

**CHALIMBANA UNIVERSITY**

***Integrity. Service. Excellence*.**

**DIRECTORATE OF DISTANCE EDUCATION**

**BMR 3112 : MARKETING RESEARCH AND PLANNING**

**FIRST EDITION 2020**

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**First Edition 2019**

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**Acknowledgements**

Chalimbana University, School of Leadership and Business Management, wishes to thank Mr Susiku A. Alistar for writing the Marketing Research and Planning module.

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**MODULE OVERVIEW**

**Introduction**

This course is designed to provide students with an understanding of Marketing Research and Planning. Its major focus is on research in marketing, and how marketing research relates to overall organizational functioning. It covers several research and planning related topics.

This is an extremely useful course for further development of your general marketing management skills.

Rationale

For every business to thrive, there is need to look at how they can increase the demand for their products and services such as product design, marketing strategy and advertising strategy. This can happen if one has a clear understanding of the meaning and nature of the marketing environment. To understand the business and marketing environments, one needs to undertake marketing research. The course will expose learners to research tecniqus that can be employed in marketing.

Aim

This course aims to introduce students to principles and problems associated with the marketing of goods and services.

Learning Outcomes

By the end of this course, learners should be able to:

* Define the basic concepts appropriate to the field of marketing.
* Demonstrate an understanding of the role and contribution of marketing within an organization.
* Explain the role of marketing in the social and economic structure of a country
* Describe the relationship between marketing and other major business activities such as production and finance.
* Develop a marketing plan.

### Course Summary

This is an introductory course in the marketing discipline, designed to provide you with the basic concepts, tools and techniques used in modern marketing research so that you can apply them to real-life problem-solving and decision-making.

The course focuses on basic marketing research and planning, the role of marketing research in the organization and in society. Several topics are covered.

The course illustrates how various facets of the marketing research interact with other areas of the business. It presents an overview of where the marketing research fits within the context of the organisation.

Study Skills

1. Find a Place to Study

Finding the right place to study has an impact on the effectiveness of time spent studying. The best study locations are comfortable and free from distractions.

1. Read Your Module

Modules are a great resource for studying marketing.

1. Do Your Activity Problems

One of the best ways of learning marketing is by practicing the marketing activity problems that are given at the end of each unit.

1. Form a Study Group

Forming study groups is an effective strategy for enhancing learning. It provides motivation and a collaborative learning environment. It also enables students to cover more materials than they could on their own.

1. Manage Your Time

Studying business management effectively is not about studying longer, it's about studying smarter. The following are proven time management tips for improving your performance in your marketing course.

* Don't procrastinate**.** Like math, many business courses are cumulative. This is because if you fall behind, it takes a lot of additional work and time to get catch up.
* Make a schedule**.** Make a realistic schedule and stick to it throughout the semester.
* Pace yourself. If you pace yourself, and begin your preparations far in advance, you will be ready for exams without needing to cram at the last moment.

**Time Frame**

37 hours.

Required Resources

Armstrong, G. and Kotler, P. (2008) Marketing: An Introduction.12th Edition. Prentice

Hall: New Jersey

Kotler, P., Armstrong, G., Harris, L. and Piercy, N. (2013). Principles of Marketing. 6th Edition. Pearson: Harlow

Blythe J. and Megicks P. (2010), Marketing Planning, Pearson : London

Recommended Reading

McDonald, M. (2007). Marketing Plans: how to prepare them, how to use them. 6th Edition. Elsevier: Amsterdam

Adcock, D., Halborg, A. and Ross, C. (2001). Marketing: principles and practice. 4th Edition. Prentice Hall: Harlow

Armstrong, M. (2012) *A Handbook of Human Resource Management Practice* 12thed, London, Kogan page.

Assessment

Continuous Assessment 50

One Assignment 25%

One Test 25%

Final Examination 50%

Financial 100%

**UNIT 1 : INTRODUCTION TO MARKETING RESEARCH**

* 1. **Introduction**

Welcome to unit one of this module. In this unit we are going to introduce the concept of marketing research, its meaning, and why you should study research. We are also going to look at the schools of thought in marketing research, divisions of marketing research, and the role of marketing research.

* 1. **Learning Outcomes**

By the end of this unit you should be able to

• Define marketing research.

• State the importance of marketing research.

• Explain the schools of thought in marketing research.

• State the divisions of marketing research.

• Explain the role of marketing research in marketing planning.

* 1. **Time Frame**

Three Hours (3 Hours)

* 1. **Marketing Research**

**1.4.1 What Is Marketing Research**

Marketing research aims to take some of the risk out of marketing decisions by providing information that can form part of the basis of decision making.

Marketing research is essentially about the disciplined collection and evaluation of specific data in order to help suppliers understand their customer needs better.

Marketing research has been defined as the systematic and objective identification, collection, analysis, dissemination, and use of information for the purpose of improving decision making related to the identification and solution of problems and opportunities in marketing (Malhotra, 2010 : P. 39).

The American Marketing Association, defines **marketing research, as the function that links the consumer, customer and public to the marketer through information – information used to identify and define marketing opportunities and problems; generate, refine, and evaluate marketing actions; monitor action performance; and improve understanding of marketing as a process. Marketing research specifies the information required to address these issues, design the method for collecting information, manages and implements the data collection process; analyzes the results and communicates the findings and their implications.**

This definition of marketing research underlies the role of research in all phases of marketing, assisting and guiding the marketing efforts of the organization. Marketing research must be at the centre of decision making.

**1.4.2 Why Study Research?**

* The study of research methods provides you with the knowledge and skills you need to solve the problems and meet the challenges of a fast-paced decision-making environment.
* The manager’s increased need for more and better information. This can be best provided by carrying out research.
* It helps the manager to have a sound information base so as to avoid the risks associated with business decisions
* The explosive technology growth, and continuing innovations in various spheres of business have created new knowledge needs for the manager to consider when evaluating any decision.
* Another reason for studying research is that you may establish a career as a research specialists.

**1.4.3 Schools Of Thought**

**a) Philosophy of Science**

All academic research is said to be grounded in a philosophical perspective. This is important because the philosophical perspective can help to clarify research design, what kind of evidence is gathered, and how data can be interpreted to provide answers to the questions asked. It can help recognize which designs are likely to work and which will not, and also highlight limitations of particular approaches, etc.

There are two competing schools of thought concerning the philosophical position from which the appropriate methods of research should be derived. The two schools are described as **positivist** and **phenomenological.** Each school has its own set of assumptions and a range of methodological implications with its position.

The researcher’s methodological, epistemological, and ontological premises can be termed as a paradigm or interpretive framework that basically encompasses a set of beliefs that guide the research action. This comprises :

* **Methodology :** This focuses on how we gain knowledge about the world.
* **Epistemology:** Isconcerned with how things can be made known to the researcher (how do we know the world?)
* **Ontology:** It specifically raises the basic questions about the nature of reality (It is concerned with assumptions about the kind of tings there are in the world).

**b) Types of Research Approaches**

There are mainly two major types of approaches. These are known as the **quantitative research** and **qualitative research** approaches or **schools of thought**.

* **Quantitative Research**

Quantitative research involves an objective way of studying things. With this type of research, the results are given numerical values and the researcher uses a mathematical and statistical treatment to help evaluate the results. Scientists carrying out experiments use this approach. Surveys by marketing people, using questionnaires and interviews where responses are given numerical values, would also be described as quantitative research. The quantitative research is sometimes referred to as positivist. It aims to be objective and collects and uses numerical data.

Positivism is a more dominant approach concerned with causal explanations. As such, it is an important methodology in the social sciences and particularly in business research. Within a positivist methodology, the ontological assumptions view the social world as an external environment, where definite structures affect people in similar ways and where people understand and react to these structures in similar ways. The epistemological assumptions in this approach are that the researcher is independent of what is being researched and their role is to observe and measure social structures. A positivist approach is therefore deductive in nature – for example, taking a theory from literature and researching it to confirm or refute the proposition.

* **Qualitative Research**

With this approach, data is usually collected in the form of descriptions. Even though some of the methods used, such as interviews are used in quantitative research, the difference is that qualitative researchers only use non mathematical procedure when interpreting and explaining their research. This type of research is also known as relativist or phenomenology.

Phenomenology is the main alternative to the positivist approach in social research, and is an interpretivist methodology. The ontological assumption here is that people are not passive in simply responding to structures but instead reality is itself socially constructed. The epistemological assumption is that the researcher interacts with the subjects of the research, and that his or her role is to understand people’s interpretation of events rather than the events themselves. The focus with this approach is to discover meaning rather than measurement. A phenomenological approach is therefore, inductive in nature, as the investigation will guide the construction of a theory.

* **Methodology and Methods**

The approach a researcher uses to investigate a subject is known as the methodology. Methodology refers to the philosophical basis on which the research is founded. The particular techniques used to collect data and information are known as methods. Each academic discipline has over the years developed characteristic methodologies and methods.

**1.4.4 Divisions Of Marketing Research**

Marketing research has developed a number of divisions covering the range of problems and decisions with which executives have to deal.

* **Customer Market Research**

Customer market research provides information on, market and market segment sizes. It also provides information on trends in the market which can be used for forecasting.

* **Advertising and Promotion Research**

Advertising and promotional research provides information on the most suitable method of promotion, the most suitable media to use, the most suitable copy and campaign material, and on the effectiveness of communications in achieving objectives.

* **Product Research**

Product research provides information on opportunities for new product development, product design requirements, packaging, and on comparative performance (competitor’s offerings).

* **Distribution Research**

Distribution research provides information on suitable distribution methods, the appropriateness of channel members, and on the best location of warehouses and retail outlets.

* **Sales Research**

Sales research provides information on the effectiveness of sales methods and techniques, establishing sales territories, the adequacy of remuneration methods, and the sales training requirements.

* **Marketing Environment**

Research in this area provides information on political influences, technological influences, social and economic influences.

**1.5 The Role Of Marketing Research In Marketing Planning**

The task of marketing research is to assess information needs and provide management with relevant, accurate, reliable, valid, current, and actionable information that can help in their planning and decision making processes.

The emphasis in marketing is on the identification and satisfaction of customer needs. Thus, in order to determine customer needs and to plan and implement marketing strategies and programs aimed at satisfying those needs, marketing managers need information. The information needed can only be acquired by carrying out marketing research.

Since planning involves some element of risk, the collection and evaluation of marketing research data could be used to reduce and control, to some degree, the parameters of risk surrounding particular marketing planning and proposals.

**1.6 Summary**

In this unit, we looked at various aspects of marketing research. We covered such areas as, the meaning of marketing research, the importance of marketing research, the schools of thought in marketing research, the divisions of marketing research, and the role of marketing research in marketing planning.

**1.7 Activities**

Attempt the following activities.

1. Discuss the schools of thought in marketing research.

2. Describe the divisions of marketing research.

**UNIT 2 : PLANNING THE RESEARCH**

**2.1 Introduction**

Welcome to unit 2 of this module. In this unit we are going to look at the various aspects of planning the research. Our focus will be on identifying the importance of problem definition, developing the research objectives, as well as on identifying the information needed.

**2.2 Learning Outcomes**

By the end of this unit you should be able to:

* Explain the importance of problem definition
* Develop research objectives
* Identify information needs

**2.3 Time Frame**

One hour (1 hour)

**2.4 The Importance of Problem Definition**

The first step in any marketing research process is to define the problem. In defining the problem, the researcher should take into account the purpose of the study, the relevant background information, the information needed, and how it will be used in decision making.

The following points scores the importance of defining the problem in marketing research:

1. A well-defined research problem will help determine:

* the type of study design
* the type of sampling strategy
* the research instrument
* the type of analysis

1. It will help the researcher to discriminate useful data from unrelated ones.
2. It will help in creating research questions and hypotheses that :

* are measurable.
* are well defined (no ambiguous language).
* are useful in decision making or in answering the overall problem.
* are directly connected to one another.
* encompass the full scope of the problem (have all the relevant questions been asked?)

1. A well-defined research problem will lead to breakthrough solutions.
2. The correct question needs to be addressed if research is to be helpful to the decision maker.
3. Without a properly defined problem, the research cannot progress. One cannot design a research plan without a very clear idea of what needs to be accomplished. A properly defined research will help the investigator to be on track.

**2.5 Developing the Research Objectives and Identifying the Information Needs**

**2.5.1 Developing the Research Objectives**

Once the problem is well defined, the next step is to set research objectives. A marketing research project can have one of the three types of objectives. These are:

* Exploratory research, to gather preliminary information that will help define the problem and suggest hypotheses,
* Descriptive research, to describe the size and composition of the market, and
* Causal research, to test hypotheses about cause-and-effect relationships.

Researchers and managers usually start with exploratory research and later follow with descriptive or causal research.

**2.5.2 Identifying the Information Needs**

Research objectives must be translated into specific information needs. For example, the following specific information needs may be required if we are carrying out research on developing a new product:

* What features should the product have?
* How should the new product be priced?
* What are the probable sales and profits?
* Where will the product be sold?

**2.6 Summary**

In this unit we have looked at various aspects of planning research, covering important areas such as the problem definition, developing research objectives, and the identification of the required information.

**Activity**

1. Explain the importance of defining the problem in marketing research.

**UNIT 3 : SECONDARY AND PRIMARY DATA**

**3.1 Introduction**

In this unit our focus will be on Secondary and Primary data. The module introduces you to various sources of secondary and primary data.

**3.2 Learning Outcomes**

By the end of this unit you should be able to:

* Define secondary and primary and data.
* Explain the types of secondary data.
* Describe the various sources of data

**3.3 Time Frame**

One hours (1 hour)

**3.4 Secondary Data**

Secondary data consist of information that is already in existence somewhere, having been collected for another purpose. Whereas primary data consist of data originated by a researcher for the specific purpose of addressing the problem at hand.

Secondary data are usually obtained more quickly and at a lower cost than primary data.

**3.4.1 Types of Secondary Data**

The starting point is to separate secondary data into either internal or external.

* **Internal Data :** internal secondary data is produced by an organization in its day-to-day operations. It refers to the sources of information within the organization. In certain cases internal sources are indispensable without which the researcher cannot obtain desired results. Data on sales, advertising, expenditures, inventory records, salespeople’s reports, distribution costs, prices, financial statements, customer details (like name, age, contact details, etc.), and company information, are just some examples of the type of internal data that is produced. This data can be collected by the researcher for his research work.
* **External Data:** External data refers to data that comes from sources outside an organization. To collect external data you may have to use indexes, abstracts, and directories as guides to help you locate information. Business journals, social books, business magazines, libraries, internet, Government census, tax records, etc., can all provide external data. The starting point in reviewing secondary data is to make sure that you have correctly identified the topic on which you need information.

**3.4.2 Sources of Secondary Data**

* **Books**

Specific sources of information include books.

* **Periodicals and Newspapers:**

Business magazines and journals published periodically contain data which is very useful for marketing research; Newspapers also contain data regarding business trends and market reports.

* **Govt. Publications and Reports:**

There are severable publications by government, which contain valuable data for conducting marketing research. Census reports of the Government, publications of various ministries and Commissions, various markets bulletins, and publications of the Statistical Departments of Governments, can all supply valuable information that can be extensively used in marketing research.

* **Census**

Census is one of the largest sources of secondary data. The range of information available from census covers both population and business. Census of the population that is conducted every ten years provides details on the nature of the population. It covers demographics such as age, sex, ethnicity, family size, material status, occupation, income, and education. The economic census include the census of production and the census of distribution. Production captures the volumes of products manufactured or produced, while distribution provides information on the structure of retail areas of distribution.

* **Professional Organizations**

Various professional sources and libraries are also useful sources of data. In Zambia, some of the professional organizations are Zambia Institute of Marketing, Zambia Institute of Human Resource Management, Zambia Institute of Directors, Law Association of Zambia, Zambia Institute of Chartered Accountants, Zambia Institute of Architects etc.

* **Business Associations /Trade Associations**

These publish useful data which is of immense help in marketing research. They include :

* Zambia Association of Manufacturers, (representing the interest of manufacturers)
* Zambia Association of Chambers of Commerce and Industry, (representing district chambers, affiliate business membership, organizations, companies, etc.).
* Zambia Chamber of Small and Medium Business Association ((represents the interest of micro, small, and medium enterprises in the country).
* Zambia Chamber of Commerce and Industry (this is an umbrella organization representing businesses across the country and across all sectors of the economy)
* **Published Surveys Of Markets:**

This is another useful source of supplying secondary data. Market surveys and reports are important instruments in the hands of the researcher for conducting marketing research. These are published by business houses or independent research organizations. These pertain to specific lines of products.

* **Foreign Governments, and International Agencies**:

Publications of foreign Governments, with regard to trade and other important aspects of economy of respective countries and information published by United Nations Organization, International Labour Organization, International Bank for Reconstruction and Development (The World Bank), etc., serve a useful purpose in making comparison of conditions prevailing in various countries of the world. For instance the, United Nations economic reports for member countries is one such a valuable source.

* **General Sources**

Besides the above mentioned sources of marketing research, there are many other sources of supplying secondary data e.g., colleges and universities, stock exchanges and commodity exchanges, specialized libraries’, internal sources such as sales and purchase records, sales reports, customer complaints, records of other companies. Company information, financial statements, reports and feedback from dealers, retailers, and distributers.

**3.5 Primary Data**

Primary data is the data that is collected directly by the researcher for the first time. It is original in nature and is specific to a research problem under study. In other words, it is data collected by the researcher from original sources.

**3.5.1 Sources of Primary Data**

The main sources from where primary data can be obtained are outlined below:

**(a) Sales personnel**

Sales personnel are the most important source of providing first hand information. They are appointed by the owners for the sale and promotion of their products. They have a direct link with the consumers understand tastes, preferences and buying habits of the consumers.

They can also know about the dealer’s reaction (especially of retailers) towards the firm’s products by taking into consideration price, design, packaging and size etc. of the product. The marketing manager may direct the salesmen to prepare periodical reports containing the information collected by them.

The information collected in this manner is original and more meaningful.

**(b) Dealers:**

This is another source of collecting primary data. Valuable information can be collected with regard to demand of the product from retailers. Information about the marketing policies of competitors can also be gathered from the dealers.

**(c) Consumers:**

This source of collecting primary data is of great importance. Representative samples of consumers may be selected for conducting thorough investigation with regard to price, quality and use of the product. This method of collection data is very reliable as it establishes direct link between producer and the consumer.

**3.6 Summary**

In this unit, we have looked at primary and secondary data. We have also looked at the sources of primary and secondary data.

**3.7 Activity**

1. Discuss various sources of primary and secondary data

**UNIT 4 : GATHERING DATA : DATA COLLECTION TECHNIQUES**

**4.1 Introduction**

Welcome to unit four of this module. In this unit our focus will be on data gathering. The module introduces you to various aspects of data gathering. The main topics covered include; collection techniques, and developing a sample.

**4.2 Learning Outcomes**

**By the end of this unit you should be able to:**

* Discuss data collection techniques
* Develop a research sample

**4.3 Time Frame**

Three hours (3 hours)

**4.4 Data Collection Techniques**

**4.4.1 Survey Method**

Surveys are the most common ways of data collection in marketing, and business studies. Major marketing research projects, more or less, follow the survey method. In general, surveys are methods of data collection in which information is gathered through oral or written questioning. Oral questioning is known as interviewing. Written questioning on the other hand, is accomplished through questionnaires which are administered to the respondents.

Because of the intensive use of questionnaires in survey methods, it is also known as the questionnaire method.

The unique characteristic of a survey method is that the data are collected by asking questions to relevant respondents. The most commonly used options in the survey methods include personal interview, group interview, telephone interview, and the postal survey.

**4.4.2 Interviews**

**Interviewing** (verbal questioning} is oneof the common methods of data collection under the survey method. It is the most widely used primary data collection method. Under this method, the interviewer asks questions either personally or through mail or telephone from the respondents to obtain the insights of the problem under study. The researcher may either visit the respondent in person at his home or meet him at the central location as mutually decided by them.

Interviews may be structured, semi structured, or unstructured. **Structured interviews** present the respondents with a fixed set of choices, often called closed questions. It employs structured questions which are verbally presented to the respondents. The answers are recorded by the interviewer. When conducting a structured interview, strict adherence to the order and wording of questions and the instructions is required**.**

**Unstructured interviews**: this kind of interviews employ unstructured questions (interview schedules) containing a number of open ended questions. The structure of the interview is flexible with minimum restrictions.

**Semi-structured interviews** is somewhere between the structured and the unstructured types. They contain elements of both, with some being closer to structured views, and others closer to unstructured ones. The degree to which interviews are structured depends on the research topic.

**4.4.2.1 Types of Interviews**

Interviews are a popular way of collecting data, and can provide a rich source of material when properly conducted.

**a) Personal Interview**

Interviews with individuals are known as personal interviews, and can either be structured or unstructured. In personal interview, the respondent and the interviewer speak face-to-face. During the interview, the interviewer must act in a neutral way to avoid exerting a bias on the responses.

In a structured personal interview, the interviewer has a list of prescribed questions for the interviewee. The advantage of this technique is that you can conduct a larger number of interviews, since the data collected is easier to interpret.

In unstructured personal interviews, the interview takes a form of discussion, and the interviewer directs the conversation by identifying a number of topics and allows the interviewee to talk them throughin their own time. The main advantage of this type of interview is that it brings forth a lot of valuable information. The main disadvantages are that it takes a lot of time than a structured interview, it may be difficult and time consuming to interpret the data, a smaller number of interviews is often conducted.

**Advantages of Personal Interview**

* Low cost
* Little of the investigator’s time is wasted
* Procedures are standardized
* points that are not clear can easily be clarified .
* Possible to use illustrative materials during the course of the interview.

**Limitations of personal interview**

* Time pressure-those in a hurry can be difficult to interview.
* High refusal rate. Some people will simply refuse to be interviewed. The rate runs from 5 per cent to 30 per cent.

**b) Group Interviews** **(Focus Group)**

A Group interview (or Focus Group interview) is one of the widely used data collection methods wherein a group of people, usually 6-12 members come together to discuss a particular topic. Here, each individual is required to provide his insights on the issue concerned and reach a unanimous decision. In this interview, your role is that of a moderator. You should regulate the discussion.

With this type of interviews it is important to have a list of topics which you intend to discuss.

With group interviews you need to be aware of group dynamics and ensure that one person does not take over the discussion at the expense of other members in the group. In this situation, you should encourage all members of the group to respond.

You can also use the critical incident technique in the group interview where necessary. Under this approach, people being interviewed are allowed to talk about a specific incident which they regard as critical and which may have brought about significant changes in their lives.

**Advantages of Group Interviews**

* They can be used in a **variety of contexts** and situations, and in conjunction with other research methods.
* Since in an interview you will be face-to-face with the interviewee, you can easily **clear up any** **misunderstanding** immediately. Either side can question what they do not understand
* Also during the interview, the researcher can **re-word or re-order** the questions if something unexpected happens.

**Disadvantages of Group Interviews**

* They are **time consuming**. You have to take into account the length of the interview, travelling to and from interview, transcription of tapes, notes, etc.
* With all the interviews there are **problems of bias**, reliability and validity which must be addressed throughout the whole interview process. For instance, some interviewees may only want to please the interviewer, and as a result, may not tell the truth.
* The **personal views** of the interviewer may creep into the interview. This can distort the results

**c). Telephone Survey (Telephone Interview)**

If a study is one requiring a broad geographical sample, national or regional, the telephone survey may be ideal. The telephone survey can also be used as an efficient follow up method in connection with another basic method of data collection. It is equally suitable when one wants short answers for a few questions. A large number of interviews can be conducted in a short time.

Telephone surveys involve some interviewers working from a central location asking participants some questions through the telephone or cell phone. The responses are then recorded systematically. Telephone interviews have many advantages as outlined below.

**Advantages of telephone interviews**

* Compulsion to answer the telephone. A person will be forced to answer the telephone, regardless of what they are doing at the time.
* Efficient call backs
* High response rate
* No travelling and no travel costs
* Question modification can be made

**Limitations of telephone interviews**

* List of telephone numbers may be outdated
* No way to provide visual aids
* There is a limit to the length of a typical telephone interview as a result limited information may be collected
* Demanding nature of the telephone ring may announce an unwanted sales pitch.
* Unwillingness by some people to participate in the survey,
* Lack of attention or non-committed answer and misleading information,
* Only respondents with telephone (and or cell phone) facility can be contacted; not much fit for rural areas.

**d) Postal Surveys (Mail Surveys)**

A postal (or mail) survey is one of the several methods that a researcher may use to collect data. Usually a printed questionnaire is posted to members of the survey sample, who are asked to complete the survey and then return it by mail. A cover letter explaining the nature, purpose and sponsorship of the survey and a reply-paid return envelope are usually provided.

The postal survey is sometimes used to get information from people who are difficult to interview in person. These are those who are insulated from personal contact by a security guard, secretary, receptionist, etc.

The postal survey may be able to handle a difficult questionnaire content. If the topic concerns delicate or personal topics such as birth control, sexual behavior or personal finance. For such topics, the postal questionnaire may be the best way of eliciting desired information.

In case of a company, a question about sales or purchase of a particular item will almost certainly require the checking of records, if an accurate response is to be obtained. The postal questionnaire once again may serve such a purpose well.

**Advantages of Postal Surveys**

* **Low cost :** the costs of a postal survey are low.
* **No interview bias** since no interviews are used.
* **Questionnaire scope :** It is possible to request for more personal information since there is no face-to-face interaction. Usually face-to-face interaction tend make most respondents reluctant to reveal their personal habits and feelings. But with a postal survey, most people freely respond to questions about their private personal matters.
* **Questionnaire length:** provided the subject matter is interesting to the respondent, the person responding will spend considerable time filling in the questionnaire. This means that there is an opportunity to ask a reasonable long sequence of questions.
* **Respondent interaction:** there is no interruption of what the respondent may be doing in order to respond to the series of questions, and instead, the person can respond whenever it is convenient to do so. There is an opportunity for a considered response, since the respondent is under no pressure to make an immediate reply

**Limitations of the postal Survey**

* **Sampling problems:** The adequacy of a postal survey is dependent on the quality of the postal list. The problem is that unlike other survey methods, the sampling frame for a postal survey is either a good list or not-so-good list. In reality, few sampling frames for postal survey are ever complete or current. For instance, telephone books, city directories, industrial directories are rarely complete or current.
* **Response Rate Problems** : Most of the time the response rate is low.
* **Lack of control over respondents:** the researcher has little or no control over the respondent. This lack of control limits the scope of questions in the postal questionnaire.
* **Wrong respondents, wrong information:** The questionnaire may be answered by someone other than the addressee. For instance, the executive may ask his secretary to answer the questions. Such a person may end up providing wrong information.
* **Incomplete responses:** The participants may give incomplete responses. Such kind of responses may not be useful to the whole research process.

**e) Panels**

A panel is a pre-recruited group of individuals who have agreed to take part in market research such as surveys, in-depth interviews, focus groups, etc. In other words, a market research panel may also be defined as a group of recruited survey respondents who have agreed to take part in surveys and or other market research. They usually share an extensive amount of information about themselves and their households, which can be used for appropriate sample selection.

A panel may be made of persons, households, or business firms. A panel may exist, for questioning purposes, for as little as a week or as long as year or more. A panel may be set up by telephone, postal or personal interview.

In the panel method, data is collected only from the panel of response groups or respondents.

For marketing research, the following are some of the types of Panels:

* **Consumer Panel:**

Such panel involves only consumers. They are consulted for the required data. They provide data periodically on any issue related to the market.

* **Dealer Panel:**

Dealer panel consists of middlemen, such as wholesalers, retailers, and agents. They can provide valuable information regarding consumers, competitors, and overall market environment.

* **Supplier panel:**

This panel includes suppliers of raw materials, provisions, parts and other inputs required in the production of products. It also includes service providers like insurance companies, transporters, bankers, and so forth.

* **Corporate Panel**

Customer or corporate panels are typically made up of solely customers who purchase specific products or services, share behavioural habits, interests or other similar traits. An example of this would be a Coca-Cola panel of members willing to participate in research about Coca-Cola.

* **Continuous or Periodical Panel**

Continuous panel provides information on a continuous basis. They maintain live contact with a company and inform the company as and when they feel that the information is important. Periodical panel, on the other hand, provides detail at a fixed interval.

* **Permanent or Temporary Panel**

Permanent panel is standing in nature. Such panel serves for relatively a long period of time. On the other hand, the temporary panel is ad-hoc in nature. It is terminated when the time is over.

* **Fixed or Variable Panel**

In case of a fixed panel, the number and type of respondents are fixed. No changes are made in the panel. While in variable panel, the number and types of respondents are subject to change.

**4.4.3 Observation**

Data collection may also be done through observation. It is one of the oldest methods of data collection. This is the record of what people do and say in real life situations. The distinguished characteristic of this method is that no questions are asked to respondents for collecting data, but their behaviors is observed minutely. Under this method, the researcher can observe, measure, or note the original behavior of respondents, mostly consumers and dealers.

The successes of observation as a technique depends on a number of important factors. These include the accurate reporting and description of the topic under investigation, free access to all aspects of the investigation, and plenty of time for the observation to take place.

**4.4.3.1 Types of Observation**

There are two ways the observation can be carried out. There is participant observation and non-participant observation. These are explained below.

**a). Participant Observation**

Participant observation refers to a technique where the researcher becomes completely involved in the situation which is being researched. ‘Thus, in most cases, in **participant observation**, the researcher joins the group they intend to study and observe it from the inside. Ideally it is not known that they are researchers. For example, researchers who wish to study homosexual behavior and attitudes towards condom advertising would pretend to be homosexuals and conduct their study from within. In a similar fashion, investigators who want to study the working conditions of a company’s sales personnel join them as sales persons, working alongside them and observing them from the inside.

To undertake this kind of research, first you need to gain access and enter the research setting. If the research is covert you must not reveal your true identity. If you arouse suspicion as to your true identity, this could generate a hostile reaction and affect the overall validity of your work.

If the research is open and the people around you know you are carrying out the work, then your interpersonal skills need to be excellent in order for you to gain their trust.

Second, monitor your conduct during the research, be polite, respectful and interested in what is happening, you need to empathize.

How you record data during participant observation can be through any of the following ways; i) taking notes, b) tape recorder, iii) or by using a checklist.

**b). Non-Participant Observation**

This is where the observer remains detached from the situation. In **non-participant observation**, researchers study their subject from the outside. Ideally, they are invisible and remain unnoticed by members of the group they are observing. They usually do not join in, but operate from the background while recording what is happening. Subjects are not always aware that they are being observed and that they are the subject of the study in general.

**4.4.3.2 Ways of Recording The Observations**

The popular ways are the diary method and the use of checklists, as explained below:

**a) Using the Diary (Method)**

Keeping a diary or log is an excellent way to record participant observation. It may be written up in two sections. The first part, known as the descriptive observation, systematically reports on the events that take place, the characters involved, conversations that occur, together with a description of the setting (e.g. office, meeting room, time and date, etc.) These events should be completed as soon as soon as possible while events are fresh in the memory. With overt research, you may be able to make quick notes as you go along and a small tape recorder used directly can prove very useful. With a covert study you have to rely on your memory.

The second stage is the narrative account. Here you reflect on the events and start to identify ideas and trends arising from the descriptions. This early analysis and interpretation may alert you to particular issues which need to be observed again or which you have overlooked and which need to be included in the next observation.

This reflection process is sometimes termed analytical induction.

A diary can be a data collection method in its own right.

**b). Tape and Video Recording**

Note taking is the most common method but it is not always possible. For instance when the information to be recorded is too dense, or if note taking diverts the attention of the observer from the scene to paper, then tape and video recording should be used. Tape and video recording are easier and certainly more efficient. The tapes can be listened to and viewed as many times as required, and this produces more accurate and more valid records. The limitation of recording, however, is that there are times when respondents objects to being recorded.

**c). Using Checklist**

With non-participant structured observation you can use checklists, sometimes referred to as an observation schedule. You include in the schedule the type of features you want to record. These may include particular events, their frequency and duration. Choose the type of incident you need to record. It is important to be as focused as possible. Record only what you need.

**Advantages of Observational Research**

* It is cheap, you can do it on your own, and it does not need expensive complex technology
* It always works since you always observe something
* You experience a situation at first hand and this may give you better insight.
* It is a useful technique to research an organization of which you are a part

**Disadvantages of observation Research**

* It is time consuming
* The researcher may become so involved in the situation that the research can take second place
* You may witness and record situations which you do not agree with or hear conversations which you think one part is obviously to blame. Thus, there is a danger of personal bias if not well guarded.

**4.4.4 Experiments**

Data may also be collected through the use of experiments.Experiments are studies involving intervention by the researcher. The usual intervention is to manipulate some variable in a setting and observe how it affects the subjects being studied. The researcher manipulates the independent or explanatory variable and then observes to see whether the hypothesized independent variable is affected by the intervention.

Thus experiments are used to ascertain the presence, type and degree of causal relationships between twovariables. The purpose of experiments is twofold, namely to test hypotheses and to develop theories.

Another way to understand experiments is to look at it from this angle: Thus, in experiments the researcher manipulates selected independent variables and measures the effect of the manipulations on the dependent variables. Causality means that a relationship exists between two or more events. The first event can be seen as a cause of the second if the occurrence of the first increases the likelihood of the occurrence of the second. The objective is to provide evidence that suggests a high probability of one event leading to another.

Under this method of data collection, a cause and effect (i.e., causal) relationship is established. The independent variables are manipulated to measure the effect of such manipulation on the dependent variables.

For example, if the marketing manager want to measure the effect of 10% price rise on sales, first, he raises price by 10% (manipulation of independent variables), and then he tries to measure the effects of the price on sales volume (impact on dependent variable).

The experimental method is very useful for certain marketing issues, such as the testing of a new product in particular localities before it is fully lunched. It can also be used to measure the effectiveness of packing and design, or to measure the effects of a particular promotional tool.

**4.4.4.1 Types Of Experiments**

* **Field (or Natural) Experiment**

Field experiments are usually conducted in the real market situation. No attempts are made to create an artificial situation for measurement of effects. One of the prime problem is that the researcher has no control on the situation.

* **Laboratory (or Artificial) Experiment**

Under this method, attempts are made to create an artificial situation in which the experiment is conducted. It is conducted in the controlled environment. The researcher has considerable control on the situations. The net or exact outcomes may be obtained. But, it is conducted in a limited scale and it is difficult to derive general conclusions.

* **Components of an Experiment**

An experiments should have three components. These are:

1. The variable being acted upon (variously called the test unit, the dependent variable or the subject).
2. The change being imposed (the treatment or the independent variable)
3. The results related to the change (the effect, outcome or observation)

**4.4.4.2 Procedure for Carrying out an Experiment**

1. Identify a problem that is agreeable to the experimental method.
2. Formulate the hypothesis and identify the variables.
3. Choose the subjects to be tested.
4. Select a suitable experimental design.
5. Carry out the experiment and collect the results
6. Allow the literature on the subject to inform your thinking.
7. Indicate how you are going to test effectiveness in the pretest and post-test situation.

**4.4.4.3 Limitations of the Experimental Methods**

1. Impact of extraneous factors that minimize.
2. The reliability of results is affected by the extraneous factors,
3. The method is costly,
4. It is time consuming.

**4.4.5 Delphi Technique**

It is a forecasting technique wherein the researcher elicits information from the panel of experts either personally or through a questionnaire sent through the mail. Here, each expert in his respective field is asked to give their opinions on the problem concerned and the consolidated view of all is used to reach the most accurate answer

**4.4.6 Projective Technique**

The projective techniques are the unstructured and an indirect interview method used where the respondents are reluctant to give answers if the objective is disclosed. In order to deal with such situation, the respondents are provided with the incomplete stimulus and are required to complete it through which their underlying motivations, attitudes, opinions, feelings, etc. related to the concerned issue gets revealed. Some of the following projective techniques are used to discover the ‘whys’ of the market and the consumer behavior.

* **Thematic Appreciation Test (TAT):** Here, the respondent is presented with multiple pictures and then asked to describe what he thinks the pictures represent.
* **Role Playing:** Under this method, the respondents are given the imaginary situations and are asked to enact in a way they would have if the situation was real.
* **Cartoon Completion:** Here the respondents are shown the cartoon pictures comprising of two or more characters and then are asked to give their ideas and opinions about the characters.
* **Word Association:** Here the researcher provides a set of words to the respondents and then ask them to tell what comes to their mind when they hear a particular word.
* **Sentence Completion:** The researcher provides the incomplete sentences to the respondents and ask them to complete it. This is done to check the ideas of the respondents.

**4.5 Developing a Sample**

Here we discuss the key elements involved in devising a sampling plan. It illustrates the important features of both probability and non-probability samples.

To sample something is to examine a small portion of it, usually for the purpose of judging the nature or quality of the whole. In statistics, a collection of elements that have one or more specified characteristics is called a population. A sample then is some portion of a population. A population is the total group to be studied, the target population. It is the grand total of what is being measured. This may be people, stores, homes, cars, cows, or whatever. Because many populations of interest are too large to work with directly, sampling techniques have been devised to obtain samples taken from larger populations.

**4.5.1 Key elements Involved in Devising a Sampling Plan**

There are three decisions to be taken in drawing up a sampling plan. These are:

1. Who is to be surveyed? This defines the target population. Once this has been done, the next step is to develop a sampling frame.
2. How many people/companies should be surveyed? Large samples give better results than smaller ones.
3. How should the respondents be chosen? This may be done through probability or non-probability sampling.

**4.5.2 The Sampling Frame**

Obtaining a sample involves selecting some elements from the target population. A sampling frame is simply a list that identifies the target population. It can be a list of names and telephone numbers, as in a telephone surveys, a list of addresses, etc. It could also be a data base. The frame defines the sampling unit, the unit used in the design of the sample. The frame, and therefore, the sampling unit, may take the form of households, students, retail stores, businesses, or transactions.

**4.5.3 Sampling Methods**

There are two major types of sampling methods. These are, probability sampling and non-probability sampling.

* **Probability** samples comprise samples in which the elements being included have a known chance of being selected. A probability sample enables sampling error to be estimated. This in simple terms, is the difference between the sample value and the true value of the population being surveyed. A sampling error can be stated in mathematical terms: usually plus or minus a certain percentage. A large sample usually implies a smaller sampling error.
* **Non probability samples** are ones in whichparticipants are selected in a purposeful way. The selection may require certain percentages of the sample to be women or men, housewives under thirty or a similar criterion. This type of selection is an effort to reach a cross section of the elements being sampled. However, because the sample is not rigorously chosen, it is statistically impossible to state a true sampling error.

**4.5.4 Types of Probability Sampling**

There are several forms of probability sampling. Discussed below are some of the types of probability sampling.

* **Simple Random Sampling**

A simple random sample is a subset of a statistical population in which each member of the subset has equal probability of being chosen. A simple random may also be defined as a subset of individuals (a sample) chosen from a larger set (a population). Each individual is chosen randomly and entirely by chance, such that each individual has the same probability of being chosen for the same sample as any other subject of k individuals. This process and technique is known as simple random sampling.

A simple random sample is meant to be an unbiased representation of a group. The principle of simple random sampling is that every object has the same probability of being chosen.

In this case all members of the population have a known and equal chance of being included in the sample. For example, the names of every firm in a given population could be written on slips of paper and the slips deposited in a box. The box could then be shaken so that all the slips of paper become thoroughly mixed up. A blindfolded person drawing successive slips of paper from the box would be taking a random sample of the population.

Another example of a random sample would be names of 25 employees being chosen randomly from a box that contains names of 250 company employees written on small cards. In this case, the population is the 250 employees, and the sample is random because each employee has an equal chance of being chosen.

Because individuals who make up the subset of the larger group are chosen at random, each individual in the large population set has the same probability of being selected. This creates a balanced subset that carries the greatest potential for representing the larger group as a whole, free from any bias.

Simple random sampling works well when we are dealing with relatively small population. For large populations, however, the method is not appropriate since it is difficult to obtain a list of all people in a given population.

* **Systematic Random Sampling**

Systematic random sampling is a procedure in which the sampling units are not only chosen randomly but also integrated with the choice of another sampling unit. The actual choice of units is orchestrated through a system of computation that aims, first to maintain randomness in selection, and second, to spread the sampling units evenly throughout a list of respondents (the sampling frame). The system is based on the sampling fraction method.

In this method, units are drawn from a sampling frame by means the sampling fraction (symbolized by k) that is equal to N/n where N is the number of units in the target population, and n the number of units of the sample. For instance, if the target population is 4,800 and the intended sample size is 600, the sampling fraction is 8 (k = 4800/600 = 8). To select a sample by using the sampling fraction method, we proceed as follows:

* Step 1 : Identify or construct a sampling frame.
* Step 2 : Determine the sample size.
* Step 3 : Compute the sampling fraction (k = N/n)
* Step 4 : Randomly select a number between 1 and k. In the above example, since k = 8 the random number would be between 1 and 8, let us say 6.
* Step 5 : Record the random number (6) and every eighth number after 6, until 6,000 is reached, e.g. 6, 14, 22, 30. These numbers were arrived at by adding 8 as indicated here in the brackets (6 +8 = 14), (14+8 = 22), (22+8 = 30), etc.
* Step 6 : Locate the names in the sampling frame that correspond to the selected numbers.

The respondents thus identified constitute the sample.

* **Stratified Random Sampling**

Stratified random sampling is a probability sampling procedure in which the target population is divided into a number of strata, and a sample drawn from each stratum. The resulting sub-samples make up the final sample of the study. The strength of this procedure is that it allows all population groups to be represented in the final sample. The division of the population into strata is based on one or more significant criteria, such as sex, age, ethnic background, race or economic status.

The sample size can be proportionate or disproportionate to the units of the target population. This means that the sample taken from each stratum can be either be proportionate or disproportionate to the size of the samples. The stratified sample is employed when there is need to represent all groups of the target population in the sample, and when the researcher has a special interest in certain strata. In this sense, the method is very economical, and offers a high degree of representativeness.

* **Cluster Sampling**

Cluster sampling is a procedure in which the researcher chooses the study units progressively, beginning with clusters and moving to smaller groups within them, before the final sampling units are considered. This sampling method is employed primarily when a sampling frame is either unsuitable or not available. Cluster sampling is also employed when alternative methods are too expensive, and particularly when clusters are an important research factor. Such clusters include schools, classes, soccer teams, hospitals, small businesses and other well integrated groups with a common identity

* **Spatial Sampling**

This procedure is employed when the study addresses people temporarily congregated in a space, and data have to be collected before the crowd is dispersed. An example of such cases is the study of the views of people demonstrating in a city square about tax policies. Due to the nature of the population, there is no sufficient time available to permit the use of other methods. Apart from this, data collection has to be conducted so that a relatively representative coverage is achieved, randomly and in a systematic way before the crowd disperses.

**4.5.5 Types of Non-Probability Sampling**

* **Accidental Sampling {Convenience Sampling}**

The procedure employees no systematic techniques to choose the respondents. Instead the sample units are those people who accidentally come into contact with the researcher. For instance, the researcher may stand at a street-corner, in front of a school, church, shopping mall, etc., and ask a number of people passing by to take part in the study. They are chosen by accident. They just happen to be there at that time. Hence, the name of the sampling procedure. Accidental sampling is also known as Convenience sampling.

* **Purposive Sampling**

In this technique, the researcher purposely choose subjects who, in their opinion, are relevant to the project. The choice of the respondents is guided by the judgement of the investigator. For this reason, it is also known as judgmental sampling. There are no particular procedures involved in the actual choice of subjects. Instead, the important criterion of choice is the knowledge and expertise of the respondents. .

* **Quota Sampling**

Quota sampling is a procedure in which the researcher sets a quota of respondents to be chosen from a specific population groups, defining the basis of choice (e.g. gender, marital status, ethnicity, education, etc.) and determining its size (e.g. 60 parents, 35 policewomen, 67 teachers, and so on). More specifically, the researcher considers all significant dimensions of the population and ensures that each dimension will be represented in the sample. It is also referred to as dimensional sampling.

This procedure guarantees that at least one case from each dimension of the population will be included in the sample. It is particularly useful when the sample is small

* **Snowball Sampling**

In this approach the researcher choses a few respondents, and asks them to recommend other people who meet the criteria of the research and who might be willing to participate in the project. This process is continued with the new respondents until saturation. Thus method is employed when the lack of sampling frames makes it impossible for the researcher to achieve a probability sample, when the target population is unknown, or when it is difficult to approach the respondents in any other way.

**4.6. Summary**

In this unit we have discussed various data collection techniques that can apply to a diversity of marketing situations. We have also looked at both probability and non-probability sampling methods. I hope you found this unit to be educative and exciting.

**4.7 Activities**

1. Describe at least three data collection techniques that a market may apply.

2. Discuss both the probability and non-probability sampling.

**UNIT 5 GATHERING DATA : QUESTIONNAIRE CONSTRUCTION TECHNIQUES**

**5.1 Introduction**

Welcome to unit five of this module. In this unit our focus will be on data gathering. The module introduces you to various aspects of data gathering. The main topics covered include; questionnaire construction techniques, the Danger of bias, and how to deal with ambiguous questions and human error in interviewing.

**5.2 Learning Outcomes**

By the end of this unit you should be able to:

* Describe the questionnaire construction techniques
* Explain the danger of bias
* Explain the ambiguous questions and human error in interviewing.

**5.3 Time Frame**

Two hours (2 hours)

**5.4 Questionnaire Construction Techniques**

A questionnaire is the most evident method of data collection, which is comprised of a set of questions related to the research problem. This method is very convenient in case the data are to be collected from the diverse population. It mainly includes the printed set of questions, either open-ended or closed-ended, which the respondents are required to answer on the basis of their knowledge and experience with the issue concerned.

Questionnaires are constructed in a very focused and systematic manner. The process of construction goes through a number of interrelated steps. The following are the most common steps in questionnaire construction.

**Step 1 : Preparation**

The researcher first decides what the most suitable type of questionnaire is, and determines the way it will be administered. There should be a search for relevant questionnaire that might already have been developed by other investigators. If found they can be used as guides in preparing new ones. If no questionnaires are found, the researcher will proceed with the construction of a new questionnaire.

**Step 2 : Constructing the first draft**

The investigator formulates a number of questions, usually a few more than required, including questions of substance (directly related to the aspects of research the topic), questions of method ( those testing reliability and wording), and secondary as well as tertiary questions.

**Step 3 : Self Critique**

The questions are tested for relevance, symmetry (similarity), clarity, and simplicity among other criteria, as well as for compliance with the basic rules for questionnaire construction.

**Step 4 : External Scrutiny**

The first draft is then given to experts for scrutiny and suggestions. It is anticipated that some questions might be changed or eliminated, while new questions might be suggested.

**Step 5 : Re-examination and Revision**

The critique offered by experts and group leaders will be considered and eventual changes implemented. If the revision is not significant, the investigator proceeds to the next step. If the revision is substantial, the questionnaire is presented again to experts and later re-examined and revised until it is considered satisfactory. The investigator then proceeds to the next step.

**Step 6 : Pre-test or Pilot Study**

In most cases a pilot study or pretest is undertaken to check the suitability of the questionnaire as a whole or some aspects of it. A small sample is selected for this purpose, and respondents are requested to respond to all or part of the questionnaire. The results are then analyzed and interpreted.

**Step 7 Revision**

The pretest and pilot study usually result in some minor or major changes. If the changes are relatively insignificant, the investigators will proceed to step 8. If changes are substantial, they will return to step 4.

**Step 8 : Second pre-test**

The revised questionnaire may then be subjected to a second test, mainly with regard to revised questions. This depends on the extent of revision and the complexity of the issue in question. Usually one pretest is sufficient. The response is considered and adjustments and revisions follow.

**Step 9 : Formulation of the Final Draft**

At this stage, the suggestions are implemented. The investigator now concentrates on editorial work checking for spelling mistakes, legibility, instructions, layout, space for response, pre-coding, scaling issues and the general presentation of the questionnaire. The copy is finally printed.

**5.4.1 Rules for Questionnaire Construction**

**a) Rules for Layout**

* Questionnaires must be easy to read.
* Questions and response categories must be easy to identify and distinguishable from other questions and response categories
* Clear instructions about how to answer the questions must be given.
* Sufficient space should be left for the respondents to make relevant remarks where required.

**b) Rules for Question Content**

* Every question must be relevant to one or more aspects of the study.
* Avoid ambiguous. Non-specific, and hypothetical questions
* Avoid leading, double-barreled, and presuming questions.
* Avoid embarrassing, personal, or threatening questions.
* Simple language should be used. If possible use the language of the respondent.
* Avoid slang, jargon, and complicated expressions.
* Each question should ask what it is supposed to ask.
* The easy flow and logical progression in the questionnaire should be ensured.

1. **Rules for questionnaire Format**

* The questionnaire should have a professional appearance and give the impression of a document that deserves respect and invokes feelings of responsibility.
* The questionnaire should be presented in a way that encourages the respondent to complete and return it.
* Writing on one side of the page only is preferable to writing on both sides.
* Print and colour of paper and ink must give the questionnaire an attractive appearance.
* The questionnaire should be presented as a complete document, with an inviting and reassuring introductory cover letter and a concluding note containing instructions about returning the questionnaire.
* The questionnaire should be kept to a minimum, with as many questions as necessary, and as few as possible.
* Sufficient instructions and probes should be provided where necessary.
* All questions should be checked for possible bias and ethical adequacy.
* Pre-coded questions should offer adequate response categories

**5.4.2 Basics of a Good Questionnaire**

**a) Introduction**

In this section we look at the design and construction of a questionnaire. Questionnaires are used in a variety of contexts in marketing research. They can be employed during the conducting of surveys. Which includes mail surveys, telephone interviews, formal structured personal interviews, and self-administered studies.

A questionnaire is a data collection instrument. It formally sets out the way in which the research question of interest should be asked. There are definite guidelines for preparing a questionnaire. It is also important to note that there are limitations to what a questionnaire can measure.

**b) Structure of the questionnaire**

The three major parts of a questionnaire are the introduction, the body of the questionnaire and its basic data.

1. **The introduction**

To be successful, the introduction to the questionnaire must achieve two things:

* It must be persuasive
* It must qualify the respondent as someone who belongs in the sample.

The starting point of the questionnaire is self-in identification. In a one-to-one interview, the investigator has to explain who they are and the firm doing the study. The introduction states the topic of the study. If it is a one-to-one survey, the person may have to be qualified to ensure that the really belong in the sample. Possibly only users of a particular type of product or service are wanted.

1. **The Body or Content**

The Body or Content consists of questions that cover information needed to solve the marketing problem. The range of topics cover facts, knowledge, opinions and attitudes, motives and possible future behavior. In other words, the questions on the questionnaire attempts to measure facts, motives, knowledge, opinions, attitudes, and behavior (e.g. consumers’ buying behavior}.

1. **Basic Data**

The last section of the questionnaire is mainly information about the household and the individual. It almost always includes demographics about the household, aspects such as family size, nature and income. Typically, it also covers demographics about the respondent and it may include questions about lifestyle and psychographics.

This section of the questionnaire has three purposes. First, where there are known and dependable statistics about the population from which the sample has been selected, such data provide a rough check on the representativeness of the sampling. Second, through analysis of subgroups, it provides a method for identifying differences of key results in response by subgroups such as gender and age. Third, there is identification material such as respondent’s address and telephone number.

**c) Question Content**

When designing the questions you should first ask yourself the following questions:

1. Is the question necessary? If the answer provided by a question does not contribute to satisfying the research objectives, the question itself should be omitted.
2. Will the respondent understand the question? The language of the question should be at the level of the respondent being interviewed.
3. Will the question suffice to elicit the required data? Questions may be badly phrased or too ambiguous to produce specific information. You should avoid questions that pose more than one question, for example, “when and where do you shop?”

**d) Question Phrasing**

1. **Clarity and Simplicity :** The style of the language used should be appropriate for the target population. Use simple words that are easy to understand.
2. **Length of questions:** Keep the sentences short and the point.
3. **Ambiguity and vagueness:** Ambiguity and vagueness in question wording must be avoided at all costs. Avoid confusing words.
4. **Biased words and leading or loaded questions:** Biased words should be avoided. Leading questions should also be avoided. Leading questions are those that suggest the way in which the respondent should answer.
5. **Negative Questions:** Questions phrased in a negative fashion should be avoided because they can be confusing (e.g. ‘you don’t think a woman can be a good Marketing Manager, do you?’).
6. **Questions asking for estimates or generalizations:** These should be avoided as they a potential source of error.
7. **Hypothetical Questions:** The words ‘would’ or ‘could’ should be avoided in questions since they encourage the respondent to guess and speculate. For instance, don’t ask people if they would purchase something if it were available.
8. **Implicit Assumptions:** when phrasing questions do not do so in a manner that assumes that all respondents are well informed and in possession of all the facts. Questions that make implicit assumptions of a respondent’s background knowledge will not produce valid, or accurate results. Different respondents will make different assumptions, so the questions will not generate useful responses.
9. **Double-barreled questions should be avoided:** These are questions where two opinions are joined together in the one question. For example: “Do you think the service provided in the hotel is friendly and efficient? There are really two questions in one here. Is the service friendly? Is the service efficient? Two questions are warranted to avoid confusion in recording and analyzing answers.
10. **Reliability and Validity of Questions:** if the respondent exhibits poor memory recall relating to the topic the accuracy of the responses will be impeded. Under such circumstances the reliability of the question is in doubt.
11. **Response Choices Should not overlap:** This applies to closed-ended questions where a number of answers are provided from which the respondent has to select the most appropriate. An example of overlapping responses would be as indicated below:

**For how long have been using the Boom detergent?**

1. 1-5years
2. 5-10 years
3. 10 years or more.

Here there is a clear overlap between category 1 and category 2, and between category 2 and category 3.

In order to remove the problem, the correct way to do it is as indicated below:

1. Less than 5 years.
2. 5 to under 10 years
3. 10 years or more

**5.4.2.1 Types of response format**

Questions can be open-ended, where the respondent can answer in their own way, or closed ended, where all possible answers are pre-specified. Open-ended questions can reveal more information. Closed-ended questions, on the other hand, are easier to interpret and tabulate.

**a) Closed-Ended:** In a closed ended question, the question is followed by a structured response. All possible answers are given with the question. Such question are easy to use, reduce interviewer bias, reduce the bias exhibited by respondents in answering questions, and facilitate coding. Given below are two categories of closed-ended questions.

1. **Dichotomous Question:** This is a question suggesting two answers, usually yes and no. These types of questions are excellent where a fact is to be determined and where the views of the respondents are likely to be clear-cut.
2. **Multiple-**Choice Question: Here the respondent is offered a list of answers from which to select one that is closest to their view. The format reduces any bias that can be introduced by the respondent’s ability to articulate. It also simplifies the coding of responses. Three or more answers are offered and the respondent usually has to select one of them.

**b) Open-Ended:** Open ended questions do not suggest an answer and allow people to write whatever they wish. The main purpose of this type of question is to obtain the respondent’s own verbalization of, comprehension of, and reaction to stimuli such as advertisements, products and concepts. Given below are two categories of open-ended questions.

1. **Unstructured Question:** Unstructured questions allow the respondent to reply in whatever format they prefer.
2. **Projective Technique:** Projective techniques include word association, sentence completion, story completion, and picture completion.

Projective.

The basic premise of projective methods is that the best way to obtain the true feelings and attitudes of people is to enable them to indirectly present data about themselves by speaking through others.

Projective techniques were devised in the belief that people have psychological blockages that prevent them from verbalizing their true feelings.

In the case of picture completion or cartoon techniques the respondents are shown a picture of one or more people in a situation related to the subject under study. They are then asked to describe what is occurring or to answer a question asked by one or other of the cartoon characters

In case of word association a respondent is given a series of single words and then asked to match each one of their own. The goal is to elicit quick unrestrained answers.

Story completion is a longer version of sentence completion in which participants are presented with partial scenarios and asked to complete the story.

**5.5 The Danger of Bias**

When collecting data it is important to bear in mind the concept of bias. Bias is can be defined as ‘allowing a particular influence to have more importance than it really warrants.’ The whole purpose of data collection is to gather information about the population. You want the data collected to represent the whole population and as far as possible to have no bias.

The greatest danger of bias is that it can influence the respondent’s responses in a wrong direction. The researcher’s conclusion and recommendations will therefore, be based on the wrong research findings. Thus, it has the capacity to make the research fail to find the correct solutions to the problem that prompted the investigation.

Bias can arise because of a number of reasons as indicated below:

1. **Sampling frame bias:** A poor, out-of-date an inaccurate sampling frame leads to bias. For instance, if you use a telephone directory to construct a sampling frame, you omit potential respondents who do not have a telephone or are ex-directory. Using an electoral register may miss out some people who for various reasons have not registered.
2. **Researcher bias:** You the researcher may unwittingly introduce bias. You may make your questions too narrow, and as a result, respondents in an interview do not have the opportunity to express themselves fully. On the other hand, your questions may be too broad and the answers so general that the final interpretations become diffuse and unfocused. Sometimes the interviewee may give you the answers that he thinks you want to hear, but in all good faith, they may not be completely honest with you.
3. **Non-response bias:** Non-response, especially in postal questionnaire, is always a problem and can generate considerable bias. You have no way of knowing how respondents would have answered the questions. People do not respond for a variety of reasons. Your questionnaire may look unattractive, they may have moved address, so they never received the questionnaire

**5.6 Ambiguous Questions and Human Errors in Interviewing**

Interviews can be affected by many and diverse problems and errors. Problems may include ambiguity, data recording errors, evaluation errors, and instruction errors as indicated below:

1. **Ambiguity**

* Asking questions that use words that have more than one meaning may confuse the respondent and thus may lead to wrong responses.
* If the meaning of the word is unclear, you cannot expect the respondents to provide a clear, unambiguous answer.

1. **Recording Errors**

* Selective hearing or vision
* Misunderstanding of the respondent
* Too early or too late registration of the responses.
* Incomplete, faulty, or illegible responses

1. **Evaluation Errors**

* **Leniency effect**. This is when extremely negative responses are avoided.
* **Severity effect**. This is when extremely positive responses are avoided.
* **Protection effect**. This is when personal prejudice and stereotypes are projected onto the respondent, affecting perception and evaluation of responses.
* **Contact effect.** This when the loss of objectivity caused by knowing the respondent leads to a mild evaluation of responses.
* **Central tendency effect.** This is when the researcher tends to avoid recording extreme responses.
* **Reference group effect.** This when the researcher develops expectations related to the reference group of the respondent and judges the responses according to these expectations, examples being:

1. **The grandpa effect.** This is when the researcher expects too little from the respondent
2. **The authority effect.** This when the researcher feels intimidated by the respondent’s position of authority.
3. **The Santa Claus effect.** This is when the researcher expects more or too much from the respondent.
4. **The identification effect.** This is when the researcher generates error associated with the researcher’s tendency to identify with the respondent and therefore treat him or her mildly, and vice versa.
5. **Instruction Errors**

* Replacing non responses with another person’s responses.
* Withholding information collected.
* Introducing changes in procedure against the researcher’s instructions, for example changing questions or the order of the questions.
* Forgery of parts of the data.
* Showing consent or rejection of responses while collecting data.

**5.7 Summary**

In this unit we have discussed questionnaire construction techniques and its associated elements such as the rules for questionnaire construction, basics of a good questionnaire, and structure of a questionnaire. We have also looked at the dangers of bias in data collection, and the ambiguous questions and human error in interviewing. I hope you found this unit to be educative enough.

**5.8 Activities**

1. Discuss basic questionnaire construction techniques.

2. Explain the types of bias in data collection.

**UNIT 6 : ANALYSIS AND INTERPRETATION OF QUALITATIVE DATA**

**6.1 Introduction**

Welcome to unit 6 of this module where we are going to talk about qualitative data analysis and interpretation. Qualitative analysis is a term for the analysis of data that are not numeric. In our discussion, we shall outline the steps and procedures that are involved in qualitative data analysis and interpretation. The unit will end with some activities that you will be required to attempt.

**6.2 Learning Outcomes**

By the end of this unit, you should be able to :

* Analyze and interpret qualitative data
* Discuss methods of qualitative data analysis
* Use Codes and Key Words for data analysis.

**6.3 Time Frame**

One hour (1 hour)

**6.4 Methods of analyzing and interpreting qualitative data**

The following are the methods that may be used.

**6.4.1 Content Analysis Methods**

There are two general types of content analysis. They are, the Conceptual Analysis and Relational Analysis.

Conceptual analysis determines the existence and frequency of concepts in a text. Relational analysis, on the other hand, examines the relationships among concepts in a text.

**a) Conceptual Analysis**

In conceptual analysis, a concept is chosen for examination. The analysis involves quantifying and counting the concept’s presence. The main goal is to examine the occurrence of selected terms in the data.

To begin a conceptual content analysis, the researcher must first identify the research question and choose a sample or samples for analysis. Next the text must be coded into manageable content categories. This is basically a process of selective reduction. By reducing the text to categories, the researcher can focus on and code for specific words or patterns that inform the research question.

The following are the steps involved in Conceptual Analysis:

**Step1 : Decide the Level of Analysis**

Decide the level of your analysis. Will your analysis focus on word, word sense, phrases, sentences, or themes.

**Step2 : Decide How Many Concepts to Code For**

Develop a pre-determined or interactive set of categories or concepts. Decide either, (a) to allow flexibility to add categories through the coding process, or (b) to stick with pre-determined set of categories.

* Option ‘A’ allows for the introduction and analysis of new and important material that could have significant implications to one’s research questions.
* Option ‘B’ allows the researcher to stay focused and examine the data for specific concepts.

**Stpe3 : Decide Whether to Code for Existence or Frequency of Concept**

* When coding for existence of a concept, the researcher would count a concept only once regardless of how many times it appeared.
* When coding for frequency of the concept, the researcher would count the number of times a concept appears in a text.

**Step 4 : Decide How you will Distinguish Among Concepts**

* Should the text be coded exactly as they appear or coded the same when they appear in different forms? For example, **‘dangerous’** and **‘dangerousness.’**
* What level of implication is to be allowed? Words that imply the concept or words that explicitly state the concept? For example**, ‘dangerous’** or **‘that person could harm you.’**

**Step 5 : develop Rules for Coding Your Texts**

* The researcher can develop rules for translation of text into codes. This will keep the coding process organized and consistent. The researcher can code for exactly what he or she wants to code.

**Step 6 : Decide What to do with Irrelevant Information**

* Should this be ignored or used to re-examine the coding scheme in case that it would add to the outcome of coding.

**Step 7 : Code the Texts**

* This can be done by hand or by using a computer software.

**Step 8 : Analyze Your Results.**

* Draw conclusions and generalizations where possible.
* Determine what to do with irrelevant, unwanted or unused text (you may re-examine, ignore, or reassess the coding scheme).
* Interpret results carefully
* Typically, general trends and patterns can be identified.

**b) Relational Analysis**

Relational analysis begins by the researcher choosing a concept for examination. The analysis involves exploring the relationships between concepts. Individual concepts are viewed as having meaning only when the meaning is a product of the relationship among concepts.

There are eight steps that are involved in relational analysis as outlined below:

**Step 1 : Identify the Question**

The research question that you will identify must be focused so that the concept types can be easily summarized and are not open to interpretation.

**Step 2 : Choose a Sample or Samples**

Select the texts for analysis carefully by balancing having enough information for a thorough analysis against having too much or extensive information. Too much information may make analysis difficult.

**Step 3 : Determine the Type of Analysis**

The researcher needs to determine what types of relationships to examine and the level of analysis. For example, the level of analysis may be word, word sense, phrase, sentence, or themes.

**Step 4 : Reduce the Text to Categories and Codes of Words or Patterns**

* The researcher can code for existence of meaning or words.

**Step 5 : Explore the Relationships Between Concepts**

Once the words are coded, the text can be analyzed for the following:

* Strength of the relationship : The degree to which two or more concepts are related.
* Sign of relationship : Are the concepts positively or negatively related.
* Direction of relationship: The types of relationships that the categories exhibit.

**Step 6 : Code the Relationships**

You must code the statements or relationships between the concepts.

**Step 7 : Perform Statistical Analysis**

* Explore the differences or look for relationships among the identified variables during coding.

**Step 8 : Map Out the Representation**

* Come up with decision mapping and mental models

**6.4.2 Iterative Qualitative Analysis Method**

This method employs two major strategies. These are the Grounded Theory and the Analytic Induction. They are characterized by the fact that their analytic process involves repeated use of data collection and analysis.

**a) Analytic induction strategy**

Developing a systematic approach for analyzing qualitative data is critical. There are four major steps to this process.

Start by reviewing the data. Reviewing data before beginning any analysis is a vital step. It is important to understand the data that has been collected by reviewing it several times. If data consists of interview transcripts, for example, they need to be read and re-read to gather a general understanding of the content.

Once data has been reviewed, the next step is to organize it so that it becomes more manageable and can be navigated with ease. This step often saves time and energy later. Do this by grouping your data into various categories.

There are several ways of grouping data, including by date, by data collection type, or by questions asked.

The next thing is to code the data. Coding data is the process of identifying and labelling themes within data that correspond with the evaluation questions. Themes are common trends or ideas that appear repeatedly throughout the data. They may appear only after the data has been read and reviewed several times.

Once coding has been done, you may start the process of interpreting the data. The process of data interpretation involves attaching meaning and significance to data. Start by making a list of key themes, then factor in an initial responses that were noted during data review.

Outlined below is a loosely structured guide for the steps taken when analyzing qualitative data. It is important to note that qualitative data analysis is an ongoing, fluid, and cyclical process that happens throughout the data collection stage of a research and carries over to the data entry and to the main analysis stages..

**Step 1 : Process and Record Data Immediately**

As soon as data is collected, it is critical that it be immediately processed and any detailed notes recorded.

**Step 2 : Begin Analyzing as Data is Being Collected**

Quantitative data analysis should begin as soon as data collection begins. From the moment the first piece of data is collected, the review of the data starts, allowing for it to be mentally processed for themes or patterns as they emerge

**Step 3 : Data Reduction**

Qualitative data generally produce a wealth of data but not all of it is meaningful. Thus, data should be subjected to the reduction process so as to identify and focus on what is meaningful. Data reduction is the process of reducing and transforming raw data. The researcher should comb through the raw data to determine what is significant and transform the data into simplified format that can be understood in the context of the research questions.

**Step 4 : Identifying Meaningful Patterns and Themes**

In order for qualitative data to be analyzable, it must first be grouped into the meaningful patterns and or themes that were observed. The process is the core of qualitative data analysis. This process is generally conducted as either a Content analysis or a Thematic analysis.

**Step 5 : Data Display**

After identifying themes or content patterns, the data needs to be assembled, organized, and compressed into display that facilitates conclusion drawing. The display can be graphic, table/matrix, or textual display. The display should assist in identifying patterns and relationships observed within groups and across groups.

**Step 6 : Conclusion Drawing and Verification**

This is the final step in qualitative data analysis. The process of drawing reasonable conclusions involves: A) stepping back and interpreting what all of the findings mean. B) Determining how these findings help answer the research questions. C) Drawing implications from the findings. These conclusions are verified by revisiting the data (multiple times) as confirmation.

It is also important to consider the practical significance of the findings.

**b) Using Simplified Codes and Key Words**

Using codes and key words is part of the analytic induction strategy. Qualitative research always generates lots of material. The following are the procedures for the analysis of qualitative data using codes and key words:

* Read through all result formats, for example, interview transcripts, questionnaires, observation sheets, etc. Note down any points and ideas that are identified.
* Identify the definitive list of ideas and topics mentioned. Give each discrete topic a code, e.g. a number or letter. The aim is to end up with the format marked up with different letters and numbers, each one representing a separate idea. Don’t forget to write down what each number or letter stands for. For instance, if your research was on decision making, you might identify from your interviews the following ideas each of which could be given a code as follows:

**Table 1 : Coding**

|  |  |
| --- | --- |
| **Idea** | **Code** |
| Team work in decision making | D1 |
| Explanation of a good decision | D2 |
| Explanation of a bad decision | D3 |
| How to make decisions | D4 |
| Conditions necessary to make effective decisions | D5 |

* As you work through your material, you may decide to include categories
* Finally, when the results have been assigned to a particular category, patterns will begin to emerge that will help you to make some interpretation and analysis. You may be able to link some of the ideas with those already identified in the literature. It may be possible to convert some of the qualitative data into a qualitative format. For example, you could calculate the percentage frequency of a particular idea, and give an estimate of its occurrence.

The above method of analysis takes considerable time. This method, enables the researcher to accomplish the following two things:

* It enables him to go through all his results and data collection records and divide them up into representative categories and ideas.
* By doing this, the researcher is able to identify how these can be linked up to form larger and more general themes.

**c) Grounded Theory**

Qualitative research should not simply describe a situation, but look for explanations and analyses and search for generalizations or theories to explain and understand the topic being investigated. These generalizations and theories should, therefore, emerge or be grounded in the empirical research. Hence the term ‘grounded theory’. Implicit in the process is that the researcher constantly looks back and reflects, and as result refines the theory against new research findings.

With grounded theory, the researcher must have an open mind right from the start. Pre-conceived ideas about the situation should be ignored. The following is a suggested grounded theory scheme of analysis.

* **Familiarization with material** : Here you read and re-read the work, teasing out patterns and themes.
* **Reflection** : At this stage you ask questions such as, “Does the research data support existing knowledge? Does it challenge existing knowledge? Does it answer previously unanswered questions?, and if the data is different, why is it different?”
* **Conceptualization**: Here you identify patterns and concepts that begin to emerge from the data. As in the method described above, the use of letters and numbers to code material may help.
* **Cataloguing concepts**: the identified concepts are now recorded on index cards (or computer database).
* **Linking**: the ideas are now linked together and hopefully you start to build grounded theory.

**6.4.3 Narrative Analysis Method**

This is mainly concerned with analyzing narrative interviews. In narrative interviews, analysis begins when narration, debate and transcription have been completed. In this sense, analysis means the analysis of transcripts, content or textual analysis. It is the analysis of the text that is produced while documenting the story presented during the interview.

The process of analysis of the transcripts of narrative interviews can be broadly summarized in six steps.

**Step 1 : Formal Textual Analysis**

The first step of analysis involves cleaning the text of non-narrative material. This includes identification of sequences in the text, the search for the presence of types of information presented by the interviewee in different levels of significance (that is whether the interviewee sets some events as more important or of a higher priority, and others as less important or of lower priority). In this way, the text is divided into sequences that demonstrate the way in which the way the respondent perceives, describes and assesses the events in question. Analysis then follows within the context of the sequenced text.

**Step 2 : Structural Description of the Content**

Here, the emphasis is placed on the overall structure of the text and on its composition. The purpose of this is to demonstrate which parts of the statement have a limited and which ones have a more general significance. To achieve this, the text is searched for indicators of connectors between individual presentations of events (such as ‘because’, ‘then’, ‘after’, ‘already’, etc.) as well as of deficient plausibility shown in the tone of the voice, structure of language, self corrections, etc.

**Step 3 : Analytic Abstraction**

At this point of analysis, the results allow a perception of the situation which is less bound to single statements or descriptions of single events and more to general and abstract expressions. Such abstract statements are contrasted with statements relating to specific life sequences, and their validity is tested. This is expected to lead to an identification of the basic and dominant experiential frequency that best describes the life events.

**Step 4 : Knowledge Analysis**

This involves an analysis of the ways in which knowledge is employed to respond to social demands. It also examines the realistic and interpretation of the life processes of the informant.

**Step 5 : Comparison**

At this stage, comparisons between more text parts are undertaken to allow relative generalizations. This eventually leads to the construction of elementary categories.

**Step 6 : Construction of a Theoretical Model**

The final aim of this analysis is to construct a theoretical model whose elements are sequentially contrasted to statements presented in the text. Those consisted with the text are maintained, others are eliminated. This contrast of the whole with the parts and vice versa is critically important for the construction of the model.

**6.5 Summary**

In this unit we introduced you to qualitative data analysis and the methods that are used. We also looked at various steps that are involved in conducting qualitative data analysis. I hope this unit was educative and interesting.

**6.6 Activity**

Discuss the Grounded Theory as it applies to data analysis.

**UNIT 7 :** **ANALYSIS AND INTERPRETATION OF QUANTITATIVE DATA : DESCRIPTIVE**

**ANALYSIS**

**7.1 Introduction**

Welcome to unit 7 of this module. In this unit, we are going to look at the analysis of quantitative data. Our focus will be on descriptive analysis. Descriptive analysis is the first level of analysis that helps researchers find absolute numbers, summarize individual variables and find patterns.

Quantitative analysis is a diverse and complex process that involves techniques by which the researcher coverts data to numerical forms and subject them to statistical analysis. it contains statistical techniques of a varying degree. Statistical processing can be conducted manually or electronically.

**7.2 Learning Outcomes**

By the end of this course, you should be able to:

* Explain the steps of preliminary quantitative data analysis.
* Discuss descriptive data analysis methods

**7.3 Time Frame**

Three Hours (3 hours)

**7.4 Steps of Preliminary Quantitative Data Analysis**

In carrying out data analysis the researcher followsthe following steps:

**a) Data Preparation**

The first stage of analyzing data is data preparation, where the aim is to convert raw data into something meaningful and readable. It includes four steps:

**b) Data Validation**

The purpose data validation is to find out as far as possible, whether the data collection was done as per-set standards and without any bias. I t is a four step process, which includes:

* **Fraud,** to infer whether each respondent was actually interviewed or not.
* **Screening,** to make sure that the respondents were chosen as per the research criteria.
* **Procedure,** to check whether the data collection procedure was duly followed.
* **Completeness,** to ensure that the interviewer asked the respondent all the questions, rather than just a few required ones.

To do this, researchers would need to pick a random sample of completed surveys and validate the collected data.

**c) Data Editing**

Typically, large data sets include errors. For example, respondents may fill fields incorrectly or skip them accidentally. To make sure that there is no such errors, the researcher should conduct basic data checks and edit the raw research data to identify and clear out any data points that may hamper the accuracy of the results.

**d) Data Coding**

This refers to grouping and assigning values to responses from the survey. For example, if a researcher has interviewed 1,000 people and now wants to find the average age of the respondents, the researcher will create age brackets and categorize the age of each of the respondents as per these codes. (For example, respondents between 13-15 years old would have their age coded as 0, while those aged 16-18 as 1, 19-25 as 2, etc.)

Then during analysis, the researcher can deal with simplified age brackets, rather than a massive range of individual ages.

After these steps, the data is ready for analysis. The **two most commonly** used **quantitative data analysis methods** are **descriptive analysis** (also known as descriptive statistics)and **inferential analysis** (also known as inferential statistics).

**7.5 Measures of Location as Descriptive Data Analysis Methods**

In this section we are going to discuss measures of location also known as measures of central tendency. These measures are used when we need to know about the average, most common or typical value in a distribution. The most useful measures that give such values are the **mean**, the **mode** and the **median**. These functions usually describes a set of data by giving the position of its centre. Thus, the measures of location tend to describe the centre of the distribution.

**7.5.1 Uses of measures of Location**

The main measures of location are the; mean, median, and the mode. Let us first consider in general why we need these measures. We need these measures for descriptive use.

Thus, the main purpose of a statistical analysis is to review sets of data so that they may be understood and used in planning the economic, marketing and business policies.

A measure of location describes one feature of a set of data by a single number. You must inspect any set of data carefully and choose the centre that is best for the problem you have to solve.

They also help in making comparisons of distributions so as to establish the differences in such distributions**.**

**7.5.2 The Mean**

The mean is the statistical name for what is commonly called the average. There are different types of means, for instance, the Arithmetic Mean, the Weighted Mean, the Geometric Mean, the Harmonic Mean, etc. In this unit, however, we are going to confine ourselves to the Arithmetic Mean and the Weighted Mean**.**

**a) Arithmetic Mean**

The arithmetic mean of a set of observation is the total sum of the observations divided by the number of observations. This is the most commonly used measure of location, and it is often simply referred to as the mean.

**Example 1**

Find the mean monthly sales of pencils in Twikatane Store, in Chongwe Town, from the twelve monthly observations given in the Table below.

**Table 2 : Monthly Sales of Pencils at Twikatane Store**

|  |  |
| --- | --- |
| **Month** | **Sales (Zambian Kwacha)** |
| January | K 5.40 |
| February | K 6.80 |
| March | K 7.20 |
| April | K 6.50 |
| May | K 5.20 |
| June | K 4.20 |
| July | K 2.10 |
| August | K 2.80 |
| September | K 3.90 |
| October | K 4.50 |
| November | K 4.80 |
| December | K 5.30 |

We will use the sigma notation to work out this problem. We let the variable x to denote the monthly sales in Kwacha. Then Σx to represent the total sales for the given year. Remembering that there are 12 months in the year, we can calculate the mean monthly sales in Kwacha (denoted by the symbolx**̄**) as:

From this example we can deduce the general formula for finding the mean of a set of n observations :

In this formula, remember that:

* represents the arithmetic mean of the sample of observations
* **x** represents the sample of observations
* **Σx** represents the sum of the sample of observations
* **n** represents the number of observations

**Example 2**

The following table is the frequency distribution of the number of days on which 100 employees of a marketing company were late for work in a given month. Using this data find the mean number of days on which an employee is late in a month.

**Table 3 : Number of days on which employees are late in a month**

|  |  |  |
| --- | --- | --- |
| **Number of Days Late**  **(x)** | **Number of employees**  **(f)** | **Number of Days**  **(fx)** |
| 1 | 32 | 32 |
| 2 | 25 | 50 |
| 3 | 18 | 54 |
| 4 | 14 | 56 |
| 5 | 11 | 55 |
|  | **Total 100** | **Total 247** |

In this example,

**x** **=** the possible values for the number of days late,

**f** **=** the frequencies associated with each possible value of x.

Then :

The total; number of days late = **Σfx = 247**

The total number of employees **= Σf = 100**

And

To deduce the general formula for a problem of this type, we let **n** (see the general formula in example 1) be the number of values that the variable may take (i.e**. Σf**). Then:

Thus, the above given formula is the formula for calculating the mean for a frequency distribution.

**b) Weighted Mean**

A firm owns six factories at which the basic weekly wages are given in column 2 of the table given below. Find the mean basic wage earned by employees of the firm.

**Table 4 : Basic Weekly Wage at Factories**

|  |  |  |  |
| --- | --- | --- | --- |
| **Factory** | **Basic Weekly Wage in**  **Kwacha**  **K(x)** | **Number of Employees**  **(w)** | **(wx)** |
| A | 85 | 50 | 4,250 |
| B | 105 | 80 | 8,400 |
| C | 64 | 40 | 2,560 |
| D | 72 | 35 | 2,520 |
| E | 96 | 90 | 8,640 |
| F | 112 | 75 | 8,400 |
| **Total** | **534** (Total) | **370** (Total) | **34,770** (Total) |

If you know the number of employees at each factory (see column 3), the calculation for the weighted mean would be :

But if you have no further information than column 2, then the calculation would be as given below:

**7.5.3 The Median**

The Median is the middle item. It is found by arranging the data in order of magnitude.

Thus, for instance, if a set of observations is arranged in order of size then, if n is the odd, then the median is the value of the middle observation. But if n is even, the median is the value of the arithmetic mean of the two middle observations.

Note that the same value is obtained whether the set is arranged in ascending or descending order of size, though the ascending order is mostly commonly used. This arrangement of size often called ranking.

**Calculating the Median**

The rules for calculating the median are:

**a)** if **n is odd** and the median is the value of the middle observation then the median is found by arranging the data in order of magnitude. The median is then the middle item.

**For example** suppose the sales commissions (in Kwacha) of 15 sales personnel were as follows:

23, 16, 31, 77, 21, 14, 32, 6, 155, 9, 36, 24, 5, 27, 19

Placing the data in order of magnitude, we have:

5, 6, 9, 14, 16, 19, 21, 23, 24, 27, 31, 32, 36, 77, 155

The middle item is the eighth value, which is 23. There are seven values smaller than 23 and 7 values larger than 23. The median value is therefore K23.

**b)** if **n is even,** the middle observations are the and observations and then:

M = the value of the mean of these two observations. Thu the Median is the value of the arithmetic mean of the two middle observations.

**For example**, when all the individual observations are listed, begin by ranking the observations. For instance, if you were asked to arrange the following given daily sales (in Kwacha) of needles at Mwaiseni Store in Kapiri Mposhi in an ascending order, the result would be as follows.

K2.10, K2.80, K3.90, K4.20, K4.50, K4.80, K5.20, K5.30, K5.40, K6.50, K6.80, K7.20

n = 12 (i.e. even), so observation is the 6th and   observation is the 7th .

Therefore:

M = mean of 6th and 7th observations.

**7.5.4 The Mode**

The mode is that value of the variable that occurs most frequently. The value can be found by ordering the observations or inspecting the simple frequency distribution. It is important to note that it is possible for several values of the variable to have the same frequency. Thus a set of data may have several modes.

* A set of observations with one mode is called unimodal.
* A set of observations with two modes is called bimodal.
* A set of observations with more than two modes is called multimodal.

**a) Calculating the Mode**

The following is an ordered list of the number of complaints received by a telephone supervisor per day over a period of time.

3, 4, 4, 5, 5, 6, 6, 6, 6, 7, 8, 9, 10, 12

The value which occurs most frequently is 6, therefore, the **mode = 6.**

Suppose one 6 is replaced by a 5, and then 5 and 6 both occur three times and the data is bimodal with modal values 5 and 6. The mode is therefore, bimodal with 5 and 6 as the most frequent occurring numbers.

**7.6 Measures of Dispersion as Descriptive Data Analysis Methods**

Measures of dispersion are also known as measures of spread, or variability. These measure are employed when we need to know how far the scores are spread around the mean, and about the average deviation of the scores from the mean. The most common method used to describe the dispersion of data are the range, variance and standard deviation. Small values for these measures indicate that the data is compact.

**7.6.1 Range**

This is the interval from the lowest to the highest value in an array of data. In other words a range is the difference between the largest and smallest score in the distribution. It may also be said to be the distance between the highest and lowest score of a distribution. It is computed from only the minimum and maximum scores. For example, if the lowest Geography score is 40 and the highest is 90 thus the range is 90-40 = 50. It is a very rough measure of dispersion (spread).

**Example 1**

A Table showing monthly sales of pencils at Twikatane Store, in Chongwe Town, from the twelve monthly observations.

**Table 5: Twikatane Store monthly pencil sales.**

|  |  |
| --- | --- |
| Month | **Sales (Zambian Kwacha)** |
| January | K 5.40 |
| February | K 6.80 |
| March | K 7.20 |
| April | K 6.50 |
| May | K 5.20 |
| June | K 4.20 |
| July | K 2.10 |
| August | K 2.80 |
| September | K 3.90 |
| October | K 4.50 |
| November | K 4.80 |
| December | K 5.30 |

From the table above, the highest monthly sales for Twikatane Store was K7.20 in March, while the lowest sales was K2.10 in July. Therefore, **Range** is = (K7.20 – K2.10) = **K5.10**

**Table 6 : Monthly sales of pencils at Jacaranda Store, in Kafue Town, from the twelve monthly observations**.

|  |  |
| --- | --- |
| **Month** | **Sales (Zambian Kwacha)** |
| January | K 6.20 |
| February | K 6.60 |
| March | K 10.60 |
| April | K 5.10 |
| May | K 4.30 |
| June | K 2.20 |
| July | K 0.40 |
| August | K 2.80 |
| September | K 3.40 |
| October | K 4.80 |
| November | K 5.40 |
| December | K 6.90 |

The highest sales for Jacaranda Store was K10.60 in March, and the lowest sales was K0.40 in July. Therefore, **Range** = (K10.60 – K0.40) = **K10.20**

The range for Jacaranda Store is double that of Twikatane Store. However, if you calculate the mean sales for Jacaranda, you find that:

which is exactly the same as for Twikatane.

From this, we can say that if we know only the means, we would say that the sales distribution for the two stores are identical, but when the range is known we can see that they are different.

**7.6.2 FREQUENCY DISTRIBUTION**

Frequency is the name given to a number of times that a value occurs. In the table 7 below, some values occur only once. This means that their frequency is 1 (one), while others occur more than once, and so have a frequency greater than 1.

Frequency distribution means the way in which the frequencies or occurrences are distributed throughout the range of values.

Suppose your company has obtained the measurement of 80 of its employees’ heights and that they are recorded as follows:

**Table 7 : Heights of Company Employees in cm (in a form of Raw Data)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 173 | 177 | 168 | 173 | 182 | 176 | 179 | 173 |
| 179 | 163 | 180 | 168 | 188 | 167 | 183 | 187 |
| 160 | 173 | 174 | 184 | 163 | 188 | 176 | 169 |
| 175 | 178 | 177 | 162 | 176 | 181 | 188 | 183 |
| 181 | 170 | 179 | 173 | 170 | 169 | 164 | 176 |
| 164 | 175 | 164 | 180 | 174 | 165 | 174 | 179 |
| 183 | 181 | 170 | 177 | 185 | 173 | 171 | 165 |
| 189 | 181 | 175 | 186 | 166 | 177 | 179 | 169 |
| 179 | 183 | 182 | 165 | 180 | 171 | 173 | 174 |
| 172 | 166 | 182 | 186 | 181 | 178 | 178 | 187 |

The table above is simply showing the data in the form in which it was collected, this is known as raw data. What does it tell us? The truthful answer must be, not much. We therefore need to start our analysis by rearranging the data into some sort of order.

**Arrays**

There is a choice between the two obvious orders for numerical data, namely ascending and descending, and it is customary to put data in ascending order. A presentation of data in this form is called an array and is shown in Table 8.

It becomes immediately obvious from this table that all the values are between 160 and 190, and also that approximately one half of the observations occur within the middle third.

**Table 8: Array of heights of company employees in cm.**

|  |
| --- |
| 160 166 170 173 176 179 181 184  162 166 171 174 176 179 181 185  163 167 171 174 177 179 181 186  163 168 172 174 177 179 182 186  164 168 173 174 177 179 182 187  164 169 173 175 177 180 182 187  164 169 173 175 178 180 183 187  165 169 173 175 178 180 183 188  165 170 173 176 178 181 183 188  165 170 173 176 179 181 183 189 |

**Ungrouped Frequency Distribution**

In an array, we write a value once for every time it occurs. We could therefore, shorten the array by writing each value only once, and noting by the side of the value the frequency with which it occurs. This form of distribution is known as ungrouped distribution because all frequency values are listed and not grouped together in any form.

Note that there is no need of including in a frequency distribution those values (for example 161) which have a frequency of zero.

**Table 9 : Ungrouped Frequency Distribution of Heights of Company Employees in cm.**

|  |
| --- |
| **Height Frequency Height Frequency Height Frequency** |
| 160 1 171 2 181 5  162 1 172 1 182 3  163 2 173 7 183 4  164 3 174 4 184 1  165 3 175 3 185 1  166 2 176 4 186 2  167 1 177 4 187 2  168 2 178 3 188 3  169 3 179 6 189 1  170 3 180 3 |
| **Total Frequency = 80** |

**Grouped Frequency Distribution**

Ungrouped frequency distribution is lengthy (long) and this makes it difficult for us to draw further conclusions about the data. What we need is some means of being able to represent the data in summary form. We are able to achieve this by expressing the data as a grouped frequency distribution.

In grouped frequency distribution certain values are grouped together. The groups are usually referred to as classes. In our table below we have grouped together all those heights of 160 cm upward but less than 165 cm into the first class. From 165 cm and upwards but less than 170 cm into the second class; and so on. See table 10 below.

**Table 10 :** **Grouped Frequency Distribution of Heights of Company Employees in cm**

|  |  |
| --- | --- |
| **Heights (cm)** | **Frequency** |
| 160 - under 165  165 - under 170  170 - under 175  175 - under 180  180 - under 185  185 - under 190 | 7  11  17  20  16  9 |
|  | **Total = 80** |

The above table is of a manageable size and clustering of a majority of the observations around the middle of the distribution is quite clear. However, as a result of the grouping, we no longer know exactly how many employees were of one particular height. In the first class, for instance, we know only that seven employees were of a height of 160 cm or more but less than 165 cm. We have no way of telling just on the information given by the table, exactly where the seven heights come within the class. As a result of our grouping therefore, we have lost some accuracy and some information. This type of trade-off will always be there.

**Cumulative and Relative Frequency**

* **Cumulative Frequency**

So far we have discovered how to tabulate frequency distribution. There is a further way of presenting frequencies and that is forming cumulative frequencies. This technique conveys a considerable degree of information and involves adding up the number of times (frequencies) values less than or equal to a particular value occur.

For instance, using our example on employee heights, we start with the value 0 as there are no employees less than 160 cm in height. There were seven employees with a height between 160 and less than 165 cm. Therefore, the total number of employees less than 165 cm in height is seven. Adding the number in the class 165 but under 170 cm, you find that the total number of employees less than 170 cm in height is 18. There are 35 employees who are not as tall as 175 cm, and so on. The cumulative frequencies are shown in Table 11.

**Table 11 : Less than Cumulative Frequencies Table of Employees’ Heights**

|  |  |  |
| --- | --- | --- |
| **Height (cm)** | **Frequency** | **Cumulative Frequencies** |
| Under 165  Under 170  Under 175  Under 180  Under 185  Under 190 | 7  11  17  20  16  9 | 0 + 7 = 7  7 + 11 = 18  18 + 17 = 35  35 + 20 = 55  55 + 16 = 71  71 + 9 = **80** |
|  | **80** |  |

You can see that the simplest way to calculate cumulative frequencies is by adding together the actual frequency in class of the cumulative frequencies is by adding together the actual frequency in the class to the cumulative frequencies of the previous classes. You will also notice in the table that the class descriptions have changed slightly, to read “under 165 cm”, this is a true description of what the cumulative frequencies actually represent.

It is possible to switch the description round, so that they read: “More than 160”, “More than 165”, etc. , as shown in the following table. This is known as more than cumulative frequency distribution as set out in Table 12.

**Table 12 : More than Cumulative Frequencies Table of Employees’ Heights**

|  |
| --- |
| **Heights Cumulative Frequencies** |
| More than 160 80  More than 165 73  More than 170 62  More than 175 45  More than 180 25  More than 185 9 |

However distributions are not usually presented in this way. Instead the less than cumulative frequency distribution is the most preferred.

* **Relative Frequency**

Relative Frequencies are the actual number of frequencies in class divided by the total number of observations, that is:

**Relative Frequency = Actual Frequency ÷ Total Number of Observations**

Let us go back to our example of employees heights. There 7 ÷ 80or 0.0875 employees who are less than 165 cm tall and 20 ÷ 80 or 0.25 who are between 175 cm and under 180 cm tall. Table 13 shows the relative frequencies.

**Table 13: Relative Frequencies of Employees’ Heights**

|  |  |  |  |
| --- | --- | --- | --- |
| **Height (cm)** | **Frequency** | **Relative Frequency** |  |
| 160 - under 165 | 7 | 7**÷**80 = 0.0875 or 8.75% |  |
| 165 - under 170 | 11 | 11**÷**80 = 0.1375 or 13.75% |  |
| 170 - under 175 | 17 | 17**÷**80 = 0.2125 or 21.25% |  |
| 175 - under 180 | 20 | 20**÷**80 = 0. 25 or 25. 00% |  |
| 180 - under 185 | 16 | 16**÷**80 = 0.2 or 20.00% |  |
| 185 - under 190 | 9 | 9÷80 = 0.1125 or 11.25% |  |
|  | **80** |  |  |

In Table 13 we have expressed the fractions also as percentages, something that is extremely useful and that improves a table. You can see at a glance that 20 per cent of all employees measured were more than 180 cm, but less than 185 cm tall. The main advantage of relative frequencies is their ability to describe data better.

**Cumulative Relative Frequency**

We have seen how to calculate cumulative frequencies. Using the same logic, you can obtain cumulative relative frequencies by adding the relative frequencies in a particular class to that already arrived at for previous classes. See Table 14.

**Table 14 Cumulative Relative Frequencies of Employees’ Heights**

|  |  |  |
| --- | --- | --- |
| **Heights (cm)** | **Cumulative Relative Frequency** | **Cumulative Percentage** |
| Under 165 | 0.0875 | 8.75 |
| Under 170 | 0.225 | 22.5 |
| Under 175 | 0.4375 | 43.75 |
| Under 180 | 0.6875 | 68.75 |
| Under 185 | 0.8875 | 88.75 |
| Under 190 | 1.0000 | 100.0 |

You will notice that in the above table, an extra column has been added which is labelled cumulative percentage. This column is the cumulative relative frequency converted to a percentage. This makes it easier for conclusions to be drawn from this table. For example 88.75 per cent of all employees measured were less than 185 cm tall.

**7. 7 Summary**

In this unit we have looked at quantitative analysis. Our focus was on descriptive analysis where we focused on preliminary analysis, measure of location and measures of dispersion. I hope you were able to understand and follow the presentation.

**7.8 Activity**

Write down the difference between the mean and the median.

**UNIT 8 : ANALYSIS AND INTERPRETATION OF QUANTITATIVE DATA : INFERENTIAL**

**ANALYSIS METHODS**

**8.1 Introduction**

In this unit, we are going to look at the inferential data analysis. These are complex analyses that shows the relationships between multiple variables in order to generalize results and make predictions. Discussed in this unit are cross-tabulation, correlation, regression, standard deviation and variance. You are welcome.

**8.2 Learning Outcomes**

By the end of this lesson you should be able to :

* Describe how to measure relationships by cross-tabulation
* Explain correlation analysis
* Discuss regression analysis, standard deviation and variance.

**8.3 Time Frame**

Three hours (3 hours)

**8.4 Measuring Relationship by Cross Tabulation**

A cross tabulation is the merging of the frequency distribution of two or more variables in a single table. It helps us to understand how one variable such as brand loyalty relates to another variable such as sex. Cross tabulations results in tables that reflect the joint distribution of two or more variables with a limited number of categories or distinct values. The categories of one variable are cross-classified with the categories of one or more other variable. Thus, the frequency distribution of one variable is subdivided according to the, values or categories of the other variables.

Suppose we are interested in determining whether internet usage is related to sex. For the purpose of cross-tabulation, respondents are classified as light or heavy users. Those reporting 5 hours or less usage are classified as light users, and the remaining are heavy users. The cross tabulation is shown in the table below. A cross tabulation includes a cell for every combination of the categories of the two variables. The number in each cell shows how many respondents gave that combination of responses. In the table, 10 respondents were females who reported light internet usage. The marginal totals in this table indicate that of the 30 respondents with valid responses on both the variables, 15 reported light usage and 15 were heavy users. In terms of sex, 15 respondents were females and 15 were males.

**Table 15 : Sex and Internet usage**

|  |  |  |  |
| --- | --- | --- | --- |
| **INTERNET USAGE** | **MALE** | **FEMALE** | **ROW TOTAL** |
| Light | 5 | 10 | 15 |
| Heavy | 10 | 5 | 15 |
| Column Totals | 15 | 15 |  |

Cross tabulation is widely used in commercial marketing research because:

* Cross tabulation analysis and results can be easily interpreted and understood.
* The clarity of interpretation provides a stronger link between research results and managerial action.
* Cross tabulation analysis is simple to conduct.
* A series of cross tabulation may provide greater insights into complex phenomenon than a single analysis.

Cross tabulation tables are also known as contingency tables.

**a) Two Variables**

Cross tabulation with two variables is also known as a bivariate cross-tabulation.

Consider again the cross-classification of Internet usage with sex given in the table above. Is usage related to sex? It appears so from the table above. We see that disproportionately more of respondents who are males are heavy internet users as compared to females. Computation of percentages can provide more insights. Because two variables have been cross classified, percentages could be computed either by column-wise, based on column totals (see table 16 below) or row-wise, based on row totals as in Table 17.

Which of these tables is more useful? The answer depends on which variable will be considered as the independent variable and which as dependent variable. The general rule is to compute the percentage in the direction of the independent variable, across the dependent variable. In our analysis, sex may be considered the independent variable, and internet usage as the dependent variable.

Note that whereas 66.7 percent of the males are heavy users, only 33.3 percent of females fall into this category. This seems to indicate that males are more likely to be heavy users of the internet as compared to females.

It is possible that the association between internet usage and sex is mediated by a third variable, such as age or income. This kind of possibility points to the need to examine the effects of a third variable.

**TABLE 16 : SEX BY INTERNET USAGE**

|  |  |  |  |
| --- | --- | --- | --- |
| **INTERNET USAGE** | **MALE** | **FEMALE** |  |
| LIGHT | 33.3% | 66.7% |  |
| HEAVY | 66.7% | 33.3% |  |
| COLUMN TOTALS | 100% | 100% |  |

**TABLE 17 : SEX BY INTERNET USAGE**

|  |  |  |  |
| --- | --- | --- | --- |
| **INTERNET USAGE** | **LIGHT** | **HEAVY** | TOTAL |
| Male | 33.3% | 66.7% | 100% |
| Female | 66.7% | 33.3% | 100% |

**b) Three Variables**

Often the inclusion of a third variable clarifies the initial association (or lack of it) observed between two variable will into four possibilities.

* It can indicate no association between the two original variables.
* It can indicate no association between the two variables, although the an association between the two variables was spurious.
* It can reveal some association between the two variables, although no association was initially observed. In this case a third variable reveals a suppressed association between the first two variables (suppressed effect)
* It can indicate no change in the initial association

**8.5 Correlation Analysis Methods**

Correlation analysis is concerned with measuring whether two variables are associated with each other. If two variables tend to change together in the same direction, they are said to be positively correlated. If they tend to change in opposite directions, they are said be negatively correlated. However, it is important to emphasize that correlation between two variables does not necessarily mean that changes in one of the variables are causing changes in the other.

**8.5.1 Scatter Diagrams**

**Examples of Correlation**

Suppose we have measured the height and weight of 6 men. The results might be as follows:

**Table 18 : Relationship of height and weight**

|  |  |  |
| --- | --- | --- |
| **Men** | **Height**  **(cm)** | **Weight**  **(kg)** |
| **A** | **168** | **68** |
| **B** | **183** | **72** |
| **C** | **165** | **63** |
| **D** | **175** | **66** |
| **E** | **163** | **58** |
| **F** | **178** | **75** |

A Scatter diagram or scatter-gram is the name given to the method of representing these figures graphically. On the diagram, horizontal scale represents one of the variables (let us say height) while the other (vertical) scale represents the other variable (weight). Each pair of measurements is represented by one point on the diagram, as shown in the figure below.

Weight (kg)

80

70

75

65

60

555

505

185

165

170

175

180

160

Height (cm)

* Each point represents a pair of corresponding values.
* The two scales relate to the two variables under discussion

The term scatter diagram or scatter-gram comes from the scattered appearance of the points on the chart

Examining the scatter diagram of heights and weights, you can see that it shows up the fact that by and large, tall men are heavier than short men. This shows that some relationship exists between men’s heights and weights. We expressed this in statistical terms by saying that the two variables, heights and weights are correlated.

**Given below is another example of a pair of correlated variables** ( Each point represents one production batch).

50

40

30

20

10

1 2 3 4 5 6

Here you see that, in general, it costs more to produce material with a low impurity content than it does to produce material with a high impurity content. However, you should note that correlation does not necessarily mean an exact relationship, for we know that while tall men are usually heavy, there are some exceptions, and it is unlikely that several men of the same height will have exactly the same weight.

**8.5.2 Degrees of Correlation**

On scatter diagrams, the horizontal scale is always the X scale, and the vertical scale is always the Y scale. There are three degrees of correlation which may be observed on a scatter diagram. The two variables may be :

**a) Perfectly Correlated**

This is when the points on the diagram all lie exactly on a straight line.

**y**

**X**

**b) Uncorrelated**

When the points on the diagram appear to be randomly scattered about with no suggestion of any relationship.

y

**No correlation**

x

It means that there is no apparent relationship between the two variables. For example, there is no relationship between the shoe size and salary.

**c) Partly Correlated**

When the points lie scattered in such a way that, although they do not lie exactly on a straight line, they do display a general tendency to be clustered around a line.

**Y**

x

**Partly correlation**

**8.5.3 Different Types of Correlation**

**a) Positive Correlation**

If the high values of the X variable are associated with the high values of the Y variable, while the low values of X are associated with low values of Y, on the scatter diagram the approximate line slopes up to the right. This correlation is said to be positive or direct correlation.

**Both variables** move in the same direction. In other words, as one variable increases, the other variable also increases. As one variable decreases, the other variable also decreases. Thus Y values increases as X values increases. If Y values decreases, X values also decreases.

**Y**

**x**

**b) Negative Correlation**

A negative correlation is a relationship between two variables that move in opposite directions. Thus, as one variable increases, the other variable decreases. In other words, when variable A increases, variable B decreases. A negative correlation is also known as an inverse correlation. In the scatter gram below, the Y value decreases as the X value increases.

If the high values of the X variable are associated with the low values of the Y variable and vice versa, on the scatter diagram the approximate line slopes down to the right. This correlation is said to be negative or inverse.

**Y**

**x**

**c) Linear Correlation**

The correlation is said to be linear when the relationship between the two variables is linear. In other words, all the points can be represented by straight lines. For example the correlation between car ownership and family income may be linear as car ownership is related in a linear fashion to family income**.**

**8.5.4 The Correlation Coefficient**

If the points on a scatter diagram all lie very close to a straight line, then the correlation between the two variables is stronger than it is if the points lie fairy widely scattered away from the line.

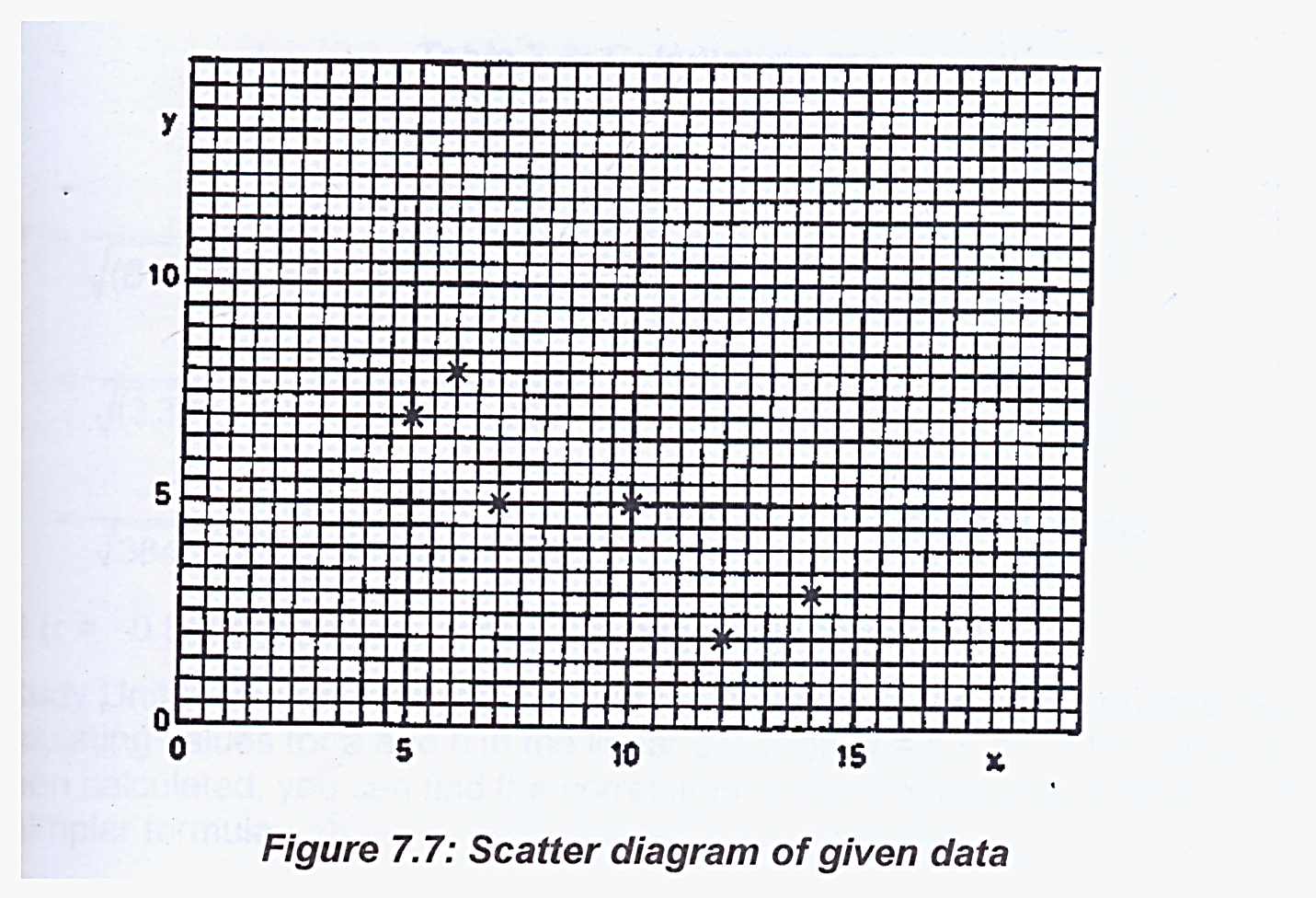
To measure the strength (or intensity) of correlation in a particular case, we calculate a linear correlation coefficient, which we indicate by a small letter ‘r’. This is sometimes referred to as Pearson’s Product Moment Coefficient of Linear correlation, after the English statistician who invented it. I t is also known as the product-moment coefficient.

For an illustration of the method used to calculate the correlation coefficient, suppose we are given the following pairs of values of X and Y.

**Table 19 : Pairs of Values of X and Y**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | 10 | 14 | 7 | 12 | 5 | 6 |
| Y | 5 | 3 | 5 | 2 | 7 | 8 |

We shall plot these on a scatter diagram so that we can make some quantitative assessment of the type of correlation present (see diagram below). We see from the scatter diagram that some negative correlation appear to be present.

****

**a) Formula**

The formula for Pearson’s product-moment correlation

- Where n is the number of pairs of readings.

- It is a good idea to set out the calculation in tabular form.

**Table 20 : Calculation** **of r**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| x | y |  |  | xy |
| 10 | 5 | 100 | 25 | 50 |
| 14 | 3 | 196 | 9 | 42 |
| 7 | 5 | 49 | 25 | 35 |
| 12 | 2 | 144 | 4 | 24 |
| 5 | 7 | 25 | 49 | 35 |
| 6 | 8 | 36 | 64 | 48 |
| **Σx 54** | **Σy = 30** |  |  | **Σxy = 234** |

n = 6, therefore r is calculated as follows :

= = = - 0.88 to two decimal places

The result (r = -0.88) shows that X and Y are negatively correlated.

**8.5.5 Characteristics of a Correlation Coefficient**

* The + (plus ) sign mean that the relationship is positive. This means that an increase of X goes with an increase of Y. On the other hand, the – (negative) sign mean that the relationship is negative, Thus, an increase of X goes with the decrease of Y.
* The correlation coefficient is always between -1 (negative 1) and +1 (positive 1). If you get a numerical value bigger than 1, then you have made a mistake.
* A correlation of – 1.0 occurs when there is a perfect-negative correlation. That is, all the points lie exactly on a straight line sloping down from left to right.
* A correlation coefficient of 0 (zero) occurs where there is no correlation.
* A correlation coefficient of +1.0 (positive 1) occurs where there is perfect positive correlation. In such a situation all points lie exactly on a straight line sloping upwards from left to right.
* A correlation of between 0 (zero) and + 1.0 indicates that the variables are partly correlated. This means that there is a relationship between the variables but the results have also been affected by other factors.

**8.6 Rank Order Correlation**

Sometimes, instead of having actual measurements, we only have a record of the order in which items are placed. For example, the results of an examination may show only the order of passing, without the actual marks, the highest candidate being number 1, the next highest being number 2 and so on. Data which is such arranged in order of merit or magnitude is said to be ranked.

**8.6.1 Relationship between Ranked Variables**

Consider as an example, the case of eight students who have taken the same two examinations, one in Mathematics and one in French. We have not been told the actual marks obtained in the examination, but we have been given the relative position (the rank) of each student in each subject.

**Table 21 : Table of Ranked Data**

|  |  |  |
| --- | --- | --- |
| **STUDENT** | **RELATIVE POSITION IN FRENCH** | **RELATIVE POSITION IN MATHEMATICS** |
| A | 8 | 6 |
| B | 5 | 5 |
| C | 3 | 4 |
| D | 6 | 7 |
| E | 7 | 8 |
| F | 2 | 1 |
| G | 1 | 3 |
| H | 4 | 2 |

We see from the table of ranks that student F was top in Mathematics but only second in French. Student G was top of the class in French, student E was bottom of the class (rank 8) in Mathematics and so on. Is there any relationship between the students’ performances in the two subjects? The answer to the question will fall into one of the following three categories:

* No correlation. No connection between performance in the Mathematics examination and performance in the French examination.
* Positive Correlation. Students who do well in one of the subjects will, generally do well in the other.
* Negative Correlation. Students who do well in one of the subjects will generally do poorly in the other.

We will start our analysis by drawing the scatter diagram. It doesn’t matter which subject we call X and which one we call Y.

**Scatter Diagram of students’ results in Maths and in French**

**10**

**9**

**8 E**

**7 D**

**6 A**

**5 B**

**4 C**

**3 G**

**2 H**

**1 F**

**0**

**0 1 2 3 4 5 6 7 8**  9 10

The general impression given by the scatter diagram is that there is positive correlation. To find out how strong this correlation is, we calculate the correlation coefficient.

**n = 8**

**Table 22 : Calculation of r**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Rank in French** | **Rank in Mathematics** |  |  |  |
| **Student** | **(x)** | **(y)** | **x²** | **y²** | **xy** |
| A | 8 | 6 | 64 | 36 | 48 |
| B | 5 | 5 | 25 | 25 | 25 |
| C | 3 | 4 | 9 | 16 | 12 |
| D | 6 | 7 | 36 | 49 | 42 |
| E | 7 | 8 | 49 | 64 | 56 |
| F | 2 | 1 | 4 | 1 | 2 |
| G | 1 | 3 | 1 | 9 | 3 |
| H | 4 | 2 | 16 | 4 | 8 |
|  | **36 (Total)** | **36 (Total)** | **204 (Total)** | **204 (Total)** | **I96 (Total)** |

**= 272/336 = 0.81**

**8.6.2 Ranked Correlation Coefficient**

There are several simpler methods of calculating a correlation coefficient. In this unit, we shall look atSpearman’s Rank Correlation Coefficient.

**8.6.2.1 Spearman’s Rank Correlation Coefficient**

This is usually denoted by the letter **rs**. Its formula is

1 -

i.e. (that is),

1 -

In some books you may find R or the Greek letter p used instead of **rs** but you will recognize Spearman’s Coefficient by its formula. I n this formula, d is the difference between the two ranks for any one item, and n is the number of items involved. In the above example, n = 8. You can follow the calculation of **rs** in the following table.

**Table 23 : Calculation of Spearman’s Coefficient**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Student** | **Rank in Maths** | **Rank in French** | **d** | **d²** |
| A | 6 | 8 | -2 | 4 |
| B | 5 | 5 | 0 | 0 |
| C | 4 | 3 | 1 | 1 |
| D | 7 | 6 | 1 | 1 |
| E | 8 | 7 | 1 | 1 |
| F | 1 | 2 | -1 | 1 |
| G | 3 | 1 | 2 | 4 |
| H | 2 | 4 | -2 | 4 |
|  |  |  | **0 (Total)** | **16 (Total)** |

1- = 1- = 1- = 1-

= 1- 0.19 = +0.81

When there is perfect agreement between the ranks of the two variates, then all the values of d will be 0 (zero) and so the rank correlation coefficient will be at +1.0 (positive one point zero). When there is complete disagreement, between the ranks, the values of d will be at their maximum and the rank correlation coefficient is -1. 0 (negative one point zero)

**8.7 Regression Analysis Method**

Regression analysis is concerned with understanding how the relationship of variables vary together. Thus, in **regression** the focus is on measuring how **a dependent variable changes as an independent variable changes.** For instance, is one variable increasing faster than the other? What is the rate of decrease of one variable if the other is increasing? The Linear regression is one way that we can use to quantify this relationship.

Regression line is a straight line that describes a how dependent variable changes with respect to an independent variable. Since in **regression** we measure how **a dependent variable changes as an independent variable changes,** making this distinction is key.

There are several ways of determining the regression line. In this unit we are going to confine ourselves to the mathematical method.

**8.7.1 Mathematical Method**

The equation of the regression line is: **Y = a + bx.** This method is often called the least squares method.

To determine the regression line we first need to find mathematically the values of the constants **a** and **b** in the equation **y = a + bx**, where:

b =

a = - or

n = number of pairs of readings.

We will now apply these formulae to the example we used when talking about the correlation coefficient. The data is reproduced below on **table 24**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| x | 10 | 14 | 7 | 12 | 5 | 6 |
| y | 5 | 3 | 5 | 2 | 7 | 8 |

If you look back at the previous study you will see that we had the following figures.

Σx = 54 Σy = 30 Σx² = 550 Σxy = 234 n = 6

Therefore = 9 and = 5

Applying the formulae we get **:**

b = = =-0.5625

a = 5 = -(-0.5625)9 = 5 +5.0625 = 10.0625

Thus, b and a are termed the regression coefficient (and b also represents the gradient). The equation for the regression line in this case is therefore :

Y = 10.0625 – 0.5625X

To draw the line on the scatter diagram, choose two values of x, one towards the left of the diagram and one towards the right. Calculate y for each of these values of x, plot the two points and join them up with a straight line. If you have done the calculations correctly, the line will pass through the point.

For drawing the regression line, we will choose values of x which are convenient, e.g. x = 0 and x = 16. The corresponding values of y are:

for x = 0, y = 10.0625 – 0 = 10.0625.

for x = 16y, y = 10.0625 – 16(0.5625) = 10.0625 - 9.0 = 1.0625

These two points (€) are marked in the scatter diagram below together with the individual points(x), the regression line (drawn as unbroken line) and the mean point (+).

Y

10

8

6

4

2

**2 4 6 8 10 12 X**

14

16

**Figure A. Regression of y on x and x on y**

The Regression Line which we have drawn, and the equation which we have determined represent the regression of y on x . We could by interchanging x and y, have obtained a regression of x on y. This would produce a different line. This latter line is shown in figure **‘A**’ by a broken line. Then which regression line should be used?

The answer is that always use the regression of y on x, denoting the variable that is being influenced as y (the dependent variable) and the variable that is doing the influencing as the x (independent variable). Then use the method described in detail above, putting y on the vertical axis and x on the horizontal axis.

If you intend to use the regression line to predict one variable from another, then the variable you want to predict is always treated as y, the other variable is x. For example, if you wish to use the regression line or its equation to predict costs from specified outputs, then the outputs will be the x and the cost will be the y. Then y will be the dependent variable and x the independent variable.

**8.7.2 Another Way of Looking at Regression**

In marketing, we are often interested in finding out if there is a relationship between two variables. For example, we may want to find out if there is a relationship between advertising costs and sales? The more a company spends on advertising, the greater the sales it could expect. To investigate this relationship we could take a random sample of companies, and ask the companies to state the amount spent on advertising and the corresponding sales of the product. Suppose we obtained the data from 10 companies as in Table 25.

**Worked Example 1**

**Table: 25.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Sales (1,000)** | **Advertising Costs ($100)** |
| A | 25 | 8 |
| B | 35 | 12 |
| C | 29 | 11 |
| D | 24 | 5 |
| E | 38 | 14 |
| F | 12 | 3 |
| G | 18 | 6 |
| H | 27 | 8 |
| I | 17 | 4 |
| J | 30 | 9 |

The first step is to plot the data in Table 25 on graph paper. The standard procedure is to plot the dependent variable on the Y axis (vertical) and the other variable on the X axis (horizontal). In the data above, the dependent variable is sales. We are assuming that sales depend on advertising. The data is plotted in Fig. B. The resulting graph is called scatter diagram.

**Fig. B : Sales and advertising costs**

**40**

**30**

**20**

**10**

**0 2 4 6 8 10 12 14 16**

The scatter diagram shows that there is a good relationship between sales and advertising costs. As sales increase with increasing advertising, we say there is a positive relationship between the two variables.

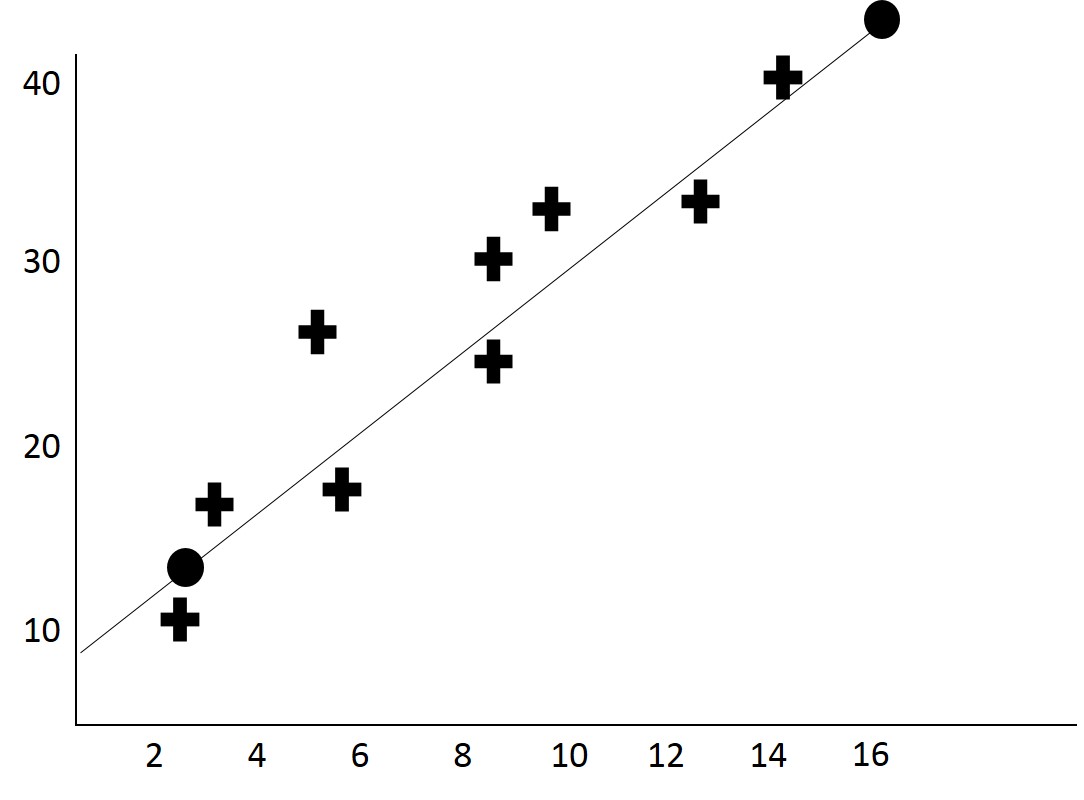
**8.7.2.1 The Regression Line**

The regression line is the line that best fits the data. This can be obtained by simply drawing a line so that the number of points above the line are approximately equal to the number of points below the line. This is called fitting by eye

In Fig.B the regression line has been drawn for the scatter diagram of Worked example 1. The equation of the regression line is : Y =a+bX

Where **a** is the intercept (this is equal to the distance between the points where the regression line cuts the Y axis and the origin) and **b** is the gradient of the regression line.

**Fig. C : Sales and advertising costs**

****

The regression line equation is Y = a+bX is often called the least squares regression line of Y on X. This is because the regression line is that line for which the sum of squared deviations between the observations and the line is the least (i.e. a minimum). It is possible to show mathematically that the values **a** and **b** are given by the following formulae:

b= a = - b

Where n is the number of pairs of observations.

The value b is called the regression coefficient. It shows the change in Y if X changes by one unit. If the regression coefficient is 3, then if the value of X increases by 1 the value of Y increases by 3. The value of b can be positive or negative. If the regression line slopes upwards, b is positive, if the regression line slopes downwards, b is negative.

There are two regression lines, Y on X and X on Y. Usually, the dependent variable is the Y data.

**Worked Example 2**

Using data of worked example 1 (Table 25), find the equation of the regression line of sales on advertising costs.

Use the regression line to forecast sales if advertising costs were $1,000.

Here we are regressing sales on advertising costs, so sales are the Y data and advertising costs are the X data. We have 10 pairs of data so n = 10. We need to find ΣY, ΣX, ΣX ² , and Σ(YX) as in Table 26

**Table 26.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Y** | **X** | **X ²** | **YX** |
| 25 | 8 | 64 | 200 |
| 35 | 12 | 144 | 420 |
| 29 | 11 | 121 | 319 |
| 24 | 5 | 25 | 120 |
| 38 | 14 | 196 | 532 |
| 12 | 3 | 9 | 36 |
| 18 | 6 | 36 | 108 |
| 27 | 8 | 64 | 216 |
| 17 | 4 | 16 | 68 |
| 30 | 9 | 81 | 270 |
| **255 (Total)** | **80 (Total)** | **756 (Total)** | **2,289 (Total)** |

b= =

= = = 2.14655

a = - b= (255÷10) - 2.14655 x (80 ÷ 10)

=25.5 -17.1724 = 8.3276

Y = a+bx Y = 8.33+2.15x

To, forecast sales if advertising costs were $1,000 we put X = 10 in the equation (remember X is measured in 100’s). We find Y = 8.33 +21.5 x 10 = 8.33 + 21.5 – 29.83

As the original data was given to the nearest integer (whole number), the forecast of sales = 30 (or $30,0000).

If you wish to plot the regression line on the scatter diagram you must take two values of X, one the smallest value of X the other the largest, and substitute in the regression equation:

X = 3 Y = 8.33 + 2.15 x 3 = 14.78

X = 14 Y = 8.33 +2.15 x 14 = 38.43

Plot these two points on the scatter diagram, and join by a straight line. (See Fig. B above).

**8.8 Standard Deviation and Variance**

**a) Variance:** The variance and the closely-related Standard Deviation are measures of how spread out a distribution is. In other words, they are measures of variability.

Variance is therefore, an index that indicates the extent to which the values are dispersed.

Were every observation in a data set the same value, the variance would be zero. In other words, if all the scores are identical, the variance will be zero.

Variance increases as values differ significantly from the mean. Thus, the greater the dispersion of scores, the greater is the variance

Standard Deviation and variance are measures of dispersion that are always discussed together in the same section because the standard deviation is the positive square root of the variance. So even if you are asked to find the standard deviation of a set of data, you will have to find the variance first.

Variance is computed as the average squared deviation of each number from its mean. For example, for the numbers 1, 2, and 3, the mean is 2 and the variance is :

**= = 0.667**

The formula (in summation notation) for the variance in a population is :

Where is the mean and N is the number of scores.

When the variance is computed in a sample, the below given formula (where M is the mean of the sample) can be used.

**S²** is a biased estimate of **σ²** however. By far the most common formula for computing variance in a sample is :

Which gives an unbiased estimate of **σ²** Since samples are usually used to estimate parameters, **s²** is the most commonly used measure of variance.

Calculating the variance is an important part of many statistical applications and analyses. It is the first step in calculating the standard deviation.

**b) Definition and calculation of Standard Deviation**

**Standard Deviation:** This is the square root of the variance and is represented by the symbol ***s.*** Standard deviation is the most commonly used measure of spread.

Another definition ofstandard deviation is that it is the positive square root of the mean of the squares of the differences between all the observations and their mean. You will find this definition quite easy to understand when you see it written in symbols.

Let σ (the small Greek letter sigma) be the standard deviation. (You will sometimes find ‘s’ or “sd” used instead.)

The standard deviation formula is very simple. It is the square root of the variance. Given below is the standard deviation formula. It is used to calculate the standard deviation of a set of data:

**Formula (a)**

Where: x =values of the observations

**=** mean of the observations

**n** = number of observations

As the standard deviation **=**

σ²=variance.

**Example 1:**

Using the data of the table below, find the standard deviation of the monthly sales of pencils at Twikatane Store. The data is shown again in the first two columns of table 27.

**Table 26: Monthly sales of pencils at Twikatane Store.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Month** | **Monthly sales in Kwacha** |  |  |
| January | 5.40 | +0.51 | 0.2601 |
| February | 6.80 | +1.91 | 3.6481 |
| March | 7.20 | +2.31 | 5.3361 |
| April | 6.50 | +1.61 | 2.5921 |
| May | 5.20 | +0.31 | 0.0961 |
| June | 4.20 | -0.69 | 0.4761 |
| July | 2.10 | -2.79 | 7.7841 |
| August | 2.80 | -2.09 | 4.3681 |
| September | 3.90 | -0.99 | 0.9801 |
| October | 4.50 | -0.39 | 0.1521 |
| November | 4.80 | -0.09 | 0.0081 |
| December | 5.30 | +0.41 | 0.1681 |
|  |  |  | **25.8692** |

Table 7 shows the calculation of using  **=** K4.89, which we have already calculated and so can assume to be known, and n =12

Then, substituting in the formula gives:

σ=

Variance =

By expanding the expression  we can rewrite the formula in the following useful way:

**Formula (b)**

The choice of the formula to use depends on the information that you already have and the information that you are asked to give.in any calculation you should keep the arithmetic as simple as possible and the rounding errors as small as possible.

* If you already know and it is a small integer, there is no reason why you should not use formula (a).
* If you already know but it is not an integer, as in example1, then formula (b) is the best to use.

When you are given the data in the form of a simple or grouped frequency distribution then the alternative formulae for calculating the standard deviation are:

**Formula (c)**, like formula (a), is derived directly from the definition of **σ.**

**Formula (d)** is obtained by using a sigma notation as in formula (b) and this is the one to use in calculations.

**=**

**Example 2:**

Using the data of table 7, find the standard deviation of the heights of employees.

Column five is added so that we have all the sums required in formula (d).

So from the table:

n =Σf = 80; Σfx = 14,070.0; ΣFx2 = 2,478,750

**Table 28 : Heights of employees in cm**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Height (cm)** | **Midpoint (x)** | **Frequency (f)** | **fx** | **fx2** |
| 160 ─ under 165 | 162.5 | 7 | 1, 137.5 | 184, 843.75 |
| 165 – under 170 | 167.5 | 11 | 1, 842.5 | 308, 618.75 |
| 170 – under 175 | 172.5 | 17 | 2, 932.5 | 505, 856.25 |
| 175 – under 180 | 177.5 | 20 | 3, 550.0 | 630, 125.00 |
| 180 – under 185 | 182.5 | 16 | 2, 920.0 | 532, 900.00 |
| 185 – under 190 | 187.5 | 09 | 1, 687.5 | 316, 406.25 |
|  |  | **Total = 80** | **Total = 14, 070.0** | **Total = 2,478,750.00** |

Then:

= 7.24

**8.9 Summary**

In this unit, we have looked at inferential analysis of data. We have covered several topics including cross-tabulation of data, correlation analysis, regression analysis, and standard deviation and variance. I hope you found this unit to be educative and of high quality standard and that it was able to meet your expectations.

**8.10 Activity**

1. With relevant examples discus the rank order correlation

**UNIT 9 ANALYSIS AND INTERPRETATION OF QUANNTITATIVE DATA : SIGNIFICANCE TESTS**

**9.1 Introduction**

In this unit, we are going to look at various significance tests. Tests of significance are employed when we want to know about the significance of our findings, that is, about the extent to which the findings of the study reflect or are consistent with what happens in the target population.

The tests include the Chi-Square Analysis, significance test for a single mean, and significance test for two means. We are also going to discuss significance tests for a single proportions, and for two proportions. We shall conclude the unit with some activities which you will be required to attempt.

**9.2 Learning Outcomes**

By the end of this unit, you should be able to:

* Conduct tests for a single mean and for two means.
* Conduct tests for a single proportion and for double proportions.
* Discuss the application of a Chi-Square.

**9.3 Time Frame**

Three hours (3 hours)

**9.4 Significance Test For a Single Mean**

**9.4.1 Procedure in Conducting a Significant Test**

There are five steps to follow. Everything begins by setting out a null hypothesis. By definition, a hypothesis is an assumption about the status of events or about relations between variables. It is a tentative explanation of the research problem, a possible outcome of the research, or an educated guess about that outcome.

In classical tests of significance, two kinds of hypotheses are used. The null hypotheses is used for testing. It is a statement that no difference exists between the parameter and statistic being compared to it. Researchers usually test to determine as to whether there has been no change or whether a real difference exists.

A second one is known as the alternative hypotheses. It holds that there has been a change.

The following are **the steps for conducting a significant test.**

**1)** **Set out a null hypothesis** and alternative hypothesis. If you are testing for an increase, for instance, this would mean:

Null hypothesis **μ =μ0**

Alternative Hypothesis **μ > μ0**

**2) State the level of significance** for the test and give the corresponding significant point. In examination questions you are often told the level of significance: 1% or 5% are the most common. If you are not told, use the 5% level. If you are using the one tailed or two tailed test, for the 1% or 5%, this would mean using the following corresponding information in the table given below:

|  |  |  |
| --- | --- | --- |
| **Significance Level** | **Two Tailed** | **One Tailed** |
| **5%** | **1.96** | **1.64** |
| **1%** | **2.58** | **2.33** |
| **0.2%** | **3.09** | **2.88** |

**3)** **Calculate z** using the formula below:

Z=

= sample mean

μ0 = the hypothesized population mean

**S =** sample standard deviation

**n =** sample size

**4) Compare the calculated value of z** with the value stated in step 2. If the numerical value of z is less than this value, state ‘not significant and accept the null hypothesis. If the value of z is greater than this value, state ‘significant at (say) 5% level’, and reject the null hypothesis. If the value of z is also greater than (say) the 0.2% level, you could point this out.

**5)** **Conclusion**. In the question you were asked (say), ‘Has the new packaging improved sales?’ If the result is significant state: ‘There is evidence that the new packaging has improved sales.’ If the result is not significant, state: ‘There is no evidence that the new packaging has improved sales.’

**a) Worked Example**

A Company is proposing to introduce a new system of production bonuses with the aim of improving productivity. Last year, the average production per man per day was 1,020. Before introducing the bonuses throughout the company, it is decided that the new bonus must be tested on a random sample of 60 employees. The mean production per day for the sample was found to be 1,050 with the standard deviation of 120. Is there any evidence that the bonus scheme has improved productivity?

= 1,050, µ 1,020, s = 120, n = 60

Null hypothesis µ₀ = 1,020

Alternative hypothesis µ µ

(For this type of question, the one tailed test is appropriate. This is so because the question asked for improved productivity.)

One tailed test 5% point: 1.64

Z= = = =1.94

z = 1.94 is greater than 5% point 1.64; therefore the result is significant.

**9.5 Significance Test for Two Means**

The procedure is similar to the procedure for that of a single mean. If the two sample means are 1 and**2,** based on samples of sizes **n**1 and **n2** respectively, the population means are **μ1** and **μ2** and the standard deviations are **σ1** and **σ2**, it is possible to show that the difference between the two sample means, i.e. -**2**  is normally distributed with a mean μ1 - μ2 and standard error.

The formula for the calculation of z is:

Z=

Where **s1** and **s2** are sample estimates of **σ1 and σ2.**

**b) Worked Example**

A survey based on a simple random was conducted to examine the income of women manual workers in the Eastern and Western Regions of Zambia. The survey showed that in the East, the sample involved 256 women, the mean weekly income was K72.58 with a standard deviation of K15.20. For the West, the corresponding figures were 170 women, K68.90, and K13.40 respectively. Is there any evidence at the 1% significance level of a difference between the income levels in the two regions?

= 72.58, 68.90, n₁=256, n₂=170, s₁=15.20, s₂=13.40

Null hypothesis

Alternative hypothesis

(The question asked the ‘difference’, thus a two-tailed is appropriate**)**

Two-tailed test 1% point: 2.58

Z = = = = 2.63

Z = 2.63. This is greater than 1% point 2.58, therefore, reject null hypothesis. There is evidence of a significant difference at the 1% level of income in the two regions.

**9.6 Significance Test of a Single Proportion**

The procedure is very similar to that of a single mean. We use the fact that for large samples *p* the sample proportion is normally distributed. The hypotheses consider πo, rather than μo**.** The formula for the calculation of z is:

Z=

**c) Worked Example**

Last year15% of companies increased their staff. A survey of 1,000 companies showed that this year 20% of companies have taken on more staff. Is there any evidence that companies have recruited more staff?

p = 0.2, πo = 0.15, n = 1,000

Null hypothesis 𝜋 = 𝜋₀ 𝜋 = 0.15

Alternative hypothesis 𝜋 𝜋

(The question asked ‘more’, thus a one-tailed test should be used)

One-tailed test 5% point: 1.64

Z= = = =4.43

Z = 4.43 is greater than 5% point 1.64, therefore the result is significant. Reject null hypothesis, z is also greater than 0.2% point 2.88.

We conclude that there is very good evidence that more companies are taking on staff this year. Very good because the result was significant at 0.2% and it was therefore very unlikely that the difference was due to the sample being unrepresentative.

**9.7 Significance Test of Two Proportions**

The procedure is similar to that of testing a single proportion. If the two sample proportions are p1 and p2, based on samples of size n1 and n2 respectively, and the population proportions areπ1 and π2,it is possible to show that the difference between the sample proportions, i.e. P1-P2, is normally distributed with mean π1 - π2 and standard error given by the following formula:

where p =

Note that some textbooks a different formula is given:

**The formula for z is :**

where p =

**d) Worked Example**

A company manufactures a component using an existing machine. It needs to expand production and buys a second-hand machine. To test the effectiveness of the additional machine, random samples are taken from the output of both machines and the number of defects produced is noted. The results for the old machine were: sample size 150, number of defectives 18, the corresponding results for the additional machine were 125, 20. Is there any difference between the two machines?

n₁= 150, p₁ = = 0.12, n₂ = 125, p₂ = = 0.16

Null hypothesis 𝜋₁=𝜋₂

Alternative hypothesis 𝜋

(The question asked ‘difference’, thus two-tailed test)

Two-tailed test 5% point: 1.96

where p =

p= = 0.1382

z = = = -0.96

We take the numerical value of z = 0.96

Z = 0.96 is less than 5% point 1.96; therefore accept null hypothesis.

There is no evidence of a difference between the two machines.

**9.8 Chi-Square Analysis**

The Chi-Square statistic) is used to test the statistical significance of the observed association in a cross-tabulation. It assists us in determining whether a systematic association exists between the two variables. The null hypothesis, **H0**, is that there is no association between the variables. The test is conducted by computing the cell frequencies that would be expected if no association were present between the variables, given the existing row and column totals.

These expected cell frequencies, denoted, **fe**, are then compared to the actual observed frequencies**, fo**, found in the cross-tabulation to calculate the chi-square statistic. The greater the discrepancies between the expected and the actual frequencies, the larger the value of the statistic.

Assume that a cross tabulation has **r** rows and **c** columns and a random sample of **n** observations. Then the expected frequency for each cell can be calculated by using the following formula:

Where :

nr = total number in the row

nc = total number in the column

n = total sample size

**Example**

For the table below, the expected frequencies for the cells, going from left to right and from top to bottom, are:

= 7.50 = 7.50

= 7.50 = 7.50

Then the value of is calculated as follows:

For the data in our table below, the value of is calculated as:

+ + +

= 0.833 +0.833 + 0.833 + 0.833 + 0.833 = 3.333

**TABLE OF SEX AND INTERNET USAGE**

|  |  |  |  |
| --- | --- | --- | --- |
| **Internet Usage** | **Male** | **Female** | **Row Total** |
| Light (1) | 5 | 10 | **15** |
| Heavy (2) | 10 | 5 | **15** |
| Column Total | **15** | **15** |  |

To determine whether a systematic association exists, the probability of obtaining a value of chi-square as large or larger than the one calculated from the cross tabulation is estimated. An important characteristic of the chi-square statistic is the number of degrees of freedom (df) associated with it.

In general, the number of degrees of freedom is equal to the number of observations less the number of constraints needed to calculate a statistical term.

In the case of a Chi-Square statistic associated with cross-tabulation, the number of degrees of freedom is equal to the product of the number of rows ® less one and the number of columns (c) less one. That is **df = (x-1) x (c-1).**

The null hypothesis (Ho) of no association between the two variables will be rejected only when the calculated value of the test statistic is greater than the critical value of the Chi-Square distribution with the appropriate degrees of freedom.

Table 3 in the statistical Appendix (at the end of the module) contains upper-tail areas of the Chi-Square distribution.

To illustrate for 1 degree of freedom, the value of an upper tail area of 0.05 is 3.841. This indicates that for 1 degree of freedom the probability of exceeding a Chi-Square value of 3.841 is 0.05. In other words at the 0.05 level of significance with 1 degree of freedom, the critical value of the Chi-Square statistic is 3.841

For the cross tabulation given in our table for internet users, there are (2-1) x (2-1) =1 degree of freedom. The calculated Chi-Square statistic had a value of 3.333. Because this is less than the critical value of 3.841, the null hypothesis of no association cannot be rejected, indicating that the association is not statistically significant at the 0.05 level.

Note that the lack of significance is mainly due to the small sample size (30). If instead the sample size were 300 and each entry of our Internet Usage Table was multiplied by 10, it can be seen that the value of the Chi-Square statistic would be multiplied by 10 and would be 33.33, which is significant at the 0.05 level.

**9.8.1 When to Use and not to Use a Chi-Square**

* The Chi-Square statistic should be estimated only on counts of data. When the data are in percentage form, they should first be converted to absolute counts or numbers.
* Chi-Square analysis should not be done (conducted) when the expected or theoretical frequencies in any of the cells is less than five.
* If the number of observations in any cell is less than 10, or the table has two rows and two columns, Chi-Square analysis should not be done.

**9.8. 2 CALCULATNG THE DEGREES OF FREEDOM**

**a) What is a Degree of Freedom (DF)**

Degrees of freedom of an estimate is the number of independent pieces of information that went into calculating the estimates. It is not the same as the number of items in the sample.

In order to get the Degree of Freedom for the estimate, you have to subtract 1 (one) from the number of items. Let us say you were finding the mean weight loss for a low-carbon diet. You could use 4 (four) people, giving you 3 (three) degrees of freedom (4-1 =3), or you could use 100 people which will give you 99 Degree of Freedom.

In mathematical terms, the Degree of Freedom will be calculated as **n - 1**. Where ‘**n’**  is the number of items.

**b) Why do we Subtract 1 from the number or items**

Another way to look at degrees of freedom is that they are the number of values that are free to vary in a data set. What does free to vary mean. Here is an example using the mean (the average).

For example, pick a set of numbers that have a mean (average) of 10. Some sets of numbers you might pick are,

(a) 9,10, 11.

(c) 5, 10, 15.

Once you have chosen the first two numbers in the set, the third number is fixed. In other words, you cannot choose the third item in the set. The only numbers that are free to vary are the first two. You can choose or pick 9 + 10, or 5 + 15, but once you have made that decision, you must choose a particular number that will give you the mean that you are looking fo. So, degrees of freedom for a set of three numbers is two.

For example, if you wanted to find a confidence interval for a sample, degrees of freedom is n-1. ‘N’ can also be the number of classes or categories.

**C) Degrees of Freedom for Two Samples**

If you have two samples and want to find a parameter, like the mean, you have **two** **‘N’s** to consider (sample 1 and sample 2). The Degrees of Freedom in that case is from the two samples and the formula is : **(N1 + N2) – 2.**

**d) Degrees of Freedom in the Analysis of Variance (ANOVA)**

In ANOVA, the drees of freedom becomes a little more complicated. Instead of a simple parameter (like finding a mean), ANOVA tests involve comparing known means in a set of data. For example, in One Way ANOVA you are comparing two means in to cells. The Grand Mean (the average of the averages) would be :

Mean1 + mean 2 = Grand mean.

What if you choose mean 1 and you knew the Grand Mean? You wouldn’t have a choice about mean 2, so your degrees of freedom for a two group ANOVA is 1(one). Thus :

**Two Group ANOVA DF1 = n -1**

It is actually a little complicated because there are two degrees of freedom in ANOVA, namely DF1 and DF2. The explanation above is for DF1.

As for DF2 in ANOVA, it is can be defined as the total number of observations in all cells minus the degrees of freedom lost because the cell means are set. Thus the formula for the two-group ANOVA is:

DF2 = n - k

The K in this formula is the number of cell means or groups or conditions. For example, let us say you had 200 observations and 4 (four) cell means. The degrees of freedom in this case would be DF2 = 200-4 = 196.

For a thee group ANOVA, you can vary two means so the degrees of freedom is 2

**9.9 Summary**

In this unit, we have looked at various significant tests as part of trying to understand our data analysis and interpretation.

The main focus was on significant tests for means and proportions and on the Chi-Square . I hope this unit was able to meet your expectations.

**9.10 Activity**

1. Discuss Chi-Square Analysis as a measure of significance

**UNIT 10 : RESEARCH REPORT PREPARATION AND PRESENTATION**

**10.1 Introduction**

In this section we focus on the last two aspects of marketing research process: report preparation and presentation.

One of the important aspects of any research project is to assist managers in decision making process and lot depends on how the researcher communicates the findings of the research project to the managers.

If the results of the research are not effectively communicated to the manager, the decision making process may not be as sound as expected. An effective research report can overcome this challenge.

This section therefore, will focus on how to write a research report which can be easily understood by manager as well as can help in decision making process as desired. We shall focus on the issue of content, format, layout and style.

**10.2 Learning Outcomes**

By the end of this lesson, you should be able to:

* Define marketing research
* Design a marketing research
* Explain research formats and styles
* Make a report presentation

**10.3 Time Frame**

Two Hours (2 hours)

**10.4 What Is a Research Report**

**A research report is** a written document or an oral presentation that is based on a written document that communicates the purpose, scope, objectives, hypotheses, methodology, findings, limitations and finally, recommendations of a research project to others. The researcher has to convince the client [and others who may read the report] that the research findings can be acted on for their own benefit.

A research report should contain descriptions on methodology, results obtained, and recommendations made. The basic orientation of a research report depends on its audience. Before writing the report the researcher must know his or her audience. He or she may have to make assumptions about the composition, background and interests of the target readers.

**10.5 Importance of a Marketing Research Report**

A marketing research report is the bridge between the researcher and the manager with regard to the research findings. If the research results are not effectively communicated using the research report to the manager, the research project may not be a success. This is because the research results will not help in achieving the major aim of any research project, which is to support the decision making process.

Research report is a tangible output of the research project and not only helps in decision making but also provides documentary evidence and serves as a historical record of the project. Many a times, managers are only involved in looking at the research report (i.e. oral presentation and written report) and therefore most times the research project is judged by the quality of the research report. This has direct association with the relationship between the researcher and manager. All of the above reasons suggest the importance of marketing research report.

**10.6 Report Formats and Styles**

No universally accepted standard format or style for research writing. Different researchers may prepare their reports differently. The personality, background, expertise, and responsibility of the researcher and those of the decision maker for whom the report is written interact to give each report a unique character. Report formats are likely to vary with the nature of the project itself. However, the research report closely resembles the steps of the marketing research process. Below are two different but closely related research formats:

**10.6.1 Basic Contents of a Marketing Research Report : Example A**

**Title Page**

1. Title

2. Client (optional)

3. Research company (optional)

4. Date

**Table of Contents**

1. Section title and subheadings with page numbers

2. Table of tables: title and pages

3. Table of figures: titles and pages

4. Appendices and titles and pages.

**Management or Executive Summary**

1. Statement of objectives

2. Statement of major findings

3. Statement of conclusions and recommendations

**Introduction**

1. Background to the research undertaken

2. People involved in the research, their positions and roles

3. Acknowledgements

**Analysis and Findings**

1. Analytical Approach adopted.

2. Tables and figures.

3. Explanatory text

**Conclusion and recommendations**

**Research Methodology**

1. Type of study

2. Purpose of study

3. Definition of population of interest

4. Sampling Design and method.

5. Data collection method adopted and justification for the method.

6. Questionnaire or other data collection instruments (description and explanation).

**Limitations**

1. Sample Size

2. Sample Selection

3. Error

**Appendices**

1. Questionnaire

2. Technical

3. Other

**10.6.2 Contents af a Generic Marketing Research Report: Example B**

A professional marketing research report must focus on several issues including (a) effective communication of findings to the manager; (b) provide sound and logical recommendation on the basis of the findings; and (c) develop report in a manner that it serves for future reference.

As the client needs, research problem definition, research objectives and methods vary for each situation, every marketing research report is unique in its own sense. However, many parts of the basic format of any marketing research report remains generic.

The Following provides the format for a generic marketing research report. 1. Title page, 2. Table of contents, 3. Executive summary: a. Research objectives. b. Brief discussion on methodology, c. Major findings, d. Conclusion and Recommendations

4. Introduction: a. Problem definition 5. Research design: a. Type of design used, b. Data collection, c. Scaling techniques, d. Questionnaire development and pilot testing, e. Sampling, f. Fieldwork, 6. Data analysis and findings: a. Analysis of techniques employed, b. Results, 7. Conclusion and recommendation, 8. Limitations and future directions, 9. Appendices: a. Questionnaire and forms, b. Statistical output.

As one can observe, the above stated format closely resembles with the marketing research process itself. In the discussion below we will focus on each of the above stated generic parts of a marketing research report.

**Title page**

The title page indicates the subject of the report, information regarding researcher and his/her associations and the name of the recipient, along with organizational details. The title should reflect the nature and objective of the project succinctly. Report preparation and presentation

**Table of contents**

The table of contents should list the topics covered with appropriate page numbers. In most reports, only major headings and subheadings are included. It is also common to provide list of tables and figures after the table of contents.

**Executive summary**

The executive summary is a very important part of the overall report. Many consider it the soul of the report and it has been observed that at times executives only read the summary of the report and decide on the quality of the report as well as sometimes take decisions only on the basis of the summary. The executive summary therefore is a brief and meticulously prepared part of the overall report.

The executive summary should focus on: (a) why and how the research was carried out; (b) what was found; and (c) what can be interpreted and acted upon by the manager. Therefore, in most reports executive summary contains research objectives, brief description of methodology employed, major findings, conclusions and recommendations.

**Introduction**

The introduction provides background information necessary for a clear understanding of the report. It may include definition of terms, relevant background details for the project (sometimes using secondary data analysis), and scope of the research. Furthermore, it also provides detailed explanation of the research problem and research objectives. After reading the introduction, the reader should know precisely as to what is the research about, why was it conducted, and what gap the research addresses which was not addressed previously.

**Research design**

The research design section of a report focuses on details relating to how the research was conducted. It focuses specifically on what type of research design was used with clear justifications. Furthermore, it explains both secondary and primary data collection processes. It describes how were the measurement scales developed and provide information on their validity and reliability. It further informs the reader about the development of the questionnaire and the pilot testing. It discusses what changes or tweaks were performed and why.

This section also describes in details the sampling process including sample population definition, sample size, sample type, and the sampling technique. It further describes the fieldwork procedures employed.

**Data analysis and findings**

In this section the researcher should describe the structure of data analysis and various techniques employed to achieve the objectives of analysis without using much technical details and jargons. Many times researchers do get carried away in explaining this in too much technicality. This can make the reader disengaged with the report as they might not be able to grasp what is being said. It is always good to provide the reader with some details regarding why a specific analysis technique was used and how the results can be interpreted.

**Report preparation and presentation**

The sophisticated analysis related data should be provided in appendices for the reader to look at if they are interested in it. The presentation of findings should directly be correlated with the research problem. It is important to use graphs and tables as they help reader understand the details much easily in most cases. However, unnecessary use of figures and tables should also be avoided.

**Conclusion and recommendation**

This section is derived out of the findings section and so closely correlates with the analysis and findings section. Conclusions can be considered broad generalizations that focus on answering questions related to the research objectives. They are succinct in nature and provide the reader with a clear interpretation of what the findings convey. Recommendations on the other hand, are generated by critical thinking and are associated with the ability of researcher to suggest the future solutions for the problem. The researcher should use each conclusion derived from the research and critically analyze it before suggesting any recommendations. Recommendations should focus on how the manager can use them to generate competitive advantage.

**Limitations and future directions**

Most scientific research projects follow a rigorous research approach; however several limitations at times are unavoidable. Common limitations associated with marketing research include sampling bias, time and cost constraints, measurement errors, and so on. As every study is unique in its own way, there are study specific limitations also.

Researcher should clearly state the limitations of the project in the report. This also provides an opportunity to the researcher for reflection on the project and how future projects can be improved without the specific limitations relating to the project at hand.

**Appendices**

The appendices section should include the other relevant details which might be helpful to the reader. The questionnaire form and sophisticated technical analysis should be added in this section also. Cross-referencing should be done within the report so that the reader can find this information easily.

**10.7 Things to Remember Before Reporting the Results**

Key issues to remember before communicating the results of the project to the manager, the researcher should keep several issues in mind for effective communication.

The first and foremost rule for writing the report is to empathize. The researcher must keep in mind that the manager who is going to read and utilize the findings of the research project might not be as technically knowledgeable with statistical techniques or at times with the methodology.

Furthermore, the manager will be more interested in knowing how results can be used for decision making rather than how they have been derived. Therefore, the jargons and technical terms should be kept at minimum. If the jargons cannot be avoided, then researcher should provide a brief explanation for the manager to understand it.

The second rule researcher should keep in mind is related to the structure of the report. The report should be logically structured and easy to follow. The manager should easily be able to grasp the inherent linkages and connections within the report. The write up should be succinct and to the point.

A clear and uniform pattern should be employed. One of the best ways to check whether the structure of the report is sound or not, the report should be critically looked at by some of the research team members.

Furthermore, the researcher must make sure that the scientific rigour and objectivity is not lost when presenting the research project findings. At times, because of the heavy involvement of researcher in the overall research process, it is possible that there is a loss of objectivity. Therefore, researcher should keep a tab on the aspects of objectivity of the overall report. Many times managers do not like to see the results which oppose their judgmental beliefs however the researcher must have the courage to present the findings without any slant to conform to the expectations and beliefs of the managers.

A professionally developed report is always well received as it makes the important first impression in manager’s mind. It is therefore, very important for the researcher to focus on the presentation of the report.

The other important aspect is the use of figures, graphs and tables. The use of figures, graphs and tables can help in interpretations as well as greatly enhance the look and feel of the report which in turn can augment the reader engagement. If the report is prepared keeping in mind the above stated key issues, the overall credibility of the research report as well as of the researcher can be greatly enhanced

**10.8 Report Presentation**

The presentation has become an integral part of most marketing research projects. Most managers are finding it hard to read the entire report and so prefer the researcher to present the report in an **oral presentation**.

Furthermore, the presentation provides an opportunity for the research and management team to interact with the issues of concern and in that way it becomes an important exercise.

For any presentation, the most important aspect is preparation. Researcher should first develop an outline of the presentation keeping the audience in mind.

Once the outline is developed, the researcher should focus on the content management and decide as to what is relevant and important and what is not. Use of various audio-visual aids as well as other materials such as chalkboards or flipcharts should be planned out in advance. While audio-visual presentation adds to the overall engagement, chalkboards and flipcharts provide flexibility in presentation.

Researchers must remember that the research was conducted for assistance in decision making and was not a statistical exercise. Therefore, the focus of the presentation should be on how the research can help managers in making a better informed decision.

**Conclusion**

As discussed in this unit, the prime objective of any marketing research report is to communicate in an effective manner, the results of the research, so the manager can take informed decisions. Marketing research report provides the communication bridge between the researcher and the manager and that is why it is an important aspect of the overall research process.

It is very important for the researcher to remember that the report is being prepared for the manager and therefore researcher must empathize with the manager in the writing process.

The report must be logically structured and easy to follow. The objectivity of the research is also a supreme concern and researcher should oppose inclusion of any judgement beliefs which cannot be supported.

The researcher should make sure that the report is well written and looks professional.

The generic marketing research project follows a format which includes title page, table of contents, executive summary, introduction, research design, data analysis and findings, conclusion and recommendations, limitations and future directions, and appendices.

Each component of the report has its own importance and should therefore be carefully prepared. Researcher must make sure that they do not over or under emphasize the relevant issues.

It is easy to get carried away when developing research project report. The researcher must focus on managers’ needs and should make sure that the report consistently adheres to it.

The same rules apply when preparing report presentation which also has become an integral part of any research project

**10.8.1 Oral Report Presentation Styles**

Generally, an oral presentation supplements the written report. Oral Presentation Should be carefully prepared keeping the audience in mind. Carefully selected visual aids such as graphs, tables, charts, maps etc. help the presentation. However, too many visual aids, particularly statistical tables, could often be boring and may not serve any purpose. During oral presentation, people may seek clarification. The speaker must be patient. He or she should be natural, establish eye contact with the audience, and interact with them. Body language and descriptive gestures are also quite useful.

### 1. Visual Style

**This style leans on the use of** slides to complement the presenter’s talking points. With this style, the speaker needs to work a little harder to get his audience engaged. He or she should be a strong public speaker, visionary, and a storyteller. This style is helpful when speaking to a large audience with broad interests.

### 2. Freeform Style

This impromptu style of presenting doesn’t require slides. Instead, the speaker relies on strong stories to illustrate each point. This style works best for those who have a short presentation time and are extremely familiar with their talking points.

### 3. Instructor Style

This presentation style allows you to deliver complex messages using figures of speech, metaphors, and lots of content -- just like your teachers and professors of old. Your decks should be built in logical order to aid your presentation, and you should use high-impact visuals to support your ideas and keep the audience engaged.

### 4. Coach Style

### This style relies heavily on role playing. Energetic and charismatic speakers gravitate towards this style of presenting. It allows them to connect and engage with their audience using role play and listener interaction. The presenter should use this presentation style when you’re speaking at a conference or presenting to an audience who needs to be put at ease.

### For example, this style would work well if you were speaking to a group of executives who need to be sold on the idea of what your company does rather than the details of how you do it.

### 5. Storytelling Style

In this style, the speaker relies on anecdotes and examples to connect with their audience. Stories bring your learning points to life. Let your emotions out and tell your story in an honest way.

This style is great for conference speaking, networking events, and sales presentations where you have adequate time to tell your stories without taking minutes away from questions.

### 6. Connector Style

In this style, presenters connect with their audience by showing how they’re similar to their listeners. Connectors usually enjoy a question and answer approach, and use gestures when they speak. They also highly encourage audience reaction and feedback to what they’re saying.

This type of speaking sets your listener at ease, elicits feedback on how you’re doing in real time, and is more of a dialogue than a one-sided presentation.

### 7. Lessig Style

The Lessig Style was created by Lawrence Lessig, a professor of law and leadership at Harvard Law School. This presentation style requires the presenter to pass through each slide within 15 seconds. When text is used in a slide, it’s typically synchronized with the presenter’s spoken words.This method of presentation is great for large crowds -- and it allows the speaker to use a balance of text and image to convey their message. The rapid pace and rhythm of the slide progression keeps audiences focused, engaged, and less likely to snooze.

### 8. Takahashi Style

This method features large, bold text on minimal slides. It was devised by Masayoshi Takahashi, who found himself creating slides without access to a presentation design tool or PowerPoint. The main word is the focal point of the slide, and phrases, used sparingly, are short and concise. This style works well for short presentations that pack a memorable punch.

Whether you’re speaking on a conference stage or giving a sales presentation, you can find a method that works best for you and your audience. With the right style, you’ll capture attention, engage listeners, and effectively share your message.

**10.9 Summary**

In this unit we have looked at reports and how to prepare and present them. We also considered the report formats. As a student, understanding this unit will help you to make effective reports. I hope you have been able to grasp the main ideas behind this unit.

**10.10 Activity**

1. Discuss the basic contents of a marketing research report.

**UNIT 11 : MARKETING PLANNING**

**11.1 Introduction**

Welcome to unit 11 of this module. In this unit we are going to look at the purpose of marketing planning, the role of a marketer in planning, stages of marketing planning process, content and structure of a marketing plan. We will conclude this unit by giving some activities to attempt.

**11.2 Learning Outcomes**

By the end of tis unit, you should be able to:

* Explain the purpose of marketing planning.
* Discuss the role of a marketer in planning
* Describe the stages of marketing planning.
* Explain the content and structure of a marketing plan

**11.3 Time Frame**

Two hours (2 hours)

**11.4 Purpose of Marketing Planning**

The purpose of marketing planning include the following:

* **Budgeting:** A good marketing plan will enable the organization to budget its resources.
* **Consistency:** The pan will provide a consistent set of instructions that fits with the overall corporate plan and with the aims of the department involved.
* **Responsibility:** The plan will help to indicate to people exactly what their responsibilities are for carrying out the plan.
* **Communication:** A marketing plan enables people to understand why they are doing things. They will understand how their role fits into the entire organization.
* **Commitment:** A good plan should help to create commitment to its implementation.
* **Competitive Advantage:** Marketing planning will help an organization to respond to competition better. It helps to create a sustainable competitive advantage.
* **Market Review:** Planning will help an organization to review its external and internal markets and what derives them.
* **Objectives:** It helps in setting objectives in the context of what an organization is trying to achieve.
* **Corporate Culture:** the plan will create a corporate culture that emphasizes cooperation, learning, and common ownership of outcomes.

**11.5 Role of a Marketer in Planning**

* Coordinating the planning process.
* Leading other members of the organization.
* Developing the marketing plan.
* Carrying out marketing audits.
* Developing marketing objectives.
* Developing marketing strategies.
* Bringing the resources together to deliver value in the market.
* Determining the most appropriate ways of fulfilling the needs and wants of customers.
* Determining how the objectives will be reached.

**11.6 Stages of the Marketing Planning Process**

* **a) Analysis:** The marketing audit is the key tool for assessing where the company is now. The planner needs to assess the current situation. Identify where the organization is currently so that the way forward can be planned. Asses the internal and external environment. Carry out a SWOT analysis to identify your strength, weaknesses, opportunities, and threats. Segment your market correctly. Target the most appropriate segments. Take an overview of how you are going to position your organization and its products in the target customer’ perceptions.
* **b) Planning:** Set the marketing objectives, put the plan together, and come up with the details of how all the different aspects are to be accomplished. Come up with the strategic marketing plan, Tactical marketing plan, and the marketing budget.
* A **strategic marketing plan** is about where the organization is heading and how it is going to get there, which customers are going to be provided with which products, and decisions about where the company wants to position itself.
* The **tactical plan** is the way in which the company will develop a mix of marketing activities (variables) in order to approach the specified segments. This plan should differentiate the firm from its competitors.
* With the tactical plan formulated, formulated, planners are in position to determine the **budget**. This may be determined by the senior management (the finance director) or it may be calculated by the planners and then sent to the finance director for approval.
* **C) Implementation:** Each member of the organization needs to know exactly how they are expected to contribute. Determine the responsibilities. Set time scales. Identify appropriate structures, systems and processes. Support the activities with your financial resources as indicated in your budget.
* **d) Control:** Put in place suitable feedback systems to enable you as a planner to adjust activities to bring the firm back on course. Take actions to bring the plan back on track. Re-evaluate some of the specific outcomes in the plan in the light of changing circumstances (this could involve setting or lowering targets depending on performance so far).

**11.7 Content and Structure of a Marketing Plan**

The tangible outcome of the planning process is the marketing plan, which can take different forms in different organizations and circumstances, but broadly includes the following:

* overview of current position and organizational context
* Organization mission and objectives
* External environmental analysis, including market and industry analysis
* Internal environmental analysis
* Gap analysis and identification of marketing opportunities.
* Setting of marketing objectives.
* Strategy formulation, including segmentation, targeting and positioning.
* Marketing programs providing a detailed specification of the extended marketing mix.
* Implementation, monitoring and control.

**Executive Summary**

* Background and context of current position of organization
* Identification of key strategic planning issues

**Organizational Strategy**

* Organizational mission and objectives
* Summary of overall position and organizational strategy

**External and Internal Marketing Audit**

* Customer analysis, including identification of environmental drivers.
* Industry, competitor and intermediary analysis.
* Market trends and projections.
* Internal analysis of resources and capabilities.
* SWOT analysis

**Marketing Objectives**

* Specification of marketing Objectives
* Financial and non-financial objectives

**Marketing Strategy**

* Market segmentation analysis
* Competitive advantage
* Alternative strategy specification and selection of target markets.
* Marketing program positioning:

- Product

- Price

- Promotion

- Place

- Physical evidence.

- People

- Process

* **Implementation and Control**
* Timing of activities
* Responsibilities and structure
* Marketing Resourcing budgets
* Monitoring Process
* Control mechanisms
* **Appendix**
* Main planning assumptions
* Projected financial and non-financial outcome forecasts

**11.8 Summary**

In this unit we have looked at the various aspects of planning, covering key areas that includes the purpose of marketing planning, the role of a marketer in planning, the stages of marketing planning process, and the content and structure of a marketing plan. I hope you found this unit valuable to your understanding of marketing planning.

**11.9 Activities**

1. Explain the purpose of marketing planning.

2. Outline the content and structure of a marketing plan.

**UNIT 12 : MARKETING PLANS AND OBJECTIVES**

**12.1 Introduction**

Welcome to unit 12 of this module. In this unit we shall discuss marketing plans and objectives. Our major focus will be on corporate objectives and on drivers of marketing planning. We shall conclude the unit by asking you to attempt all the activities posed at the end of the lesson.

**12.2 Learning Outcomes**

By the end of this unit, you should be able to:

* Discuss corporate objectives.
* Discuss the drivers of marketing planning.

**12.3 Time Frame**

Two hours (2 hours)

**12.4 Corporate Objectives**

a). Profitability

Profit making for the firm is the major objectivity.

**b). Growth**

Growth of sales turnover or assets is the main objectives.

**c). Shareholder Value**

Increasing share holder value is one of the marketing objectives. Shareholder value depend on three factors. These are; i) dividends, ii) a rise in the value of the shares, and iii) cash payments in respect of assets sold. Shareholders will invest if they believe that the company will provide them with better returns. This will mean receiving dividends. It will also mean gaining more capital as the shares rise in value,

**d). Customer Satisfaction.**

Customer satisfaction is a very important objective for achieving any other objective. Companies must focus on satisfying customer needs. This is so because, customer satisfaction promotes customer loyalty, retention and increased revenues. It also helps in Winning new customers, and in winning back those customers who had gone away. However, customer satisfaction should not ignore profitability. Instead, there should always be a trade-off between the needs of shareholders, employees and managers on one hand and those of customers on the other.

**12.5**  **Drivers Of Marketing Planning**

Contemporary marketing planning has some major factors operating in the external environment that have become key drivers of change. Marketers now need to incorporate these influences into their strategic and operational decisions as they have become very important in terms of their impacts on the way the customers make buying decisions and how competition takes place in the markets. This suggests that marketing plans should be built around wider external forces that shape consumer and competitive behavior in the market

The following external influences may be considered to drive change and hence marketing planning:

* **Socio-cultural.** This factor includes culture, fashion in thought, attitudes, social class issues, and consumer behavior, which is constantly evolving as a consequence of wider influences. In addition there has been major demographic change throughout the world, leading to an aging population in many countries, and significant changes in migration patterns. Social mobility resulting from mass education has also become an important factor in affecting consumer attitudes, expectations and behavior.
* **Technological.** This factor includes new technology, engineering breakthroughs, availability of specific technologies, and shifts in processes brought about by new ways of doing things. Of major significance has been the growth in the use of new information, computing and communications technologies, by both consumers and organizations. The subsequent effects on buying behavior and the production and supply of goods and services have been revolutionary.
* **Economic.** This includes he general state of the national economy, the wealth and income of the company’s customers, economic recession, and economic barriers such as tariffs or availability of foreign currency. The economic recession can affect savings and availability of credit. This in turn affects the consumers’ capacity to purchase and businesses’ ability to invest.
* **Political.** The political climate of a country can change dramatically according to which political party is in power. Some political parties are more pro-business generally, and are prepared to help business organizations both through legislation and through direct help. Others are not pro-business and can make things difficult for business organizations.
* **Globalization.** Globalization in the recent decades has meant that organizations have to deal with consumer who do not fit neatly into the country segments but into transnational customer groups that cut across the boundaries of nations or even regions throughout the world. At the same time organizations have to develop their production, supply chain and distribution models to take account of global economics and shift the way they have traditionally operated by using new business models such as outsourcing.

**Corporate Social Responsibility.** This is another important factor in influencing marketing behavior and planning. Organizations are now only expected to act in the best interest of customers and at the same time to be socially responsible in the way that their business impacts on employees, the wider community and the environment.

**Competition.** Competitive behavior also impact strongly on organizations. A new competitor entering the market, or a more aggressive stance taken by an existing competitor, can make a significant impact on the company’s chances of success

All in all, changes in the external environment have an enormous part to play in determining the way the organizations go about planning their marketing effort, and the significance of some of the key drivers in shaping strategy and plans cannot be understated.

**Factors in the Internal Environment**. Alternatively organizations can be viewed from an internal perspective. The internal factors include corporate culture, mission, resources and capabilities.

For instance a resource based marketing approach will try to generate a marketing plan that will focus on developing a good fit between the needs of the market and the ability of the organization to produce benefits for them. Resources may include the following:

* **Technical Resources**: Technical skill is a key resource for many organizations because it enables the company to develop new products and process as the market’s needs change.
* **Financial Standing**: the degree to which the company has ace to working capital will determine its ability to respond to opportunities. Equally the credit standing of the organization will be a key factor in securing supplies. Marketers within the organization will always have to ask for a budget in order to carry out any activities.
* **Managerial Skills**. Top-flight, experienced managers can direct and motivate staff to create the maximum use from physical resources such as buildings, equipment and vehicles.
* **Organization**. Organizational structure makes a significant difference to the effectiveness of the organization. The traditional pyramid or hierarchical structure of organizations is extremely effective in markets where change is slow: the mechanistic approach enables organizations to gain maximum efficiency through division of labour. In more volatile market conditions, where change is rapid and unpredictable, a matrix organization is probably better since it can respond more flexibly to changes.
* **Information Systems**. Having accurate, up-to-date information to hand create a strong competitive advantage itself. For example, the barcode readers in supermarkets provide instant information on which products are selling well, allowing the supermarket to ensure that stocks are held at the optimum level.

**12 . 6 Summary**

In this unit we have discussed corporate objectives and drivers of marketing planning under the general wider concept of marketing plans and objectives.

**12 . 7 Activities**

1. Discuss the drivers of marketing planning.

2. Explain corporate objectives.

**UNIT 13 MARKETING PLANNING IN CONTEXT**

**13.1 Introduction**

Welcome to unit 13 of this module. In this unit we are going to discuss the implementation of marketing plans. We are also going to look at adapting marketing planning to context. We are going to conclude the unit by asking you to attempt some activities.

**13.2 Learning Outcomes**

By the end of this unit, you should be able to:

* Describe the implementation of marketing plans.
* Explain the adapting of marketing planning to context

**13.3 Time Frame**

Two hours (2 hours)

**13.4 Implementation of the Marketing Plans**

Once you are confident you have a thorough, comprehensive marketing plan for your business, you can take steps to implement the actions outlined in the plan.

Your marketing is more likely to succeed if you have adequate resources and expertise to implement it.

**a) Set the Right Expectation**

It is important to remember that marketing is not a quick fix. It takes some time before you start seeing the return on your marketing efforts. Because marketing success takes time, it is important to make sure your company leadership and team understands that setting those expectations upfront will help everyone understand.

**b) Build the Team and Secure Resources**

It is important to think through who you will need to help with this effort. Sometimes that will include employees at your company, such as members of your marketing department, sales team, or customer service department. Other times that means bringing in an outsourced marketing partner to help you..

Either way make sure you know who needs to be on your team to implement the effort.

Also look at what other resources you need. Are there tools, materials or education that you need to get started. Get those resources in place too.

**c) Communicate with Your Staff**

Once you have built your marketing team, be sure to communicate the marketing strategy to your team and help them understand the goals. Make sure each member of your marketing team understands the role they plan in implementation effort and how they will contribute to your success.

The more you involve your marketing staff in your marketing plan, the more they will invest in it. Your team needs to have total confidence in the information and actions outlined in its marketing plan.

Communicate the plan to your team as much as possible, and make sure they have an opportunity to contribute to it. In particular :

* Make sure they understand how the marketing plan fits with your business goals, objectives, priorities and policies.
* Discuss whether your staff have the skills and aptitude to implement your marketing plan
* Give them opportunity to develop their marketing skills and mentor your staff if they are enthusiastic.
* Consider whether you need to recruit additional marketing staff.

In addition to communicating the plan to your core team, you should also give the rest of your company an overview of your efforts. This will create excitement about your efforts and make the entire organization feel they are part of what is happening.

**d) Build out Timeline and Tasks**

Include a detailed project timeline. Take each project and break it up into smaller tasks and deadlines to make the effort manageable to your team.

**e) Build up a Dashboard for Tracking Success**

You can’t manage what you can’t measure. It is important to set up the proper tracking tools to measure your efforts. Your measurement dashboard should be a template that you can easily update with key metrics.

What gets measured will be different for every company based on your goals and marketing strategy. However, make sure to tie your metrics to the overall business objectives for your marketing efforts.

For instance if your company wants to increase revenue by 25 percent this year, make you’re your efforts are tracking the number of leads and sales generated from your efforts.

You should also track the key performance indicators.

**f) Know Your End Goals**

Don’t lose sight of your unique selling proposition. It is what sets you apart from your competition, and helps keep your marketing focused and effective.

**g) Monitor Your Progress**

You should treat your marketing plan as a living document that you continually revise. Revisit your marketing plan at least once in a quarter. Develop a set of questions that help the review process such as:

- Are you on target?

- Have your tactics been too ambitious?

- Is your budget on track?

- Are any of your tactics not working on your customers?

**h) Make Adjustments**

Make adjustments to your marketing plan whenever they are necessary. Stay aware of changes in technology, market competition, customers, suppliers and any other external factors.

**i) Develop Contingency Plans**

Recognize that not all of your plans will work. Marketing is a creative process that grows and changes. You may need to develop contingency plans, extend your time frames, add a new step into your actions, or refine your marketing objectives.

**j) Seek Expert Advice**

Developing and measuring marketing activities is a specialist field. It is a good idea to seek advice from professional marketing consultants if you are concerned that you do not have enough skills or experience. The Zambia Institute of Marketing provides resources, training and advice on marketing practice and standards.

**k) Communicate the Results**

Let your team know that your marketing efforts are working. Reward your team when you hit certain benchmarks and goals.

Even when things are not working, ensure that you share that information. It will give your team the opportunity to share feedback and generate new ideas.

**13.5**  **Adapting Marketing Planning to Context**

Marketing planning does not happen in a vacuum. The planning process and outcomes will be affected by the context in which they occur. This section will examine some of the contexts in which planning happens and will also discuss some of the issues which arise for planners.

1. **Business Planning in business-to-business markets**

Business-to-business markets differ from business-to-consumer markets in the following ways:

* There are relatively fewer customers.
* Order values are much bigger.
* Business buyers are buying on behalf of an organization, not for their own use.
* Business may not consume the products themselves. They may simply sell them on.

Business-to- business markets tend to be less volatile, and it is easier to develop long term relationships, so planning is easier in many ways.

Planning in business-to-business markets is therefore likely to be much more detailed and careful (since there are fewer customers, it is dangerous to lose even one) and is likely to focus on establishing long-term relationships. Salespeople and key-account managers become much more important in this context.

1. **Non-profit Marketing**

Not all marketing activities take place in a profit context. Instead, marketing also takes place within a non-profit context. Charitable organizations spend large sums on advertising in order to persuade people to donate or to change their behavior in ways which fulfil the aims of the organization.

Non-profit marketing falls into two main categories. These are charitable donations and cause related marketing. Charities may simply be seeking donations to fund their work, or may be seeking to change public attitudes concerning an issue.

In non-profit marketing, it may be difficult to define what the exchange is, in other words, what the contributors to the charities gain from their donation. The exchange is not always made in financial terms.

In case of charities, the donors obtain a sense of having done the right thing by giving. In case of contributions from businesses, socially responsible behaviour on part of the corporation boosts sales.

Charities frequently use volunteers, whose needs must be met. They give up their time in order to help the charity and need to feel compensated in some way.

From a planning viewpoint, a large number of stakeholders involved in non-profit scenario creates a series of conflicts in trying to balance the needs of many different people, all with different agendas. This is especially difficult when a charity uses volunteer workers, who (since they are unpaid) feel that they can come and go as they please, and not necessarily put a great deal of effort into what they are doing. Charities therefore have little control over their internal environment. They however, have a moral high ground when it comes to dealing with outside organizations such government officials and the news media.

1. **Services Marketing**

Much marketing theory has been developed around the marketing of physical products, but in fact the majority of day-to-day marketing is concerned with services.

Service products have the following characteristics:

* **Intangibility:** the product cannot be touched, which means that it is difficult to evaluate in advance of purchase.
* **Inseparability of production and consumption :** in most cases, the production of a service and its consumption happen at the same time.
* **Variability :** Because services are produced on an individual basis, they are often variable in nature. As such, they are difficult to standardize.
* **Perishability :** Services cannot be stockpiled for later use.

From a planning perspective, services marketing usually involves a large input from employees. In effect, since time is extremely perishable, planning needs to consider the loading element of demand. Demand will need to be managed in some way. Low-cost airlines do this by having flexible pricing. The aim is for every aircraft to take off full, even if some passengers have paid only a low fare, because even a small amount of money is better than nothing at all. Other service businesses have discounts for students or senior citizens during quite times or promote in other ways.

1. **Planning in Small and Medium Enterprises**

Small businesses have specific problems and advantages in terms of planning. In most cases, small firms have few resources to devote to the level of research and planning time that a full blown marketing would require. Nevertheless, small firms are often run by a single entrepreneur or a small team of partners who are able to respond rapidly to changes in the market.

For most small firms, a business plan is simply something that a bank manager requires if the firm needs to borrow money. The plan is unlikely to be followed rigidly.

Small firms are likely to be profit maximizing and emergent, and therefore their strategy will evolve rather than planned. This does not mean that they have no strategy. It simply means that the strategy changes from time to time as circumstances dictate.

This is so because the environment is too unpredictable for long-range planning to have any reasonable chance of success. From the evolutionary approach, it is the market, not the managers that make important choices.

**13.6 Summary**

In this unit we have discussed marketing planning in context. Our focus was mainly on the implementation of the marketing plans and on how to adapt marketing planning to context. I hope the unit was able to meet your expectations and that it was educative enough.

**13.7 Activity**

1. Describe the steps involved in the implementation of the marketing plans.