bar graph shows data in various types of bars/stacks. The bars can be arranged vertically (up and down), or horizontally (across).

3) **Picture Graph:** A picture graph uses suitable pictures or symbols relevant to the characteristics of the data. One picture often stands for more than one characteristic so the key in this type of graph is to understand the symbols.

4) **Histogram Graph:** A histogram is a special kind of bar graph. This is drawn to plot statistical measures graphically. Hence, the stacks are connected to each other. The class intervals must be shown below, sometimes less than or more than cumulative frequency is plotted as per the purpose of analysis.

5) **Line Graph:** A line graph shows points plotted on a graph for a specific scale of units. The points are then connected to form a line.

8.3 SUMMARY

Data Interpretation is the most important aspect of the research. It is the process which is the basis for the research report. Interpretation helps the researcher to draw inferences from the analysed data. Interpretation helps to find out solutions to the research problem.

Report writing is the last stage in research. In this stage the researcher provides his analysis, findings, interpretation, conclusion and recommendations for the research problem. The report must be easy to understand and well drafted. Researchers can use visual aids such as tables, graphs, diagrams, charts to increase effectiveness of the report.

8.4 EXERCISE

Fill in the blanks

1. A good report contributes in….

   A. saving time of the readers B. brings enjoyment to the readers
   C. saves money of the readers D. brings good teamwork

2. …. are those reports submitted to the senior executives?

   A. Technical reports B. Popular reports
   C. General reports D. Sample reports

3. ……is also called a "narrative report".

   A. Informational reports B. Analytical Reports
   C. Recommendation Reports D. Informative Reports

4. The findings derived from the research work are presented by ------

   A. Report writing B. Diagrams C. Graphs D. Tables

5. ….. is also called "executive summary"

   A. Abstract B. Title C. Tag D. Hashtag

6. ….. is the main section of any report.

   A. Body B. Introduction C. Abstract D. Executive Summary

7. …. describes the research method and research framework and the sampling method adopted in the research work.

   A. Methodology B. Report writing C. Diagrams D. Graphs

8. … is a part which contains the additional details of the data, maps of the sample collected site/ market location.

   A. Appendix B. Reference C.Bibliography D. Index

9. …. is a list showing the full details of all the information sources to which the researcher has referred.

   A. Reference B. Appendix C.Bibliography D. Index

10. ……function to add interest to a presentation (a report) by giving the audience (readers) something to judge by allowing them to examine (easily).

    A. Visual Aids B. Authors Photo
    C. Symbol of the Organisation D. Foreign Language

11. A ……. graph is shaped is based on angular degrees like a circle

    A. Pie chart B. Pictograph C. Bar Graph D. Histogram

Key:

Q. No.	1	2	3	4	5	6	7	8	9	10	11
Key	A	A	A	A	A	A	A	A	A	A	A

Match the column

Column-A	Column-B
1. Circular Graph	a. Data- Stacks
2. Bar Graph	b. 360 degree
3. Picture Graph	c. Cumulative frequency
4. Histogram	d. Point data
5. Line Graph	e. Symbols

(Key: 1-b, 2-a, 3-e, 4-c,5-d)

True or False

1. The commonly used rectangular diagrams belong to the category of the two-dimensional diagrams.
2. Proper use of visual aids helps to retain more concepts permanently.
3. A report should describe research objective of the study but not the nature of the problem
4. Informational reports is also called "narrative report",
5. A good report should not be visually appealing to read.

(Key: 1-True, 2-True, 3-false, 4-True, 5-false)

Short Notes

Write short notes on:

a. Two dimensional diagrams

b. Pictograms

c. Pie Chart

d. Line or Arithmetic Chart

Answer in Brief

1. Why is report writing in business research an important aspect of effective research?
2. Explain types of research reports.
3. Describe common contents of a business research report.
4. Explain major steps in writing a good research report.
5. Describe the Importance of report writing in business research.
6. What are the common types of reports suitable for business research?

7. Explain the role of Visual Aids (VA) in report writing.
8. Explain the advantages of Visual Aids (VA) in report writing.
9. Explain the various graphic formats used in report writing.
10. What is Data Interpretation? Explain its importance

8.5 REFERENCES

1) Adams, Mortrie R., "Annual Reports… Who reads them?", 2012.

2) Pope, C., Ziebland, S., and Mays, N. (2000). 'Analyzing qualitative data'. British Medical Journal, 320: pp. 114–116

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