Creativity and Innovation

Waste Management – Research and Innovation

First Edition

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Contents

About the Book

Research is a scientific and systematic   search for knowledge. According to Cambridge dictionary, research is 'a detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding.' It is considered as a voyage of discovery. Research is a multi-stage process commencing with defining the problem, formulating hypothesis, collecting, organizing and evaluating data, making deductions, reaching conclusions and testing the conclusions.   It thus contributes to the existing knowledge and helps in advancement of knowledge.

The main objective of research is to discover answers to questions through the application of scientific procedures. The research may aim to get acquainted with a phenomenon or to gain insights into it or to study the characteristics of a particular individual, situation or a group or to identify a causal relationship between variables. The main types of research are Descriptive Research, Analytical Research, Applied Research, Fundamental Research, Quantitative Research, Qualitative Research, Conceptual Research, Empirical Research and Historical Research. Two major approaches to research are qualitative approach and quantitative approach.

Today, the role of research in applied economics, especially business has increased. The business firms and the government have turned their focus into research to find solutions to their complex operational problems. Research facilitates the decisions of the policy maker. In business and industry, operational research, market research and motivational research assist in taking business decisions. For a social scientist, research helps in studying social relationships and to find answers to various social problems.

Research methodology is a way to systematically solve the research problem. It is important for the researcher to know the methodology to design his research.

This book will also provide introduction to creativity and innovation management in business organization set up. The essence of creativity is to bring out new business ideas in terms of products, service and processes. Innovation management transforms the idea into a business level implementation that benefit improved market share, sustain customer satisfaction or gain competitive advantage. This Block will discuss about the creativity and innovation management, New product development, the process of divergent-convergent and creativity for business.

The idea about content development on Consumer Behavior actually sprouted from the end of Mahatma Gandhi National Council of Rural Education (MGNCRE), MHRD. The authors have put their heart and soul in the creation of this module. The task was more challenging because integration of waste management was made a part of it.

In recent times, there have been phenomenal changes in the service sector, e- commerce and most importantly in the transformation of rural consumers towards the urban side. The formidable challenge before the marketer and budding marketer (student) is to deeply integrate the nuances of buyer behavior with environment friendly interventions and waste management. This book is an attempt to encompass all aspects of consumer behavior and touch upon it with a feel for waste management.

The model questions included in the chapters facilitate the readers to develop analytical skills by putting the subject knowledge into action via its neat buttressing with waste management.

The language of the book has been kept simple and lucid and well substantiated via diagrams, figures and flowcharts to facilitate learning. I hope the reader enjoys her / his journey through the book and gets motivated enough to put the learning into practice!

Acknowledgement

Block 1
Research Methods in Rural Management

Contents

Chapter 1Introduction to Research Methods

Introduction

The unique characteristic of human mind is the curiosity to know about the universe. Seeking answers to questions and finding solutions to the problems have been the basis of human progress. A systematic search for an answer to a question or a solution to a problem is called research. Research is generally referred to as search for knowledge. It is an art of scientific investigation. Oxford Advanced Learner's Dictionary defines 'research' as "careful study of a subject, especially in order to discover new facts or information about it." In the field of management, research is defined as a systematic inquiry aimed at providing information to solve managerial problems. Thus, research contributes to the existing quantum of knowledge and helps in advancement of knowledge.

Objectives

At the end of the chapter, the students will be able to:
- ➢ Understand the concept, nature, scope and objectives of research.
- ➢ Comprehend the types of research.
- ➢ Differentiate different research designs.
- ➢ Understand the processes involved in a research.
- ➢ Gain confidence in sequencing various steps for undertaking research.
- ➢ To explain various research designs available for research.

Structure

1.1	• Nature, Scope and Objectives of Research
1.2	• Types of Research
1.3	• Research Process
1.4	• Understanding the Language of Research
1.5	• Research Design

Figure 1.1 Chapter Flow

1.1 Nature, Scope and Objectives of Research

Definition of Research

Research may be defined as the application of scientific method in the study of problems.

- In the *Encyclopedia of Social Sciences*, D Slazenger and M Stephenson (1930) defined research as "the manipulation of things, concepts or symbols for the purpose of generalizing to extend, correct or verify knowledge, whether that knowledge aids in the construction of theory or in the practice of an art."
- Redman and Mary (1923) defined research as a "systematized effort to gain new knowledge."
- According to Black and Champion (1976), "scientific research consists of obtaining information through empirical observation that can be used for systematic development of logically related propositions attempting to establish casual relations among variables".

Research is an investigative process of finding reliable solution to a problem through a systematic selection, collection, analysis and interpretation of data relating to the problem. In other words, research is all activities that make us discover new knowledge about things around us. Merriam-Webster dictionary defines research as studious inquiry or examination especially investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.

It was believed that research provides the foundation of professional status. Research always facilitates effective management. Research is a process of identifying problem thoroughly, establishing an objective, collecting and analyzing the relevant data in order to determine the possible factors causing the problem. Thus, research activities are consistent search for information with the objective to get a clearer picture concerning the problem and to propose specific recommendation for the solution. Research is purposeful investigation. It provides a structure for decision making. There are three parts involved in any investigation: (1) the implicit question posed, (2) the explicit answer proposed and (3) collection, analysis, and interpretation of the information leading from the question to the answer. This third part is the defense that justifies the recommendation and is viewed as research. Through research, an executive can quickly get a synopsis of the current scenario which improves his information base for making sound decisions affecting future operations of the enterprise.

Role of Research

An organization's future rests on making right decisions which affect its future operations. Research provides a summary of the current scenario which facilitates an organization/executive to make sound decisions. The following are the major areas in which research plays a key role in making effective decisions:

Marketing - involves the process of systematic collection, compilation, analysis, and interpretation of relevant data for marketing decisions.

Major marketing studies include demand forecasting, consumer buying behaviour, measuring advertising effectiveness, media selection, test marketing, product positioning, and new product potential.

Production - Research facilitates decisions on production, quality control and setting up optimum inventory level.

Banking - Banking institutions gather information for their internal operations and for studying the economic conditions of business through research.

Materials – Materials department uses data for making policies of their purchase.

Human Resource Development – Research is the best resource for manpower planning.

Government - Research lays the foundation for all government policies in our economic system which includes budget, economic planning etc.

Figure 1.2. Major Areas of Research

Nature and Scope of Research

Nature of Research

Research is considered as a systematic process of analyzing a problem, identifying the variables involved in the phenomenon, collecting and analyzing data on such variables to find answers to certain crucial questions. Thus, research is a formal, systematic process of carrying on the scientific method of analysis. Hence any research should possess characteristics like objectivity, precision, design and verifiability.

Objectivity

Research is beyond the subjective bias of the researcher. Objectivity is achieved through standardization of research instruments, choosing appropriate research design and tools and ensuring dependability of data.

Precision

Research uses a technical language, to convey the exact meaning to the reader, e.g., validity, reliability, random sampling, etc. Precise language describes the study accurately so that the study may be replicated, or the results correctly used.

Design

Research should have a systematic design so that it can be replicated for verification.

Verifiability

Research design and findings are presented to the professional community for other researchers to analyses, confirm or reject them. The results of a study are confirmed only through further investigation or replication of studies.

Scope of Research

Scope of research can be explained mainly at three levels:

Figure 1.3. Scope of Research

- **Organizational Level**: Research is conducted to improve Human Resource Management, Finance, and Production etc.
- **Marketing Level:** Research helps in improving quality of the product, to develop new pricing strategies and new methods of advertising and promotion of products etc.
- **Environmental Level:** Research is initiated to adapt to new technological innovations, to know the dynamism of socio-cultural, economic, political and legal environment. Research is also done to develop new products and services.

Need of Research

Research always facilitates effective management. Today most of the organizations rely on research for their decision-making process. Research is used to identify various problems and the opportunities in the market. Communication strategies play a vital role today. Research helps in adopting effective communication strategies for capturing the market. Research also facilitates the introduction of new products, policies, programs etc. into the market. Success of management depends heavily on apt management decisions and research plays a vital role in helping mangers to take relevant and up-to- date managerial decisions. Management needs up-to-date information on consumers, market, latest trends, technological changes, consumer needs etc. Access to this information is gained through systematic research. Effectiveness of advertising is also determined

through research strategies.

Research in management helps in the following ways:
- Research provides valuable data – this data is useful for decision making, it also improves the quality of decisions made.
- It studies consumer behavior – it provides opinions of consumers. This helps in designing new policies and products.
- It helps an organization to evaluate its performance – it provides information about consumer's reaction towards new policies and products. It also evaluates the sales promotion techniques, effectiveness of advertising etc.
- Management decisions based on good research can minimize risks and pay dividends.
- Research helps to measure progress of any organization by creating benchmarks.
- It plays a vital role for any business to stay competitive in the market.
- For identifying right employees with right skills and attitudes, human resource personnel rely on research.

Any organization with an objective to grow relies on research for its manifold activities. Research is important due to the following reasons:

Importance of Research
•It is a tool for building knowledge and facilitate learning •It helps to promote public awareness •It helps to understand various issues and aid to achieve success •It facilitates to seize opportunities available at the right time
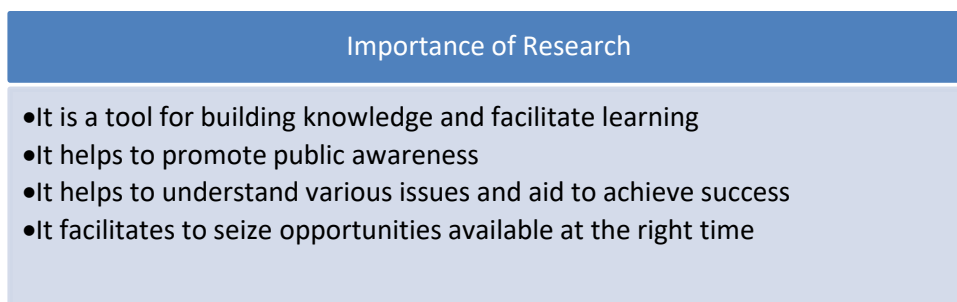
Figure 1.4. Importance of Research

Objectives of Research

The main aim of research is to find out the truth that is hidden and has not been discovered yet. A systematic approach is essential in good research. Each step must be so planned that it leads to the next step. In order to get the right solution for a problem, clearly defined objectives are essential. Clearly defined objectives guide the researcher in the right direction. Though each research has its own specific purposes, Kothari C R (2004) has identified the main objectives of research as follows:
- To gain familiarity with a phenomenon or to achieve new insights into it (i.e., exploratory or formulative research studies)
- To portray accurately the characteristics of an individual, situation or a group (i.e., descriptive research studies)
- To determine the frequency with which something occurs (i.e., diagnostic research studies)
- To test a hypothesis of a causal relationship between variables (i.e., hypothesis-testing research studies)

Managerial Value of Rural Research

The managerial value of research is that it provides information that facilitates decision making and thus reduces uncertainty. It also helps in devising strategies to achieve organizational goals. Socio-economic factors play a key role in the economic and social development in rural areas. Innovative

projects in rural areas are part of global processes involved in the economic and social development. Rural development depends on several factors viz., organization, knowledge, geographical and environmental considerations, social capital, organizational structure etc.

The agents necessary for implementation and development of innovative projects in rural areas are given in the following figure 1.5. Scientific and technical support provided by research centres greatly support rural development. This substantiates the value and importance of research for rural development.
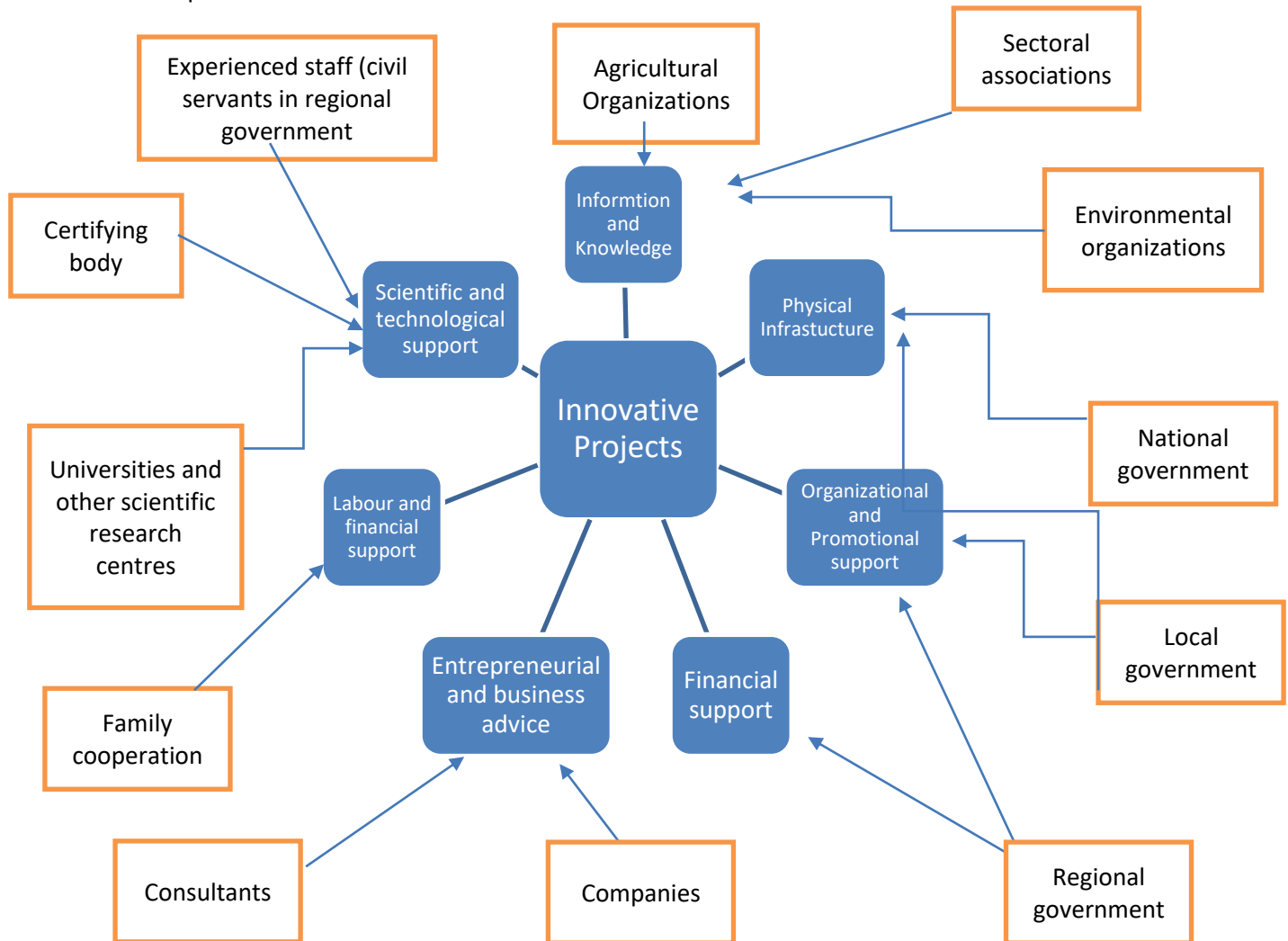
Figure 1.5. Main Actors and their Contributions to the Development of Innovative Projects
(Source: www.redgtd.org/CENTRODOC/BD_ARCHIVOS/Esparcia_Innovations&Networks_2014.pdf)

1.2. Types of Research

Before undertaking the research, the researcher should have a clear understanding of the topic of research. The selection of the topic depends on various factors. To make research scientific, alternative types of research are available for the researcher to choose from. The researcher can combine with advantage several types of research in one's inquiry. Therefore, before designing the research we should know about different types of research.
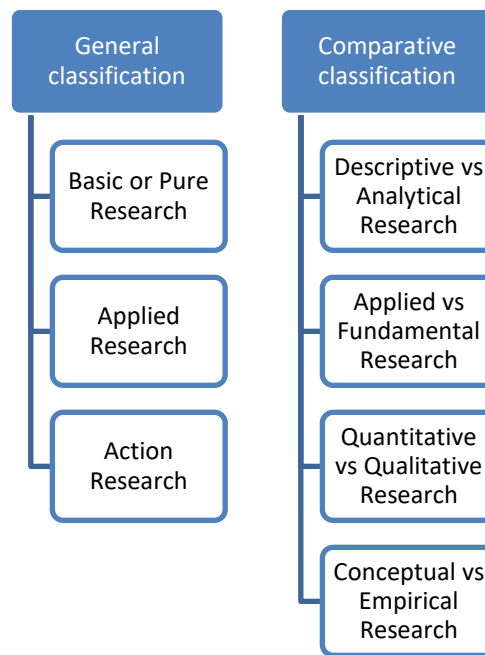
Figure 1.6. Types of Research

Basic or Pure Research and Applied Research

Basic Researchas pure or fundamental research deals with the principles or laws or fundamental rules. It aims at achieving knowledge for its own sake. It pertains to the quest for knowledge about a phenomenon without concern for its practical use. Pure research lays the foundation for applied research. Using pure research, we can develop a theory concerning the functioning of the group mind or group dynamics. Pure research can also be used to reject or support existing theories about social phenomena. Sociologists have generally carried out pure research in order to discover laws governing social phenomena.

Applied Research is concerned with applying the rules and principles to solve social/management problems. It is thus problem oriented and action directed. There is vast scope for applied research in the fields of technology, management, commerce, economics and other social sciences. In management, applied research is undertaken to solve various management problems. Researchers in the field of Waste Management try to find out why waste is generated, how it is generated to a hazardous level, how can we tackle the situation to save our environment. Those who study the nature of waste, its composition and structure are doing pure research whereas when they study the methods to reduce the waste or prevention of waste at source, they are doing applied research.

Action Research

Kurt Lewin first coined the term 'Action Research' in 1944. He described action research as "a comparative research on the conditions and effects of various forms of social action and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action". Action research is done by practitioners to improve their own conditions and to take action in their areas of work. Here, research is joined with action. It is an action program launched for solving a problem or for improving an existing situation. Social welfare programs, research for improving the qualities of life in factories etc., are some examples of action research program.

Characteristics of Action Research
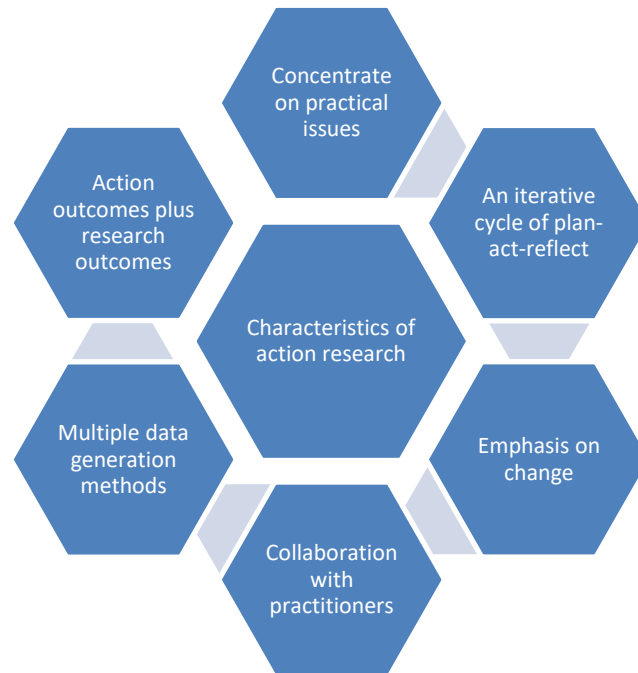
Figure 1.7. Characteristics of Action Research
(Source: https://www.medien.ifi.lmu.de/lehre/ss14/swal/presentations/topic5-fritzsche_just-ActionResearch.pdf)

Action Research can be done by a single person or a group of colleagues sharing a common concern. It is a seven-step process:

- **Selecting a Problem**– selection is based on a reflection of work/issues faced in the management system where there is a felt need for investigation to improve the situation.
- **Clarifying Theories**– identify the existing theories and strategies which work best to solve the problem.
- **Identifying Research Questions**– once the problem has been selected, generate meaningful research questions to guide the inquiry.
- **Collecting Data**– reliable and valid data are collected for analysis. In order to maintain reliability and validity of data, multiple independent sources should be used for data collection.
- **Analyzing Data**– data is carefully analyzed to answer the research questions. This may result in producing grounded theory regarding what might be done to improve the situation.
- **Reporting Results**– reporting of results occur during seminars or meetings with colleagues. Sharing the results contribute to a collective knowledge which is the most rewarding aspects of this work.
- **Taking Informed Action**– taking informed action is where the practitioners are involved in the action planning process.

Descriptive and Analytical Research

The main purpose of descriptive research is to describe the state of affairs of a situation as such. Descriptive research describes a social situation, social systems, etc. For example, study of environment pollution may include questions like the factors that contribute to the environment pollution, the nature of environment pollution, causes and effects of environment pollution, source

of environment pollution etc. In social science and business research, the term *Ex post facto research* is used for descriptive studies. The main characteristic of this type of research is that researchers have no control over the variables; they can report only what has happened or is happening. Descriptive research uses survey method for their studies. It describes accurately and precisely a wide variety of the characteristics of the population in general as well as the population of different regions and communities.

In analytical research, the researcher has to use facts or information already available and analyses them to make a critical evaluation of the material. A social analyst assumes that behind the collected data there is something more important and revealing than the facts and figures. It is assumed that when these collected facts and figures are related to other variables present in the entire body of data, it may reveal a significant general meaning, from which one can draw a valid generalization. The first step in analytical research is a critical examination of the assembled materials, keeping steadily in mind the purpose of the study and its possible bearing on scientific discovery. One of the tasks in the analysis of data is the establishment of a cause-and-effect relationship. It is vital to look for the whole range of causal factors which generally play a significant role in bringing about a complex social situation.

Quantitative and Qualitative Research

Quantitative Research is defined as the systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical or computational techniques. Quantitative research is based on the measurement of quantity or amount. It is applicable to phenomena that can be expressed in terms of quantity. The results of quantitative research are interpreted objectively. Generally quantitative market research is done using a survey,questionnaire, online polls, web-intercept surveys etc. Surveys can include interviews, which can be carried out using several different methodologies including face-to-face, telephone, online or computer assisted interviews. After data collection, the analysis of data requires systematic tools and processes like independent sample t-tests, correlated t-tests, variance calculations, and regression analysis etc.

An example of Quantitative Research is the survey conducted to understand the amount of waste generated in a mall or a function hall. A survey can be administered to the visitors and floor managers to ask questions like how much waste is generated per day, the types of wastes generated, the frequency of visitors, time or seasons where maximum waste is generated, customers' preferences, their awareness etc. Quantitative research templates are objective, elaborate and are investigational in nature. The results achieved from this research method are logical, statistical and unbiased. Data collection is done using a structured method and conducted on larger samples which represent the entire population. This type of research can be conducted with a specific target audience group and across multiple groups along with comparative analysis. A prerequisite for this type of research is that random sampling method should be used for objectivity.

Qualitative Research is concerned with qualitative phenomenon. This method is not only about "what" people think but also "why" they think so. Qualitative research methods allow for in-depth questioning of respondents based on their responses and the researcher tries to understand their motivation and feelings. Qualitative research methods are designed in such a manner that they reveal the behaviour and perception of a target audience with reference to a topic. The results of qualitative methods are more descriptive, and the inferences can be drawn quite easily from the

data that is obtained.

For Example, to study the reasons for human behaviour (i.e., why people think or do certain things), we use 'Motivational Research'. This is an important qualitative research which aims at discovering the underlying motives and desires of people, using in-depth interviews for the purpose. Attitude or opinion research, i.e., research designed to find out how people feel or what they think about a subject is also qualitative research. Qualitative research is especially important in the behavioural sciences where the aim is to discover the underlying motives of human behaviour.
Different types of qualitative research methods include case study, content analysis, focus groups, ethnographic research, in-depth interview etc.

Case Study: Case study is an intensive study of a particular case. A case may be a person, a group of persons such as family or gang, a class of persons such as bureaucrats or professors, an ecological unit such as neighbourhood or community, a cultural unit such as fashion or institution.

Example for a Case Study: Solid waste management on dumping ground in Mumbai region – A study by M.P. Joshi, S.B. Patil, K. Mourya. International Journal of Computer Applications (0975 – 8887), International conference on Green Computing and Technology, 2013.

> **To Do Activity**
> Form groups and undertake case studies on the causes, effects and solutions of garbage pollution.

Content Analysis Content analysis is a method of social research that aims at the analysis of the content, qualitative and quantitative- of documents, books, newspapers, magazines and other forms of written material

Focus Groups A focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards a product, service, concept, advertisement, idea, or packaging. Questions are asked in an interactive group setting where participants are free to talk with other group members. Focus groups allow interviewers to study people in a more natural setting than a one-to-one interview.

Ethnographic Research is the most in-depth observational method that studies people in their naturally occurring environment. In this method the researchers adapt to the target audiences' environments which could be an organization, a city or any remote location. This research aims to understand the cultures, challenges, motivations, and settings of the subjects of study.

In-Depth Interviews In-depth interview is one of the most common qualitative research methods where a personal interview is carried out with one respondent at a time. This method provides a great opportunity to gather precise data about what people believe and what their motivations are. It can be performed face-to-face or on phone.

Conceptual and Empirical Research
Conceptual Research is related to some abstract ideas or theory. It focuses on the concept or theory that explains or describes the phenomenon being studied. It is conducted by observing and analyzing

already present information on a given topic. Conceptual research framework constitutes a researcher's combination of previous researches and associated work and explains the occurring phenomenon. It is generally used by philosophers and thinkers to develop new concepts or to reinterpret existing ones.

Empirical Research is research that is based on evidence drawn from observation or experience. The evidence is based on data that can be quantitative or qualitative. It is a data-based research coming up with conclusions which are capable of being verified by observation or experiment. This is also known as experimental research. In this type of research, the researcher must first make a working hypothesis and then works to get enough data to prove or disprove his hypothesis. He then set up experimental designs to manipulate the materials concerned to bring forth the desired information. The experimenter has control over the variables under study and can manipulate one of the variables to study its effects. Evidence gathered through empirical studies is considered as the most powerful support for a given hypothesis.

1.3. Research Process
Research process is illustrated in the following diagram.
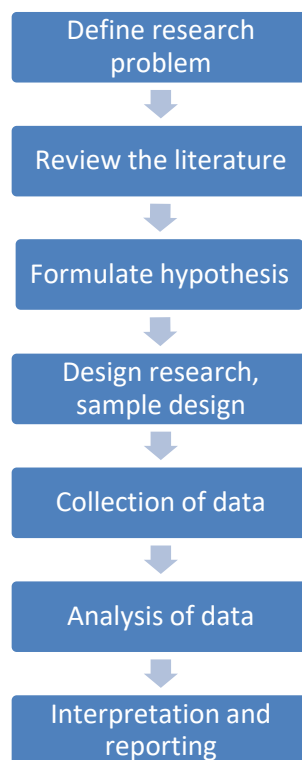
Fig 1.8. Research Process

A brief description of the research process is given below (Kothari, CR, 2004).

- **Formulating the Research Problem:** The foremost step in the research process is to select and properly define the research problem. Initially the problem may be stated in a broad general way and later a specific problem is formulated. The researcher should understand the problem thoroughly and then rephrase it in meaningful terms from an analytical point of view, i.e., put the problem in as specific terms as possible. The problem to be investigated

must be defined unambiguously. The statement of objectives is of vital importance because it determines the data to be collected, relations to be explored, the choice of techniques to be used in these explorations and the form of the final report.

- **Review of Literature:** Once the problem is formulated, a brief summary of it should be written down. This is accomplished only by an extensive literature survey connected with the problem. A researcher may use academic journals, conference proceedings, government reports, books etc. depending on the nature of the problem. In this process one source will lead to another. Earlier studies similar to the present problem should be carefully studied. Optimal use of library is essential at this stage.

- **Development of Hypothesis:** A hypothesis is a tentative assumption made in order to draw out and test its logical or empirical consequences. A research hypothesis provides the focal point of research because it determines the type of data required and the methods of data analysis. Hypothesis should be very specific because it has to be tested. Hypothesis delimits the area of research and keeps the researcher on the right track.

  Preparing the Research Design: Research design determines the conceptual structure within which research would be conducted. A good research design fosters the conduct of research under optimal conditions. However, research design depends on the purpose of the research. If the research is of exploratory nature, a flexible research design would be appropriate because it provides opportunity for considering different aspects of a problem.

- **Determining the Sample Design:** A sample design is a definite plan for obtaining a sample from a given population. Thus, the plan to select 12 of a city's 200 plastic stores in a certain way constitutes a sample design. Samples can be either probability samples or non-probability samples. In probability sample, each element has a probability of being included in the sample.

- **Collecting Data:** Appropriate data are to be collected for proper conduct of the research. Primary data can be collected either through experiment or through survey. The researcher should select an appropriate data collection tool depending on the nature of investigation, objective and scope of the inquiry, financial resources, available time and the desired degree of accuracy.

- **Execution of the Project:** The researcher should see that the project is executed in a systematic manner and in time.

- **Analysis of Data:** Analysis of data requires a number of operations such as establishment of categories, application of these categories to raw data through coding, tabulation and then drawing statistical inferences. A large data especially in large inquiries is tabulated by the use of computers. The analysis of data is conducted with the help of various statistical measures.

- **Generalization and Interpretation: I**f a hypothesis is tested and upheld several times, researcher may arrive at generalization, i.e., build a theory. A real value of research is its ability to arrive at certain generalizations. If there is no hypothesis, the researcher might explain his findings based on some theory which is known as interpretation.

- **Preparation of The Report:** Careful preparation of the report has to be done by the researcher by keeping the following points:
  (a) The layout of the report should be as follows: (i) preliminary pages, (ii) the main text, and (iii) the end matter.

(b) Preliminary pages contain title, acknowledgements, foreword, list of contents, list of tables, list of graphs, charts etc.

(c) The main text of the report has the following parts: introduction, summary of findings, main report and conclusion.

(d) At the end of the report, appendices, references, index etc. should be given.

Criteria of Good Research

For any scientific research, the following are the criteria to be followed (Kothari, C R, 2004):

- A good research should have clearly defined purpose and should use common concepts.
- The researcher should use clear procedure so that the study can be replicated.
- Careful selection of research design is vital to obtain results as objective as possible.
- Procedural design of research including its limitations should be given with openness and its effect on its findings must be listed.
- The data collected should be reliable and valid and appropriate data analysis procedure should be used.
- After the analysis of data, conclusions should be confined to those justified by data.
- An experienced researcher with integrity and good reputation may conduct research with greater confidence.

Qualities of Good Research

The qualities of good research are as follows (Kothari, C R (2004):

Systematic - with proper steps and specified sequence	Logical - applies logical process of induction and deduction
Empirical - deals with concrete data that provides a basis for external validity	Replicable - should be replicable to substantiate the results
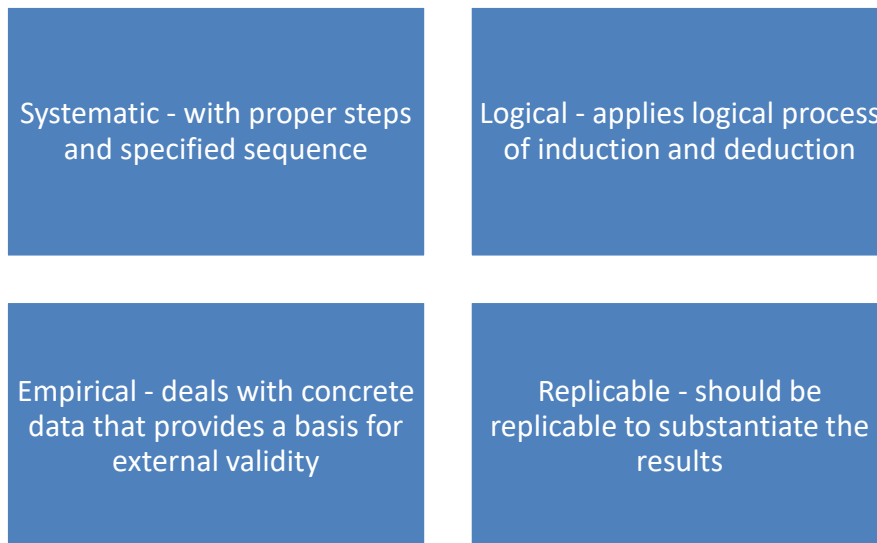
Figure 1.9. Qualities of Good Research

Problems Encountered by Researchers

Researchers in India face several problems. Some of the problems are listed below:

- **Lack of Scientific Training:** Due to the absence of systematic research methodology, many researchers enter the research process without proper knowledge of research methods. This leads to producing results which do not reflect the reality. This scenario warrants the need for some training to be imparted to researchers in research methodology prior to undertaking research activities.
- **Insufficient Interaction:** There is lack of interaction between the university research departments and business establishments, government departments and other research

institutions. This leads to the underuse of primary data. University research departments should introduce interaction programs with other research institutions, government departments and business establishments to establish a liaison between the practitioners and the researchers for optimum use of research.

- **Lack of Confidence:** Business units in our country are reluctant to share their information with researchers due to lack of confidence that they might misuse the data. It is important to build confidence-building measures which will convince the business units that their data will be put to productive purposes and will not be misused in any manner by the researcher.
- **Duplication of Research Studies:** Due to gap in communication on the researches undertaken by people in various places, duplicity occurs which results in wastage of resources. The research problems and studies conducted at various places should be uploaded in a common platform and updated regularly to avoid duplicity.
- **Lack of Code of Conduct:** Lack of a code of conduct leads to inter-university and inter-departmental rivalries. A uniform code of conduct must be followed to avoid this problem.
- **Improper Library Management:** Systematic library management and functioning is lacking in many places which results in wastage of time and energy by researchers. It is essential for the researcher to track books, journals, magazines, reports etc. with ease.

1.4. Understanding the Language of Research

Concept, Variable and Construct

Research is a complex decision-making process. The objects of investigation include events, institutions, policies, ideas, personalities etc. Only certain dimensions of these objects are selected for investigation. It is difficult to identify all the factors with which these objects are associated. Hence the conduct of the research greatly depends on which variables are selected for study.

Concept: Concepts are abstractions representing empirical phenomena. In order to move from conceptual to the empirical level, concepts are converted into variables. When the researcher formulate hypothesis, concepts will appear as variables which can be tested. Concepts which are abstract aspects of reality generally name possible properties of things, people or events. Sometimes concepts seem concrete or tangible but at other times they seem very complex. For example, 'empathy' is one facet of people that we do not see or feel but can be inferred by observing social behavior, thus making it difficult to measure. Complex concepts like 'empathy' which cannot be directly measured but are inferred are named as constructs. Construct is a mental construction. When we measure a construct in a way that gives varying values, it is named as a variable.

Measurability is the main difference between a concept and a variable. Concepts are mental perceptions, and their meanings differ markedly from individual to individual. Concepts are therefore converted into variables as they can be subjected to measurement by mapping them into a set of values. On the other hand, variables are measurable with varying degrees of accuracy. A variable is an empirical property that takes two or more values. For example, 'social class' is a variable because it can be differentiated by distinct values like, lower, middle, upper etc. Similarly, 'expectation' is a variable because it can be assigned two values, 'high' and 'low'.

Examples of Concepts and Variables

Table 1.1. Examples of Concepts and Variables

Concepts	Variables
Impact	Age
Effectiveness	Gender
Satisfaction	Socio-economic status

Converting Concepts in to Variables

If a construct is used in the study, we need to consider its operationalization, i.e., how it is measured. For this we have to identify indicators which reflect the concept. For example, 'rich' (wealth) is a concept. Next step is to identify the indicators. Income is an indicator of wealth. Income is a variable because it can be measured.

Types of Variables

A variable can be classified in a number of ways. If the researcher wants to study a causal relationship or an association, there are four types of variables which operate in the study:

- **Independent Variable:** The cause that is responsible for bringing about changes in a phenomenon.
- **Dependent Variable:** The changes brought about by the introduction of an independent variable.
- **Extraneous Variable:** Several other factors in real life situation may affect the changes in the dependent variable. These factors may increase or decrease the strength of the relationship between independent and dependent variables.
- **Intervening Variable:** It links the dependent and independent variable, also known as confounding variable.

For example, in a study of the relationship between hazardous waste and cancer, there are many factors that affect the relationship. It may be exposure to smoke emanating from burning plastic, continuous exposure to carcinogenic plastic, intake of smaller amounts of plastic through various means, exposure to toxins etc. All of these factors may affect the extent to which hazardous waste might cause cancer. These variables may either increase or decrease the magnitude of the relationship. The use of protective mask and gloves may act as an intervening variable. The use of protective mask is also affected by other factors like attitude towards safety measures, level of education, age, socio-economic status, awareness of health etc.
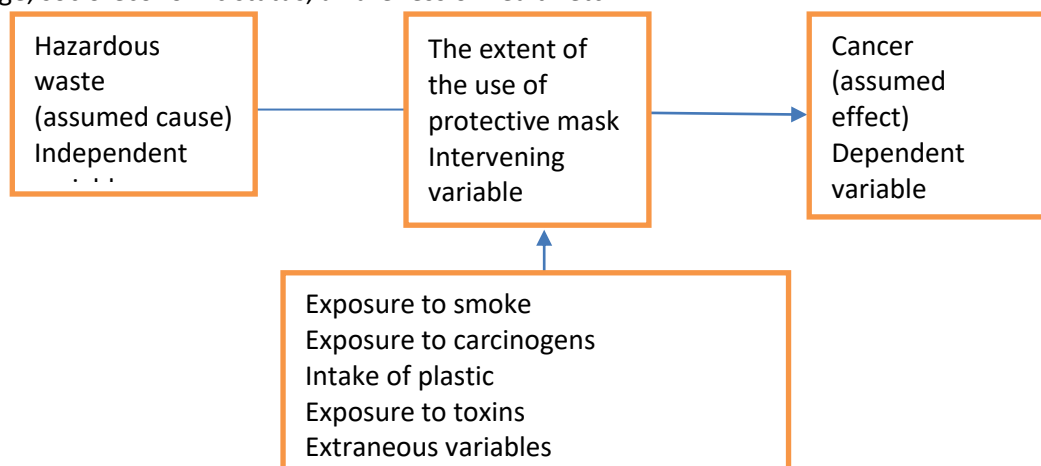
Figure 1.10. Independent, Dependent, Extraneous and Intervening Variables

To Do Activity
Name the different types of variables in a research study on the role of community advisory committees in solid waste management.

1.5. Research Design

Research design is the conceptual structure within which research is carried out. It constitutes the blueprint for the collection, measurement and analysis of data (Selltiz et.al., 1967). The research design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. Keeping in view of all the processes involved in a research design, the overall research design may be divided into the following parts (Kothari, 2004):

- **The Sampling Design**– deals with the method of selecting items to be observed for the given study.
- **The Observational Design**– relates to the conditions under which the observations are to be made.
- **The Statistical Design**– concerns with the question of how many items are to be observed and how the data are to be analyzed.
- **The Operational Design**– deals with the techniques by which the procedures specified in the sampling, statistical and observational designs can be carried out.

In short, a research design must contain:

A clear statement of the research problem

Procedures for data collection

Population and sample of the study

Data analysis procedures
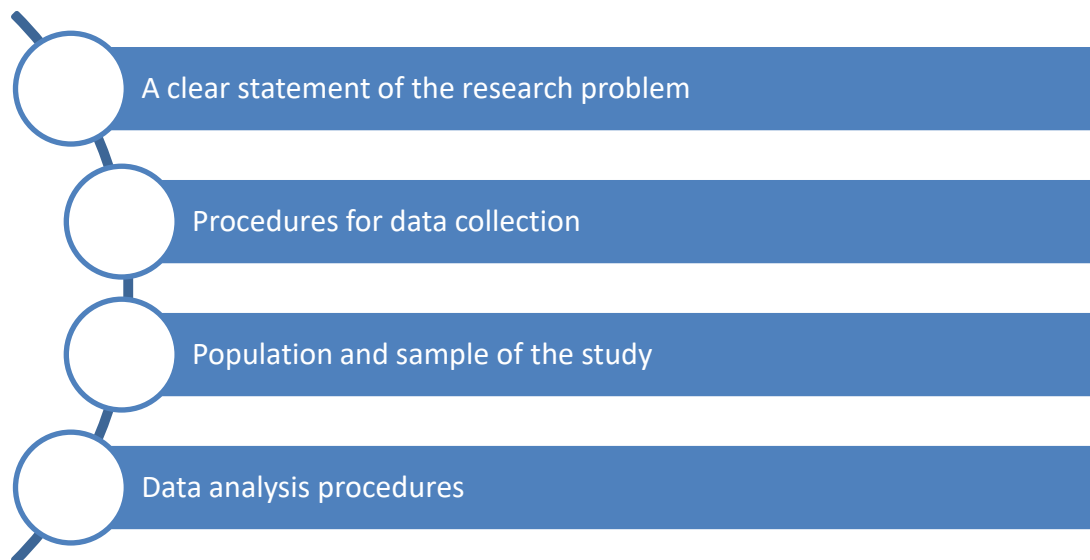
Figure 1.11. Components of a Research Design

Need and Importance of Research Design

Research design carries an important influence on the reliability of the results attained. It therefore provides a solid base for the whole research. Research design is needed because it facilitates the smooth functioning of various research operations thus producing optimum results with minimum use of time, effort and money. Just as any project needs a plan, research also needs a plan in

advance for data collection and analysis of data. Reliability of the research results greatly depend on research design and hence research design should be prepared with utmost care as any mistake at the planning stage might upset the entire project. A research design is important due to the following reasons:
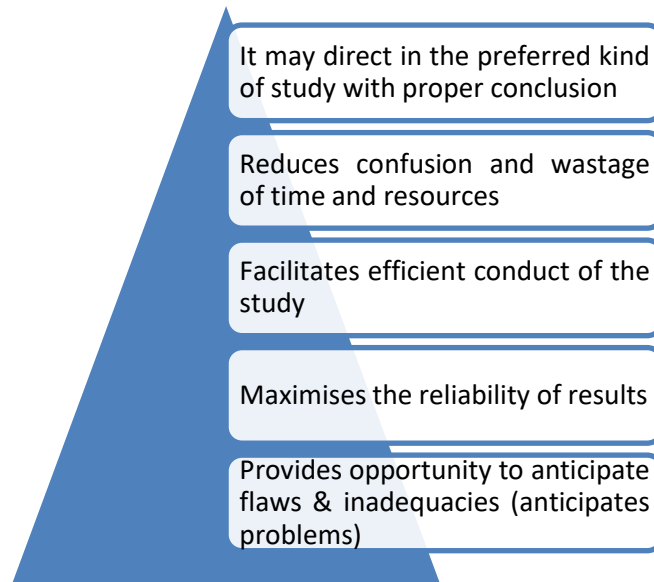
Figure 1.12. Importance of a Research Design

Features of a Good Research Design
A good design is one which minimizes bias and maximizes the reliability of the data collected and analyzed. In many investigations the best design produces the smallest experimental error. A design which provides opportunity for considering many different aspects of a problem is also considered as an appropriate and efficient design. A research design is considered good depending on the objectives and nature of the study. An appropriate research design is prepared considering the following factors:
- Means of obtaining data
- Objectives of the study and nature of the investigation
- Availability and skills of the researcher
- Availability of resources for the research study

Different Types of Research Design
Different research designs are broadly categorized as (Kothari, 2004):
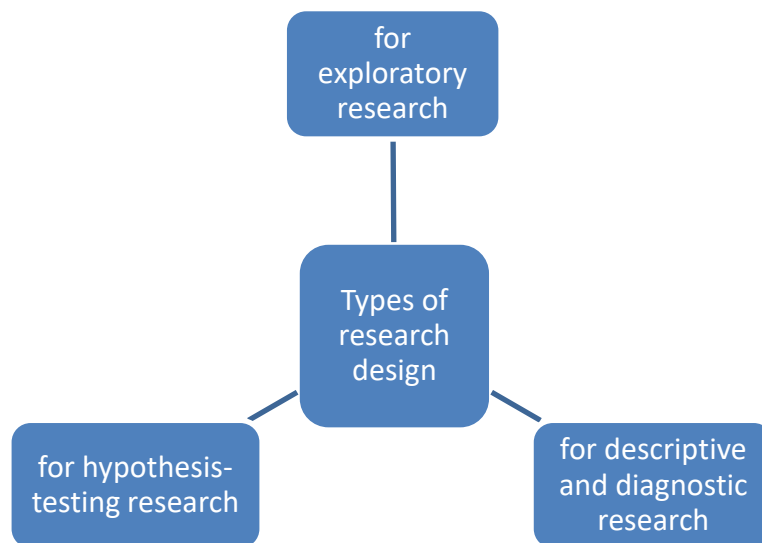
Figure 1.13. Types of Research Design

1. Research Design in Case of Exploratory Research Studies

Exploratory research studies are also known as formulative research studies. The main objective of such studies is formulating a problem for more precise investigation or of developing the working hypotheses from an operational point of view. Such studies emphasize on the discovery of ideas and insights. Research design for such studies must be flexible enough to provide opportunity for considering different aspects of a problem under study. In this context, the following three methods should be considered:

- The Survey of Concerning Literature is the most fruitful method for formulating the research problem or developing hypothesis. The researcher can review the existing hypotheses and suggest new hypotheses or formulate new ones. Bibliographical survey of studies in one's area of interest also helps in formulating the problem.
- Experience Survey is the survey of people who have had practical experience with the problem to be studied. The objective of the survey is to obtain insight into the relationships between variables and new ideas related to the research problem. Thus, an experience survey may enable the researcher to define the problem more concisely and help in formulating the research hypothesis.
- Analysis of 'Insight-Stimulating' Examples suitable in areas where there is little experience to serve as guide. This method consists of the intensive study of selected instances of the phenomenon in which one is interested. Examples for insight-stimulating cases are the reactions of strangers and marginalized individuals, reactions of individuals from different strata of society etc.

2. Research Design in Case of Descriptive and Diagnostic Research Studies

Descriptive research studies are concerned with describing the characteristics of a particular individual or of a group. For example, studies concerned with specific predictions, with narrations of facts and characteristics concerning individual, group or situation. E.g., how consumers respond to

innovations like use of alternatives for plastics, use of biodegradable materials etc. Diagnostic research studies determine the frequency with which something occurs or its association with something else. E.g., studies concerning whether certain variables are associated. E.g. average time spent on shopping, consumption of plastic per month or per household etc. Since the aim of these two studies is to obtain complete and accurate information, the research design must be rigid and focus on the following points:

- **Formulating the Objective of the Study** Objectives must be specified precisely to ensure that the data collection is relevant.
- **Designing the Methods of Data Collection** The researcher can choose from different methods like observation, questionnaire, interview etc. Whichever method is selected, questions must be well examined and be made unambiguous and interviewers must be trained to obtain uniform data. It is always desirable to pre-test the data collection instruments before final use, i.e., structured instruments should be used for the study.
- **Selecting the Sample** Sample is selected in such a way that it may yield accurate information. Usually probability sampling methods are used for the study.
- **Data Collection** should be performed honestly and without prejudice. It should also be examined for completeness, comprehensibility, consistency and reliability.
- **Data Processing and Analysis of Data** This step includes coding the interview replies, observations etc., tabulating the data and performing statistical computations such as averages, percentages and various coefficients. Appropriate statistical operations along with the use of appropriate tests of significance should be carried out to safeguard the drawing of conclusions concerning the study.
- **Reporting the Findings** Reporting should be done in an efficient manner. The layout of the report needs to be well planned so that all things related to the research study may be presented in a simple and clear manner.

Table 1.2. Research Designs in Different Studies (Source: Kothari, 2004)

Research Design	Type of Study	
	Exploratory or Formulative	Descriptive/Diagnostic
Overall design	Flexible design	Rigid design
i. Sampling design	Non-probability sampling design	Probability sampling design
ii. Statistical design	No pre-planned design for analysis	Pre-planned design for analysis
iii. Observational design	Unstructured instruments for data collection	Structured instruments for data collection
iv. Operational design	No fixed decisions about the operational procedures	Advanced decisions about operational procedures

3. Research Design in Case of Hypothesis-Testing Research Studies: Hypothesis-testing studies are also known as experimental studies. Here the researcher tests the hypotheses of causal relationships between variables and the design is known as experimental designs. Prof R A Fisher is the pioneer in experimental designs, and it was originally used in agricultural research.

Basic Principles of Experimental Design: according to Prof Fisher, the three important principles of

experimental designs are:
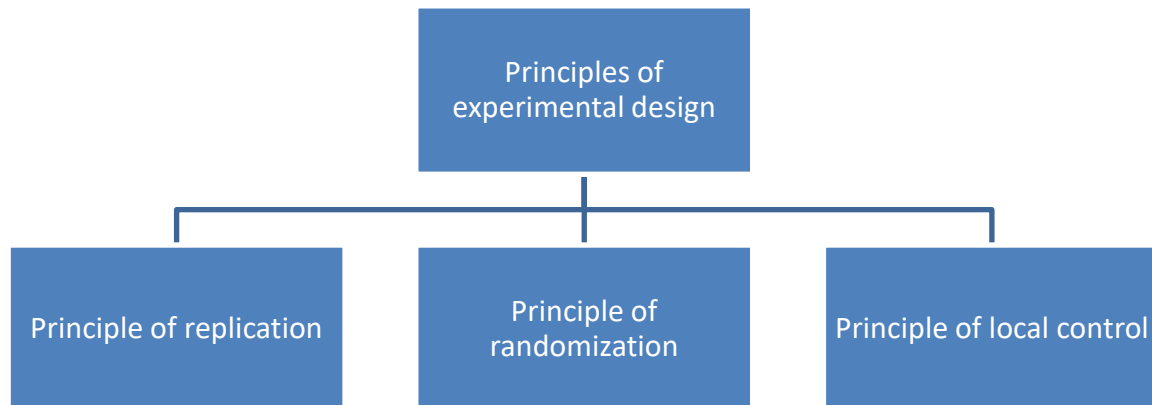
Figure 1.14. Principles of Experimental Design

The Principle of Replication According to this principle, the experiment should be repeated more than once. By doing so, the statistical accuracy of the experiment is increased. The entire experiment can be repeated several times for better results.

The Principle of Randomization This principle indicates that we should design the experiment in such a way that the variations caused by extraneous factors can all be combined under the general heading of 'chance.' We may apply the randomization principle to protect ourselves against the effects of extraneous factors.

The Principle of Local Control by applying this principle, we can eliminate the variability due to extraneous factors from the experimental error.

Summary

Research is an investigative process of finding reliable solution to a problem through systematic selection, collection, analysis and interpretation of data relating to the problem. Research always facilitates effective management. Today most of the organizations rely on research for their decision-making process. Generally, research is classified into three categories: Basic or Pure Research, Applied Research and Action Research. A scientific research is carried out by following systematic steps to obtain valid and reliable results. These steps include formulating a research problem, review of literature, development of hypothesis, preparing a research design, collection of data, analysis and interpretation of data and preparation of research report.

> **To Do Activity**
> Select a research topic on 'Solid Waste Management' and prepare a detailed Research Design considering all the aspects discussed in this block.

Model Questions

1. Define research.
2. Enumerate the role of research in Indian context.
3. Explain the different types of research.
4. Briefly outline the research process.
5. Differentiate concept and variable with examples.
6. Outline the features of a research design.
7. Describe different types of research design.

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Chapter 2 Sampling

Introduction

Sampling is one of the important aspects in a research process. For example, a researcher wants to study about the environmental impacts of food waste in a district. Imagine the amount of time and resources required for the collection of data from each and every household, institutions etc. Instead we can select a few households and few institutions to become the basis of the enquiry and then make an estimate of the impact in the whole district. Thus, sampling is a handy tool used for gathering information effectively.

Objectives

At the end of the lesson students will be able to:

➢ Understand the concept of population and sample.
➢ Explain different types of sampling used in research.
➢ Describe various types of data and their measurement.

Structure

2.1	• Sampling
2.2	• Types of sampling
2.3	• Attitude scaling techniques
2.4	• Measurement in research
2.5	• Methods of data collection
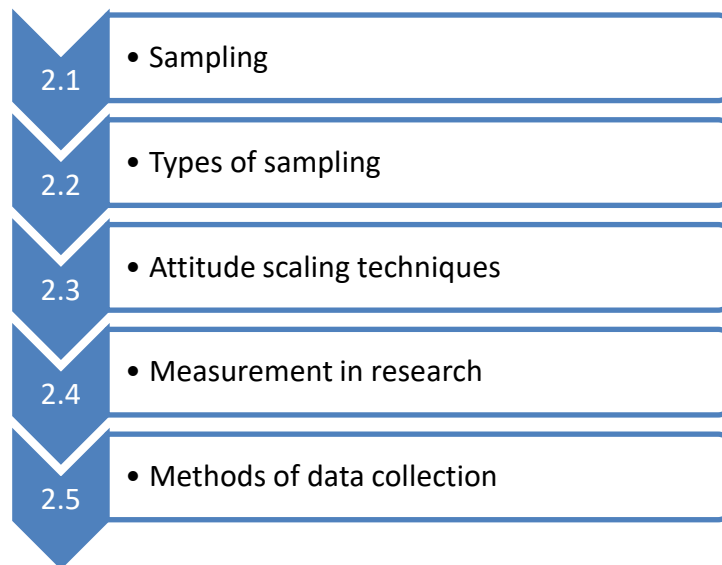
Figure 2.1. Chapter Flow

2.1 Sampling

What is Sampling?

A question asked during a research is that: should all the people (entire population) be studied or a limited number of selected persons be studied and then extend our findings to the entire population? 'Population' refers to "all the people with the characteristics which the researcher wants to study within the context of a particular research problem." E.g., all households in a village, all patients in a hospital, all users of mobile phones etc. When we have a large population, researchers select only a sample. Thus, sample is a small portion of people selected from the larger population. Care should be taken to select a representative sample for accurate results.

Purposes of Sampling

A large population cannot be studied in its totality due to its size and inaccessibility. According to Sarandakos (1998), following are the purposes of sampling:

- Population in many studies may be so large and scattered that a complete coverage may not be possible. For example, Nokia wanted to study the amount of electronic waste produced due to their old mobile handsets. For this they have to contact all their customers. They may be spread across the nation; some may not be accessible. It would be impossible to contact all their customers.
- Sampling deals with small number of persons and hence offers high degree of accuracy.
- Lengthy period of data collection produces data which is obsolete. For example, opinion expressed by people may change or be influenced if there is a long period involved in data collection. On the other hand, with a small sample, collection of data occurs in a short period of time and comparable results may be obtained.
- Compared to target population, sampling is less demanding in terms of requirements of investigation.
- Sampling is economical as it requires small percentage of the target population.

Principles of Sampling

The main principle underlying sampling is that we seek knowledge about the total units (population) by studying a few units (sample) and extend our inference about the sample to the entire population. The use of sample becomes essential because the study of a large population requires longer duration, more interviewers, large amount of money and resources, and doubtful accuracy of data collected by numerous investigators. Sarandakos (1998) has given the following principles of sampling.

Sample units must be chosen in a systematic and objective manner	Sample units must be independent of each other	Sample units must be clearly defined ad easily identifiable
Same sample units should be used throughout the study	Sound criteria should be used for selection of sample units	Avoid errors and biases in selection of sample

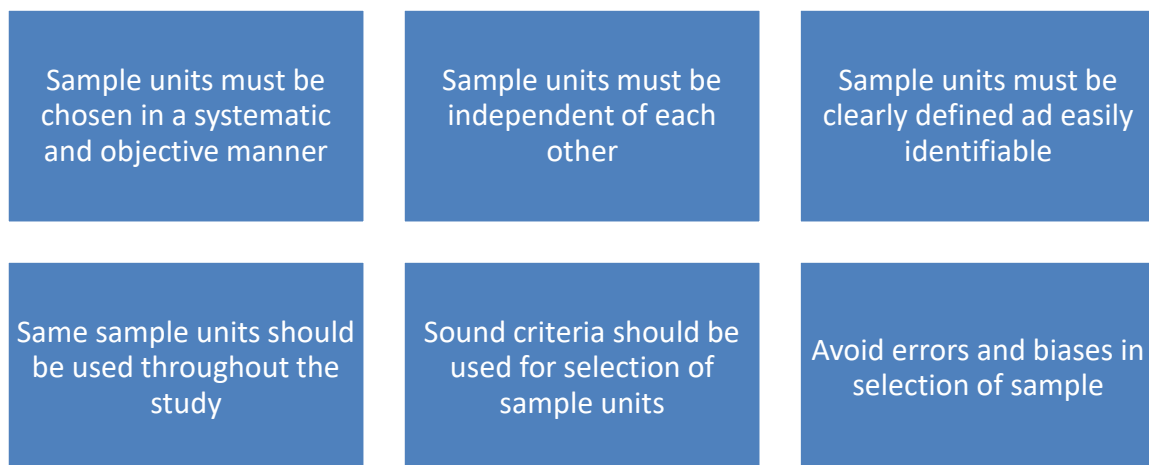**Figure 2.2. Principles of Sampling**

- Study of a large population is unmanageable, and sampling will reduce the number
- It saves time, money and resources
- The researcher has more control over smaller number of subjects which leads to greater accuracy
- It elicits greater response and cooperation from subjects

Figure 2.3. Advantages of Sampling

Universe or Population

The sum total of all units or cases that conform to a set of specifications is called the universe or population. For example, a study is conducted on the "Awareness of the environmental impact ofsingle use plastic bag among women in rural areas". The study is confined to married and unmarried women and widows in the age group of 18-50 years. If the village has 2200 females, our universe or potential respondents are 2200. But since our target of study is among women in the age group of 18-50 years, and if that village has 970 women in that particular age group, 809 married women,87 unmarried and 74 widows, our target of study will be 970. Age is the main variable for stratifying them in groups. Other variables like educational level, religion, family income, occupation, caste, family structure etc. can also be used for the study. A population may be a group of people, workers, customers, registered voters etc. depending on the purpose of investigation.

Sample

It is a portion of the total population. Manheim (1977) has defined sample as "a part of the population which is studied in order to make inferences about the whole population". In the above example of women, out of the total population of 970 women in 18-50 years age group, if we use the mathematical formula $\frac{n}{1+n\,(e)^2}$ where 'n' is 970 (total number of women) and 'e' is 0.05 (confidential level), the number comes to 283. Rounding off this figure, we may study 300 women. This number can be stratified in to three groups based on their age: 18-30 years (young), 30-40 years (early middle aged) and 40-50 years (late middle aged). We can study 100 women from each of the three groups.

Sample Size

Sample size represents the number of items to be selected from the universe to constitute a sample. The size of the sample should neither be too large nor too small but should be an optimum number to get precise results. The sample should be representative as well as reliable. The size of population variance should be looked at while selecting the sample because a large population variance requires a bigger sample size. Generally, the size of the population limits the sample size. Budgetary limitations also should be considered while deciding the size of the sample.

Sampling Element

Each entity (person, family, group, organization) from the population about which information is collected is called a sampling element. In the above example, all the 970 married and unmarried and

widows in 18-50 years age group will be sampling elements.

Sampling Frame

It is the complete list of all units/elements from which the sample is drawn. For example, in the study of "awareness among women", the total number of women in the age group of 18-50 years would be the *sampling frame*. This number can be taken from the voter's list or from any other reliable sources. The sampling frame is also called the *working population* or source list. The list should be comprehensive, reliable and appropriate. Source list should also be representative of the population.

Target Population

Target population is one to which the researcher would like to generalize his results. In the above example of 'awareness among women', the target population is 970. Careful definition of the target population is essential so that the source from which the data are collected is genuine. In the above example, the criterion for selection of target population is selection of rural women in the age group of 18-50 years.

Sampling Trait

It is the qualitative or quantitative element from which the sample is drawn. In our example, the sampling traits are age, gender and residence.

Sampling Fraction

It is the proportion of the total population that is included in the sample. The formula applied to find the sampling fraction is sampling fraction $= \frac{size\ of\ sample}{total\ population}$ or $\frac{n}{N}$

In the above example, sampling fraction $= \frac{300}{2200}$, i.e., about one seventh of the total population.

> **To Do Activity**
>
> A study is undertaken on 'strategies of hospital waste management in the municipal area of Hyderabad'. Write down the population, sample, sample size, sampling element, sampling frame, target population, sampling trait and sampling fraction in this study.

Parameters

Parameters represent the characteristics of population. Sanders and Pinhey (1983) described parameters as the summary description of a variable for population. For example, we want to measure the average age of ten women in a village. We find the mean (add all their ages and then divide them by the number of cases, i.e., 10) and it is found to be 22. So, we determine the parameter of 'young age'. Since we do not know the parameters of population, we estimate the parameters by using data from the sample. In the above example, a parameter would be the average age of all the women in the village. Thus, a *parameter* constitutes a summary description of the population and *statistic* constitutes a summary description of the sample.

Sampling Error

Sampling error is the difference between the total population value and the sampling value. In other words, it is the degree to which the 'sample characteristics' approximate the 'characteristics of the

total population'. For example, let us take study of 'the use of single use plastic carry bags among college students.' We select one college and then select one department, say, MBA students only. So, the population in this case is 'all the students of this college' and study population will be only MBA students from that college. Suppose one parameter of the population regarding age is that the average age is 22 years. Imagine, we are taking three samples from that population and have calculated the average age of these three samples (statistic). It was observed that the three samples provide three different averages. In the first sample, the average age is 23 years, in the second, it was 20 years and in the third it was 25 years.
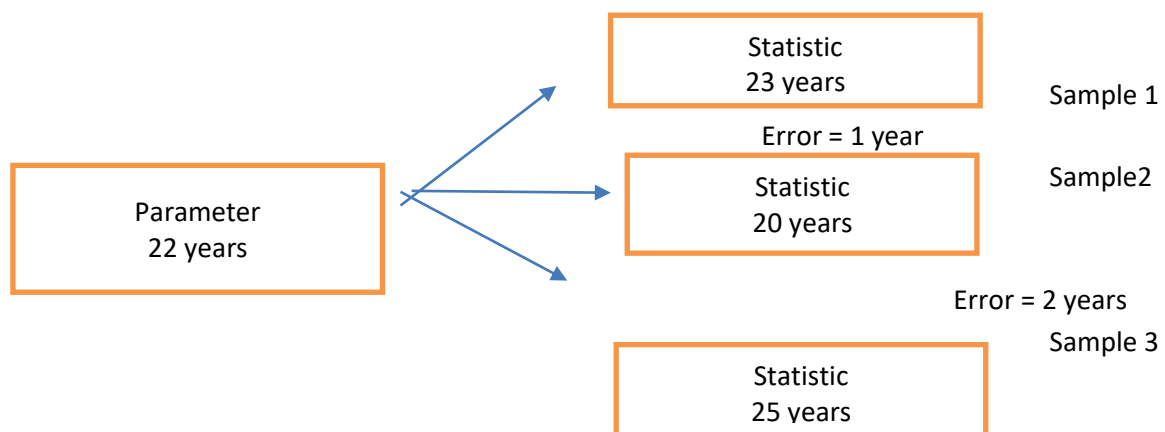
Figure 2.4. Sampling Error

In probability sampling, as sample size increases, sampling error decreases and for a homogeneous population the sampling error happens to be small. To find sampling error, the equation is

Sampling error = $\sqrt{sampling\ variance}$

Thus, sampling error is not a measurement error, but it is an error which depends on the representativeness of the sample. If sampling error is less, the precision of the sample will be more.
A representative sample depends on two factors, i.e., sampling error and non-sampling error. Non-sampling error is also known as systematic error. Systematic error occurs due to faulty research design, sampling frame errors, non-response errors etc. A researcher should be very careful in selecting a sampling procedure to ensure that a representative sample is selected, and the sampling error is less.
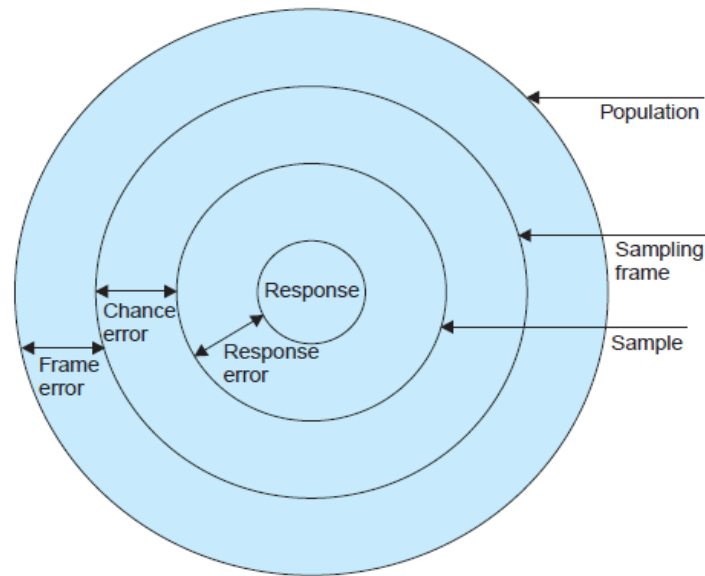
Sampling error = Frame error
                 + chance error + response error.
(If we add measurement error or the non-sampling error
to sampling error, we get total error)

Figure 2.5. Population, Sample, Sampling Frame
(Source: https://www.wisdomjobs.com/e-university/research-methodology-tutorial-355/some-fundamental-definitions-11511.html)

Results in obtaining a truly representative sample

Causes a small sampling error

Systematic bias can be controlled

Results can be applied to the universe with a reasonable level of confidence

Figure 2.6. Characteristics of Good Sampling Design

2.1 Types of Sampling

A sample is a small proportion of the population that is selected for observation and analysis. Characteristics of the sample can be inferred from the characteristics of the population from which it

was drawn. Samples are selected in a systematic way so that the operation of probability is utilized. The concept of randomness has been fundamental to scientific observation and research. It is assumed that though individual events cannot be predicted with accuracy, but aggregate events can. For example, a scientific study may accurately predict the average accumulation of *e waste* in a locality though it may not accurately predict the amount of waste in a household. The important application of randomization in research is that the researcher can select a group of households for observation who are representative of the population about which the researcher wishes to generalize.
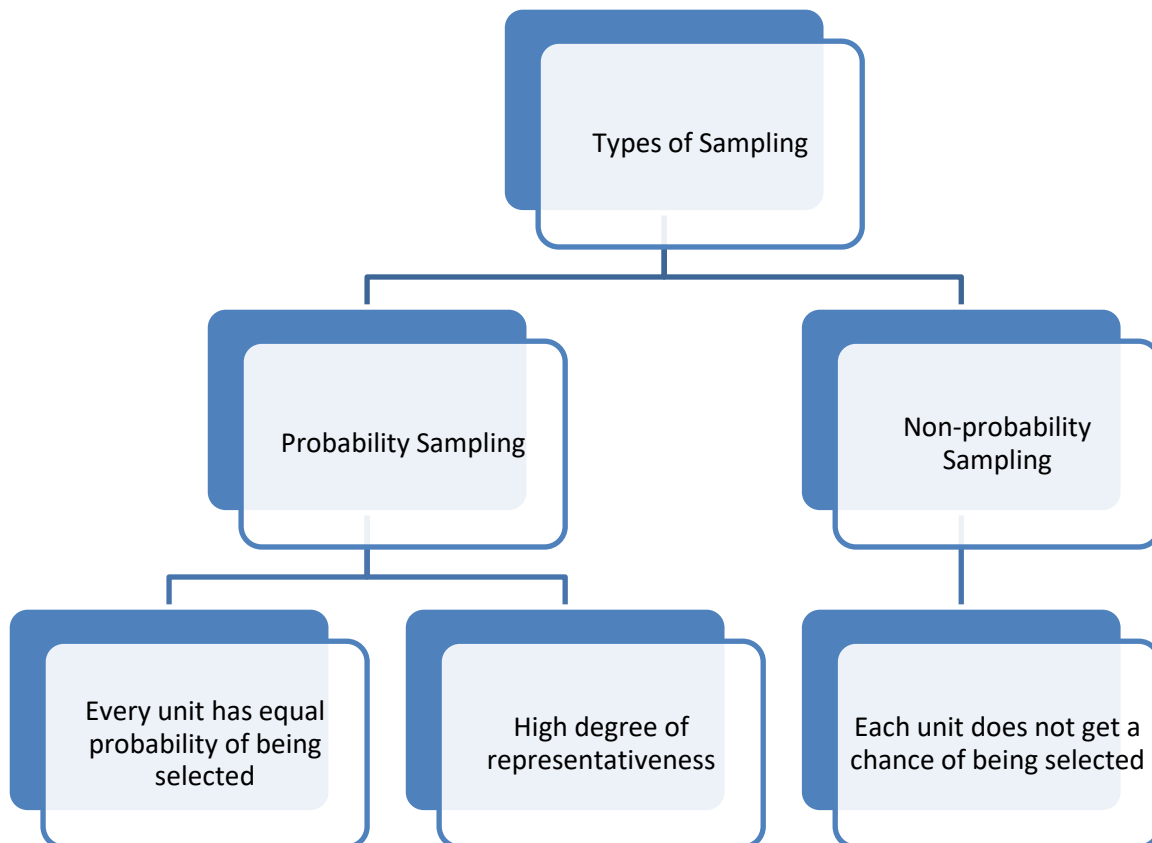
Figure 2.7. Types of Sampling

Probability Sampling

In probability sampling, every item/unit of the universe has an equal chance of being included in the sample. It is also known as 'random sampling' or 'chance sampling'. In simple terms it is a lottery method in which individual units are selected form the whole group by some mechanical process. Black and Champion (1976) proposed the following conditions for probability sampling:
- Complete list of units/elements to be studied is available.
- Size of the universe is known.
- Desired sample size must be specified.
- Each element must have an equal chance of being selected.

There are six forms of Probability Sampling which are given below:
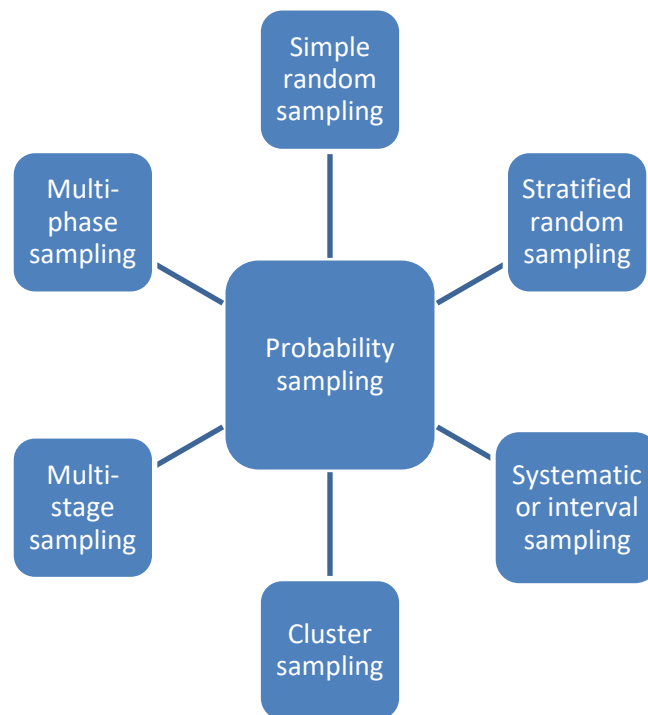
Figure 2.8. Types of Probability Sampling

 (a) Simple Random Sampling

Random sampling ensures the Law of Statistical Regularity which states that if on an average the sample chosen is a random one, the sample will have the same composition and characteristics as the universe. Therefore, random sampling is regarded as the best method for selection of a representative sample. In this sampling, sample units are selected by means of lottery method, Tippet's tables, personal identification number (PIN) or by first letter.

   (i)   **Lottery Method** constructs a sample frame with all the units of the target population, e.g., the names of all households in a village. Write this names/numbers in small pieces of paper and deposit in a jar. Mix the papers and take out the numbers one by one till the required number is reached.

   (ii)   **Tippet's Table** Tippet has prepared a table of random numbers (of one to five digits each). These numbers are readily available in different forms, sizes and number combinations. Take any page and randomly choose the number.

 (b) Stratified Random Sampling

In this method, the population is divided into a number of homogeneous sub-groups or strata and random sample is drawn from each stratum. The population may be divided into homogeneous strata based on their age, gender, education, occupation, socio-economic status, religion, caste etc. Stratification does not involve ranking.

 For example, a study is conducted on the attitude of rural men on recycling of plastic packaging waste. The population may be divided into a number of strata based on the occupation of the villagers, farmers, businessmen, professionals, skilled workers, unskilled workers etc. Random

samples should be taken from each stratum to form the representative sample.

The advantage of using stratified random sampling is that the sample chosen represents various groups and patterns in desired proportions and it can be used for comparing the sub-groups.

(c) Systematic or Interval Sampling

This sampling is carried out by selecting every nth person from a predetermined list of persons. The first element is selected randomly followed by every n^{th} element. 'n' is the sampling interval. In this method, samples are drawn from a sampling frame based on the sampling fraction which is equal to $\frac{N}{n}$, where N is the number of units in the target population and 'n' is the number of units/elements of the sample.

For example, in a particular study, if the target population is 8000, and the intended sample size is 500, the sample fraction is 16 ($\frac{8000}{500}$), and every 16th person from the list would be drawn as sample. The advantage of systematic sampling method is that it is simple, easy and a quick method to draw samples.

(d) Cluster Sampling

In cluster sampling, population is divided into clusters and random samples are drawn from each cluster. When the population is divided into different geographical units, and when clusters are geographical units, it is called 'area sampling.' For example, a village may be divided into different wards, each ward further into areas and each area into neighborhoods and further into lanes etc. The advantage of cluster sampling is that when a large population or large geographical area is studied, division into clusters will be convenient and cost effective. The difference between cluster sampling and stratified sampling is that in cluster sampling, homogeneous group is classified into heterogeneous units and in stratified sampling, heterogeneous group is stratified into homogeneous units.

(e) Multi-Stage Sampling

Here sampling is selected in various stages but only the last sample of subjects is studied. For example, village panchayat employees in one district are to be studied to assess their views on the implementation of waste sorting centres. The names of all panchayat employees will be typed in the first stage. Suppose these names are typed in 100 pages, each page containing 20 names alphabetically. Our sample size is 50. In order to select fifty names, we will take out every tenth page, i.e., 10 pages, and from each page, we take out every fourth name (i.e., five employees from one page).

(f) Multi-Phase Sampling

It is similar to multi-stage sampling. The difference is that in multi-phase sampling, each sample is adequately studied before another sample is drawn from it. The advantage of multi-phase sampling over multi-stage sampling is that, since each sample is studied, the information gathered at each phase helps the researcher to choose a more representative sample at the next phase. Suppose we want to study Law students in a city. There are five Law Institutes in that city and in each Institute, there are 30 students. At the first stage, the sampling frame of Law students in five institutes will be constructed. In the first phase, the academic background of all the students will be studied, namely whether they are from arts, science, commerce, management, engineering etc. and whether they are first or second or third divisions. In the next phase, 50 students will be selected randomly, 10 students from each institute with varying academic backgrounds. At the last phase, 25 girls and 25 boys will be selected from these 50 students and this will be the final sample for the study.

Non-Probability Sampling

In non-probability sampling there is no probability that each unit/element is included in the sample. In many research studies, the list of persons to be studied may not be available or non-existent. Example, the list of drug addicts, consumers of disposable plates and cutlery, migrant workers etc. In these studies, the use of probability sampling is inappropriate, and the researchers use non-probability sampling.
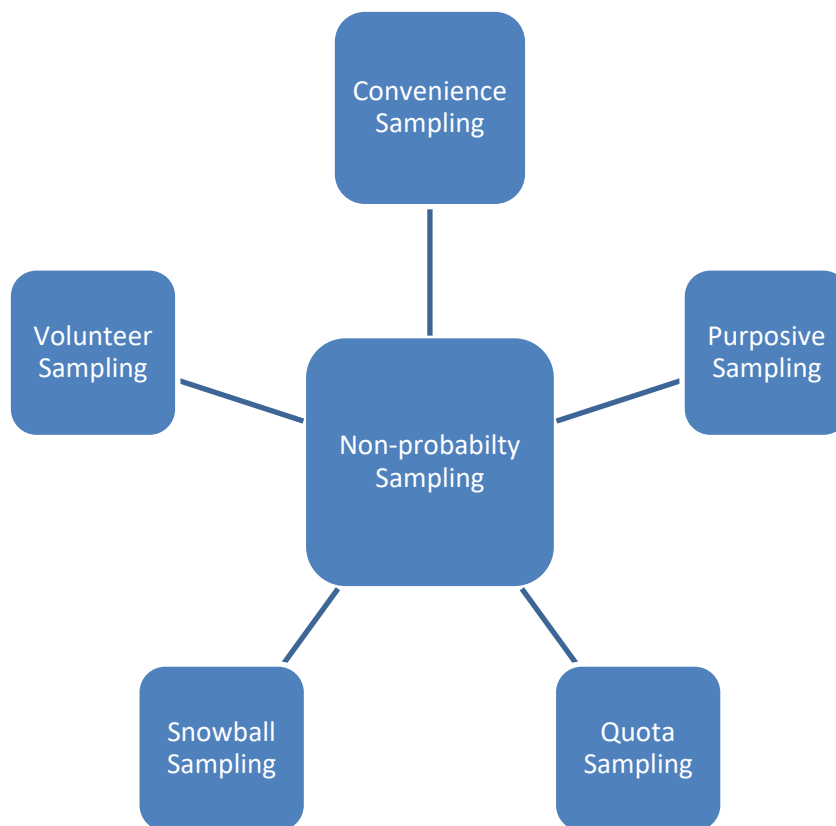
Figure 2.9. Types of Non-probability sampling

(a) Convenience Sampling

In this type of sampling the researcher selects the persons who are conveniently available to the researcher or those persons whom he accidentally meets during the course of his research. Therefore, this is also known as 'accidental' sampling or 'haphazard' sampling. For example, the researcher wants to study the healthcare personnel in order to study healthcare waste management from hospitals. He will visit the hospital, different departments, canteen, staff hostel etc. and interview the required number of personnel. Its major advantage is that it is less time consuming and economical. The disadvantage with convenience sampling is that the sample may be biased. Convenience sampling is mostly used in exploratory studies.

(b) Purposive Sampling

The researcher purposely chooses persons with appropriate characteristics and easy access whom he might think are suitable for his research. This is also termed as 'judgement' sampling. This type of research is mostly done in market research where they select test market cities with typical demographic profiles closely matching the national profile. Here the selection of the unit/element is

deliberate and based on prior judgement.

(c)   Quota Sampling

Here the researcher fixes some quotas for selection of sample. In the example of selecting Law students, the researcher has to select 50 Law students from five institutes. He fixes a quota often students from each institute, five boys and five girls. But the choice of the students is left to the researcher or the interviewer. Quota can be fixed according to the nature of research or according to the total population. This type of sampling takes less time and also economical but may not be a representative sample.

(d)   Snowball sampling

In this sampling, the researcher identifies a handful of respondents who are known to him and start the study. These respondents in turn give the names of other persons whom they think will fulfil the criteria of research. This is continued until the required number of respondents are interviewed or until no more respondents are discovered. This method is suitable when we have an unknown target population or when it is difficult to approach the respondents in any other way. There is a chance of obtaining a biased sample through this method.

(e)   Volunteer Sampling

This is a method in which the respondent's volunteers to take part in the study.

> **To Do Activity**
> Prepare a sampling design for a study on 'hazardous waste management in five industrial districts of Gujarat.

Attitude Scaling Techniques

One of the important aspects of any research is the need of valid measurement. When the concepts to be measured are complex and abstract, a researcher finds it difficult to get standardized measurement tools. Especially if we measure attitudes and opinions of people, validity of measurement is at stake if the tools used are not standardized.

Concept of Scaling

Human decisions are often driven by economic factors like price, supply, demand etc. and personal preferences. They may also be influenced by other social and cultural factors. Consumer markets also affect human decisions to some extent. Cambridge dictionary of English defines attitude as 'a feeling or opinion about something or someone, or a way of behaving that is caused by this'. According to Business Dictionary, attitude is defined as a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action, and responses to challenges, incentives, and rewards (together called stimuli). Four major components of attitude are

Affective
•emotions
•feelings

Cognitive
beliefs or
opinions held
consciously

Conative
inclination for
action

Evaluative
positive or negative
response to stimuli
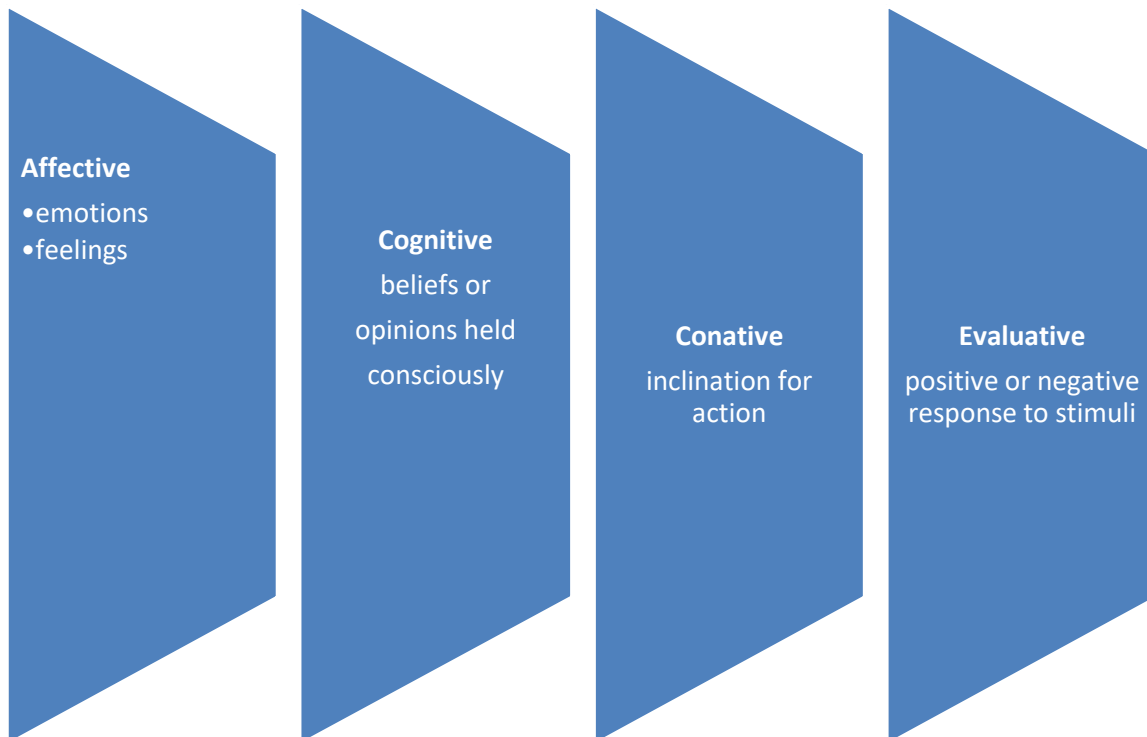
Figure 2.10. Major Components of Attitude

Measurement of attitude thus focuses on beliefs and emotions. Generally, attitudes are measured using questionnaire or through observation. Scaling is a procedure of assigning numbers to various degrees of attitudes, opinions and other related concepts. In this method, questionnaires are constructed in such a way that individual's responses are placed on a scale. A scale is a continuum consisting of a highest point, a lowest point and some intermediary points. Thus, scaling procedures tries to quantitatively measure abstract concepts like attitude, preferences etc. Scaling is defined as a "procedure for the assignment of numbers (or other symbols) to a property of objects in order to impart some of the characteristics of numbers to the properties in question" (Phillips, 1971). The procedures of assigning numbers in scaling techniques are classified as follows (Kothari, 2004):

- **Subject Orientation**– the scale is designed to measure the characteristics of the respondent
- **Response Form**– the scale may be categorical or rating scale where the respondent scores some objects or comparative or ranking scale where the respondent compares two or more objects
- **Degree of Subjectivity**– the scale may measure the subjective preferences of respondents or non-preference judgements
- **Scale Properties**– scales may be nominal, ordinal, interval and ratio scales
- **Number of Dimensions**– scales may be uni-dimensional where we measure only one attribute or multi-dimensional where several dimensions are measured

Important Scaling Techniques
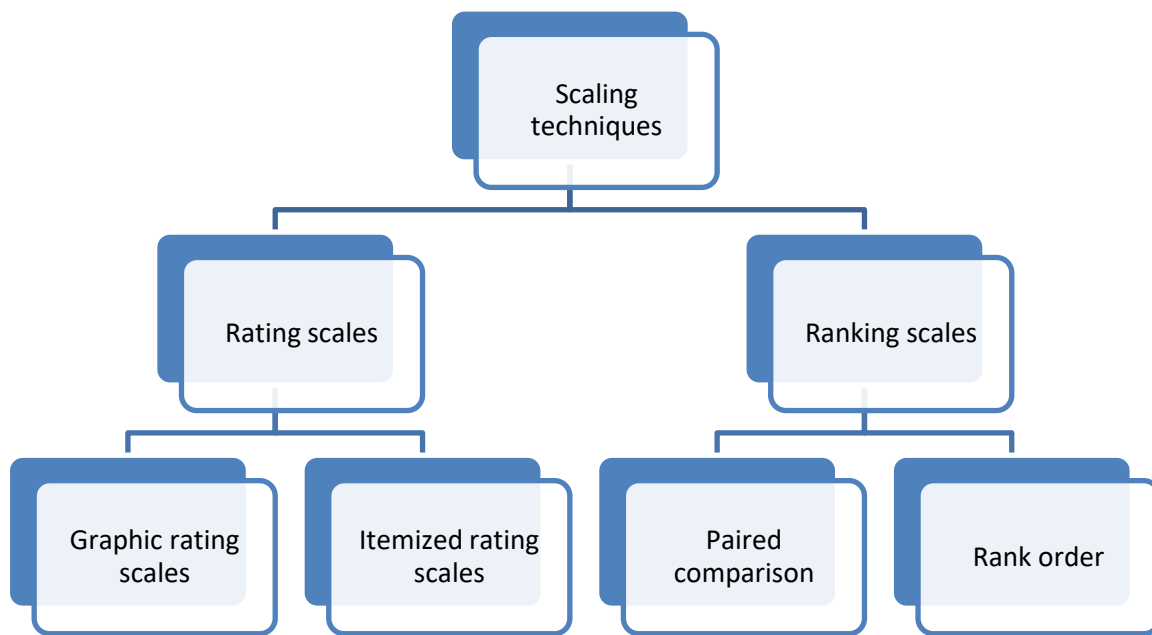
Figure 2.11. Scaling Techniques

Rating Scales– when we use rating scales, we judge an object in absolute terms against some specified criteria. Different forms of rating scales are:

- Like-dislike
- Like very much-like somewhat-neutral-dislike somewhat-dislike very much
- Excellent-good-average-below average-poor

Generally, three to seven-point scales are used because more points on a scale offers higher sensitivity of measurement. Rating scales can be of two types:

 (a) **The Graphic Rating Scales**

It is the most common rating scale used by researchers. In this type of scale, various points are put along a line to form a continuum and the respondent can indicate his rating by simply putting a tick mark (✓) near the point or in the box given below the points.

Example: to check the liking or disliking of a product:

How do you like plastic food containers?

| Like very much   like   neutral   dislike   dislike very much

Instead of line, boxes may also be used to mark the liking:

Like very much ☐   Like ☐   neutral ☐   dislike ☐   dislike very much ☐

 (b) **The Itemized Rating Scales**

Here a series of statements are presented to the respondents. The statements presented are ordered progressively in terms of some property. He must select one which best represents his evaluation. It is also known as numerical scale. For example, we want to study the reuse of plastic

packaging materials among housewives. We may prepare few statements and ask the respondents to select one to express her opinion. Statements are given below:

- I almost always throw the plastic packaging materials
- I often throw the plastic packaging materials
- I sometimes throw the plastic packaging materials
- I seldom throw the plastic packaging materials
- I almost never throw the plastic packaging materials

This method provides more information and meaning to the respondent and hence is highly reliable. One advantage of rating scales is that it requires less time and is interesting to use.

Ranking Scales

In ranking scales, respondents compare two or more objects and make choices and thus make relative judgements against similar objects. This scale is also known as comparative scale. Two approaches of ranking scales are method of paired comparisons and method of rank order.

(a) Method of Paired Comparisons

Here the respondents can express his attitude by making a choice between two objects. For example, he can make a choice between disposable plates and stainless-steel plates. But in the case of more than two objects, the number of judgements required in a paired comparison is given by the formula:

$$N = \frac{n(n-1)}{2}$$

where N = number of judgements, n = number of stimuli or objects to be judged.
The results of paired comparison provide ordinal data, and it can be converted into interval scale by the method of the *Law of Comparative Judgement* developed by L L Thurstone

Method of Rank Order

In this method, the respondents are asked to rank their choices. To secure a simple ranking of all items involved we simply total the rank values obtained by each item. The data obtained through this method will be ordinal data and hence rank ordering is an ordinal scale. The disadvantage is that if the number of items is more than ten, the respondents will be careless in assigning ranks.

Scale Construction Techniques

When we measure abstract concepts like attitudes, opinions etc. researchers generally use attitude scale or opinionnaire. In such a situation, the score of the individual responses assigns him a place on a scale. Here the researcher prepares a series of statements relevant to the issue and the respondents express his agreement or disagreement. To develop relevant statements, a researcher must consider the following points:

- The statements must elicit responses which are psychologically related to the attitude being measured
- The statements must discriminate between extremes of attitude and also between respondents who differ slightly

There are certain limitations while inferring attitudes from opinionnaires. Sometimes the respondents may conceal their attitudes, they may be unaware of their feelings about a social issue or their attitude towards an abstract situation etc. Sometimes attitudes cannot be inferred from

their behaviour. There is no absolute method for measuring attitude. To overcome these limitations, psychologists have developed certain scale construction techniques so that researchers can develop appropriate scales for their studies. Some of the approaches and the scale developed under such approaches are given below (Kothari, 2004):
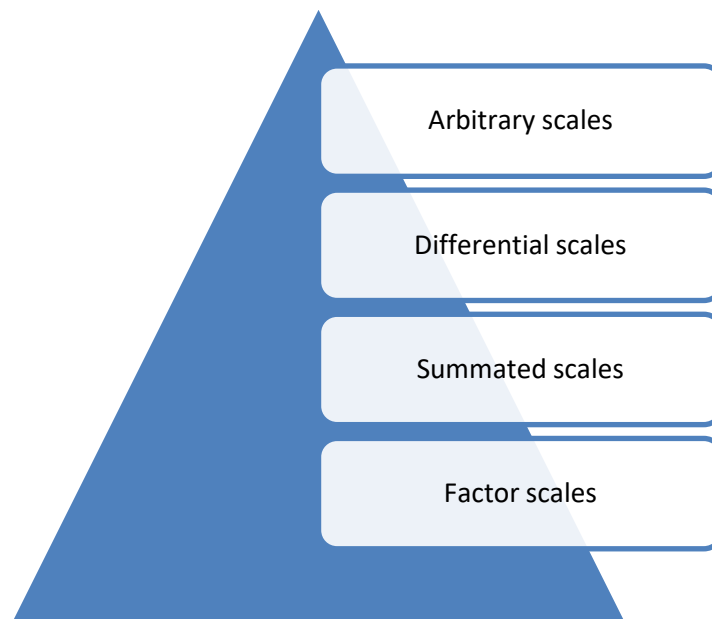
Figure 2.12. Different Types of Scales

(a) Arbitrary Scales

This scale is developed on an ad-hoc basis. Initially the researcher subjectively collects few statements relevant and appropriate to the topic. He then selects some of these items to be included in the measurement scale. The chief advantage of this scale is that it is easy to make, and it can be highly specific. But sometimes it lacks objectivity.

 (b) Differential Scales (or Thurstone-Type Scales)

Differential scales are developed using consensus scale approach. Here the selection of items to be included in a study are made by a panel of judges after evaluating their adequacy and relevancy. Procedure:

- The researcher collects a large number of statements relevant to the topic
- Submit those statements to a panel of judges
- Judges arranges those statements into groups ranging from one extreme to the other
- Each item/statement will have a composite position
- Each item selected is then assigned a median scale value
- Statements whose median values are evenly spread are selected and included in the final instrument

The statements are arranged in random order of scale value and administered to respondents as opinionnaire. This type of scales is mostly used to measure attitudes towards various issues like religion, war etc. Such scales are most reliable when measuring a single attitude.

(c)   Summated Scales (or Likert-Type Scales)

Summated scales are developed using item analysis approach. The summated scale consists of a large number of statements which expresses either a favourable or an unfavourable attitude towards an object. This instrument is administered to the respondent and he indicates his agreement or disagreement with each statement. Each response is assigned a numerical score and

the total score represents the respondent's attitude.

Example: in a study on the hazardous nature of open municipal dumping yards, the respondents are asked to express their opinion. A five-point scale is given below which follows the Likert scale pattern. (It may be three or seven-point scale).

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
(1)	(2)	(3)	(4)	(5)
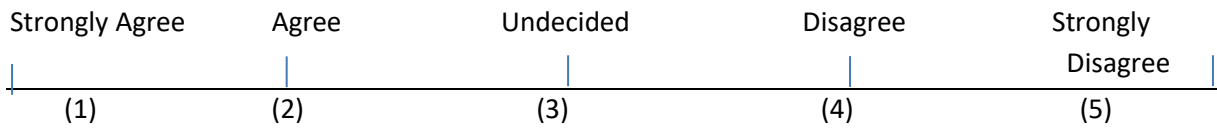
Each point on the scale carries a score. The score values may not be printed in the instrument but are shown here to indicate the scoring pattern. Each and every statement in the instrument will have a score value. Thus, it provides a total score for each respondent. If the instrument has 30 statements, the score values would be as follows:

30 x 5 = 150, most favourable response

30 x 3 = 90, neutral attitude

30 x 1 = 30, most unfavourable attitude

The scores for any respondent would lie between 30 and 150. If the score is above 90, it shows a favourable attitude towards the given point of view and if the score is below 90, it shows an unfavourable opinion.

It is advised to collect a large number of statements which are relevant to the attitude to be studied. A trial study should be conducted with a small group of respondents from those who are going to be studied. Scores are calculated and only those statements that correlate with the total test are included in the final instrument.

(d) Factor Scales

William Emory describes factor scales as "useful in uncovering latent attitude dimensions and approach scaling through the concept of multiple-dimension attribute space." Factor scales are developed through factor analysis or on the basis of inter-correlations of items which indicate that a common factor accounts for the relationship between items. Two important factor scales based on factor analysis are:
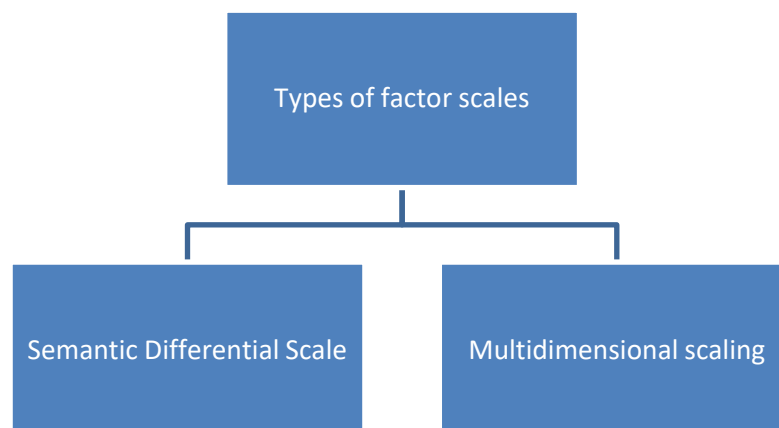

Figure2.13 Types of Factor Scales

(a) Semantic Differential Scale (SD)

Semantic Differential Scale was developed by Charles E Osgood, G J Suci and P H Tannenbaum in 1957. This scale is based on the assumption that an object can have different dimensions which can be located in multidimensional property space or semantic space. It consists of a set of bipolar rating scales satisfied/unsatisfied, strong/weak, active/passive etc. by which one or more respondents' rate one or more concepts on each scale item. Surveys or questionnaires using Semantic Differential Scale is the most reliable way to get information on people's emotional attitude towards a topic of interest.

(b) Multidimensional Scaling (MDS)

It is a relatively more complicated scaling device through which one can scale objects, individuals or both with minimum information. Multidimensional scaling can be characterized as a set of procedures for portraying perceptual or affective dimensions of substantive interest. Multidimensional scaling is used when all the variables in a study are to be analyzed simultaneously and all of them are independent variables.

Multidimensional scaling is a visual representation of distances or dissimilarities between sets of objects. "Objects" can be colors, faces, map coordinates, political persuasion, or any kind of real or conceptual stimuli (Kruskal and Wish, 1978). Objects that are more similar (or have shorter distances) are closer together on the graph than objects that are less similar (or have longer distances). As well as interpreting dissimilarities as distances on a graph, MDS can also serve as a dimension reduction technique for high-dimensional data (Buja et. al, 2007).

2.4. Measurement in Research

Measurement is an everyday process. We use certain standards in measuring things like weight, volume etc. We also measure abstract concepts like beauty, intelligence, personality, motivation etc. Measurement becomes a complex task when we measure abstract things.

Concept of Measurement

Measurement is a procedure for assigning symbols, letters, or numbers to empirical properties of variables according to rules. It is a process of mapping aspects of a domain onto other aspects of a range according to some rules of correspondence. Numbers are assigned for two reasons: numbers permit statistical analysis of the resulting data and numbers facilitate the communication of measurement rules and results.

For Example, we want to study the people visiting a supermarket. Initially, we tabulate those who come to the supermarket according to their gender. This is known as mapping the observed physical properties of those persons visiting the supermarket (the domain) onto a gender classification (the range). If the object in the domain is a male, assign to "0" and if female assign to "1". We can also record "yes" or "no" answers to a question as "0" and "1" or "1" and "2". In this way a categorical data is converted into numerical data. If we code various categories, the numbers we record are referred to as nominal data. Though they are numerical numbers, they do not share any arithmetic properties.

In examples of data where we set up inequalities, it is referred to as Ordinal Data. In the case of solid waste, we assign numbers depending on their toxicity. For example, we assign numbers one to six to toxic substances like tin, manganese, Sulphur, antimony, mercury, lead. Though we can write 6 >2

or 1 < 5, this does not show the difference in the amount of toxicity. We cannot infer that lead is five times toxic than manganese and so on, because it may be much more than that. The symbol, greater than (>) or less than (<) simply represents more and less. In case of abstract concepts, the symbol '>' may refer to 'happier than' or 'preferred to' and the like.

When we set up differences between data, it is referred to as interval data. When we form quotients where we can perform all arithmetic operations, such type of data is known as ratio data. The application of statistical techniques depends on the type of data we have collected.

Measurement Scales

Based on the four types of data mentioned above, measurement scales are classified on the basis of their mathematical properties.

Nominal scale

Ordinal scale

Interval scale

Ratio scale
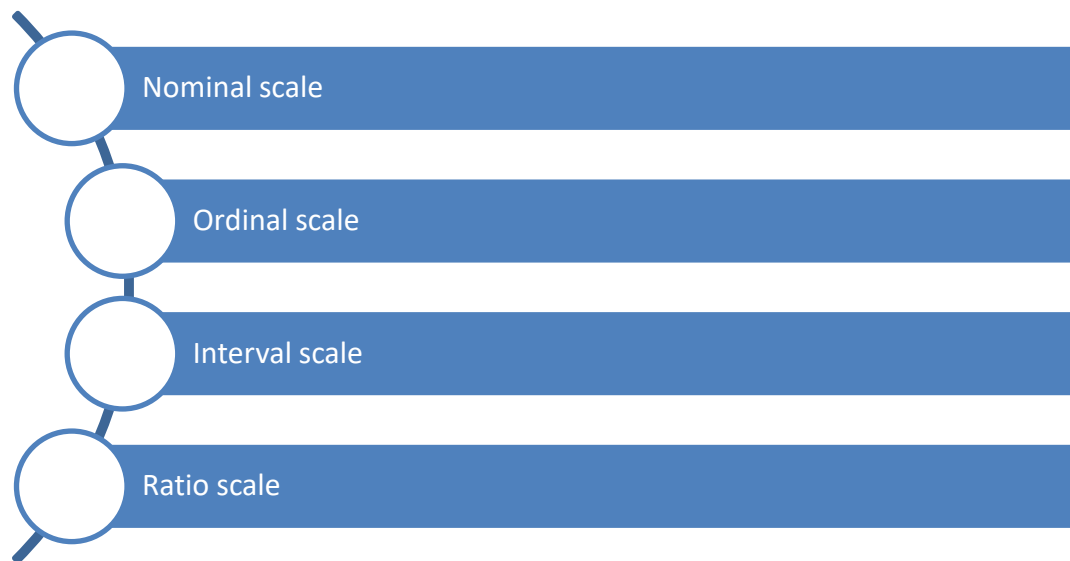
Figure 2.14 Types of Measurement Scales

Nominal Scale

A nominal scale is used to classify individuals, objects or responses based on a common shared property or characteristic. It simply assigns numbers to objects or responses in order to label them. These individuals, objects or responses are divided into subgroups where each member in the subgroup shares a common characteristic. A variable measured in a subgroup may have one, two or more subgroups. The numbers are just convenient labels and as such have no quantitative value. In this nominal scale, counting of members in each group is the only possible arithmetic operation. Hence, we use only 'mode' as the measure of central tendency. For statistical significance, Chi-square test is employed, and contingency coefficient is used for the measure of correlation.

Gender	Political parties	Attitude	Religion
•Male •Female •Neuteral	•BJP •INC •CPI(M) •CPI •TRS	•Favourable •Unfavourable	•Hindu •Christian •Muslim •Sikh

Figure 2.15. Examples for Nominal Scale

A nominal scale describes differences between things by assigning them into categories. Nominal data is counted data. Nominal scales are used in surveys and ex-post-facto research where data are classified into sub groups of the population.

Ordinal Scale

This is also known as ranking scale. It has the characteristics of a nominal scale, i.e., categorizing objects, responses etc. into subgroups but also ranks the subgroups in a certain order. The items are then arranged either in ascending or descending order. Also, the 'distance' between the subcategories is not equal as there is no quantitative unit of measurement. Rank orders denote ordinal scales and are used in qualitative research studies.

Income (Rs)	Age (years)
•<10,000 •10,000-25,000 •25,000-50,000	•18-24 •25-29 •30-34

Figure 2.16. Examples for Ordinal Scale

The ordinal scale uses a statement of 'greater than' or 'less than' but may not be able to say how much greater or less. Ordinal scales use 'median as the measure of central tendency. To measure dispersion, a percentile or quartile measure is used.

Interval Scale

Interval scales has all the characteristics of ordinal scales and it uses a unit of measurement that enables the objects or responses to be placed at equally spaced intervals in relation to the spread of the variable. This scale has a starting point and an ending point, and it is divided into equally spaced units. Interval scales can have an arbitrary zero, but it lacks an absolute zero. It cannot measure the complete absence of characteristics. Celsius and Fahrenheit scales are examples of interval scale.

The measure of central tendency in interval scale is 'mean' and 'standard deviation' is themeasure of dispersion. Statistical testing use product moment correlation techniques and 't' test and 'F' test.

Ratio Scale

A ratio scale has all the properties of nominal, ordinal and interval scales. It has absolute zero as

starting point and the difference between the intervals is measured from zero point. All mathematical operations can be applied in ratio scale. Ratio scale represents the actual amounts of variables. Example, education, measurement of income, age, number of family members, etc. A person who is 20 years old is twice as old as 10 years. Geometric and harmonious means are used as measures of central tendency and coefficients of variation may be calculated in statistical measurements.

Scales of Measurement

Table 2.1. Scales of Measurement

Scale	Characteristics	Common Examples	Specific Examples	Permissible Statistics	
				Description	Inference
Nominal	Numbers classify objects	Numbering of college students	Brand numbers, store types	Percentages, mode	Chi-square test, binomial test
Ordinal	Numbers indicate relative positions of objects, but not the magnitude of differences between them	Quality rankings	Preference rankings, social class	Percentile, median	Rank order correlation, Friedman ANOVA
Interval	Difference between objects	Temperature - Fahrenheit	Attitudes, opinions	Range, mean, Standard deviation	Product moment correlation
Ratio	Zero point is fixed, ratio of scale values can be compared	Length, height, weight	Age, sales, education	Geometric mean and harmonious mean	Co-efficient of variation

Tests of Measurement
Three major considerations for evaluating a measurement tool are tests of validity, reliability, practicality. According to Thorndike and Hagen (1969), Validity refers to the extent to which a test measures what we actually wish to measure, Reliability has to do with the accuracy and precision of a measurement procedure and Practicality is concerned with a wide range of factors of economy, convenience and interpretability.
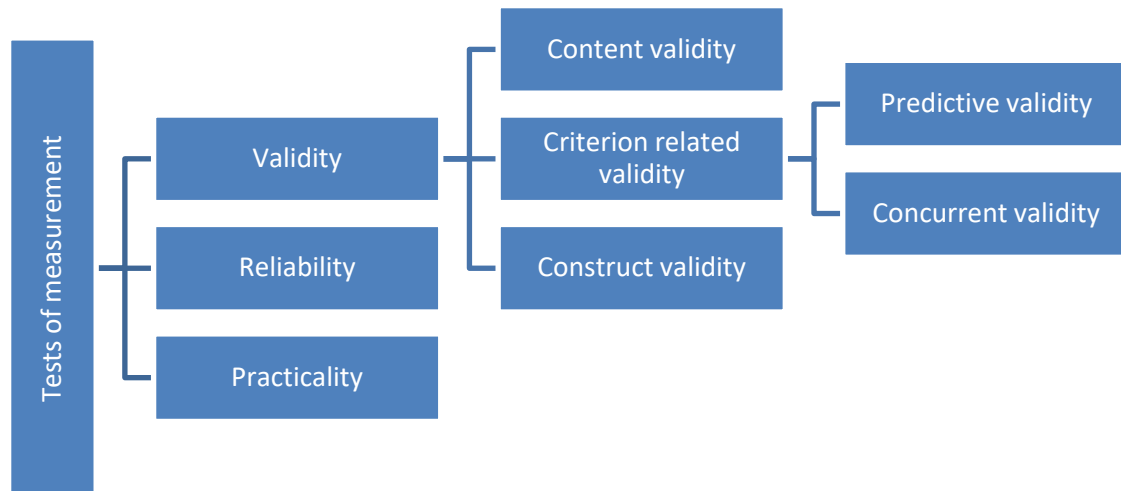
Figure 2.17. Tests of Measurement

(a) Test of Validity

Validity is the most important criterion and represents the degree to which the instrument measures what it is supposed to measure.

(i)   **Content Validity** It is the extent to which a measuring instrument ensures adequate coverage of the topic which is studied. If the instrument draws a representative sample of the universe, it may have good content validity.

(ii)   **Criterion-Related Validity** It represents our ability to predict some outcome. The concerned criterion must be relevant, free from bias, it should be reliable or reproducible and the information specified by the criterion must be available.

    a)   Predictive validity represents the usefulness of an instrument in predicting future result.

    b)   Concurrent validity refers to the usefulness of a test in closely relating to other instruments of known reliability.

(iii)   **Construct Validity** It is the degree to which scores on a test can be accounted for by the explanatory constructs of a sound theory. A test instrument possesses construct validity if it confirms to predicted correlations with other theoretical propositions.

(b) Test of Reliability

If a test instrument provides consistent results, we refer to it as a reliable instrument. A reliable test need not be valid test, but it contributes to validity. On the other hand, a valid test will always be reliable.

Aspects of Reliability

Stability refers to consistent results with repeated testing with the same person using the same instrument.

Equivalence refers to the amount of error produced by various investigators or different samples of the items being studied.

Reliability can be ensured by standardizing the conditions under which measurement happens and by following uniform procedures for measurement among different groups.

(c) Test of Practicality

The practicality of an instrument is interpreted in terms of economy, convenience and

interpretability of the instrument. The measuring instrument must provide detailed instructions for administering the test, scoring keys, evidence about reliability, guides for using the test and interpreting the results and it should be easy to administer.

2.5. Methods of Data Collection

Data collection is a process of collecting information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes. When we undertake a research study, we need to collect the required information. However, in many cases the required information is already available, and we need to extract the information. Researchers choose data collection strategies based on their requirement.
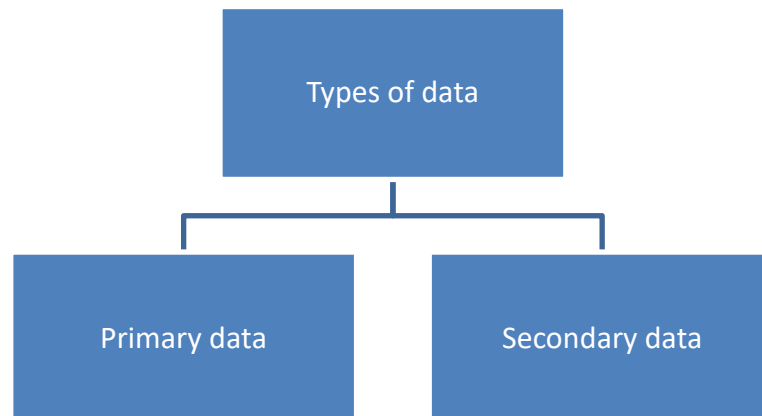
Figure 2.18. Types of data

Primary Data: Data collected from primary sources. It gives firsthand information. Examples – attitude of a community towards open municipal dumps, evaluating a social program, determining the job satisfaction of the employees of an organization etc.

Secondary Data: Data collected from secondary sources. Examples - Collection of data from sources like articles, journals, books, magazines etc. to get historical information, use of census data, voter's list, municipal records, hospital records etc. to obtain information about community.

To Do Activity
Identify the primary data and secondary data for a study on 'sustainable plastic waste management.'

Data Collection Using Primary Sources

The selection of the appropriate data collection method depends on the purpose of the study. It is always important to know the age, education and socio-economic status of the population before selecting a tool for data collection. Different data collection methods are given below (Kumar R, 2011):
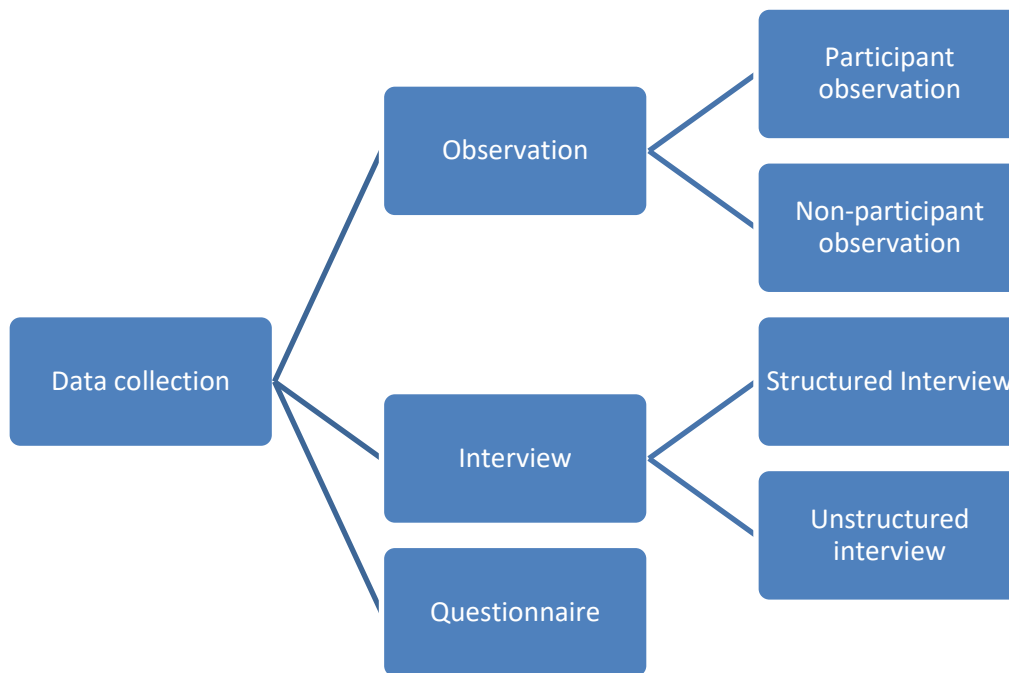
Figure 2.19. Methods of Data Collection

(i) Observation

It is a purposeful, systematic and selective way of watching and listening to an interaction or phenomenon as it takes place. Example – study the behaviour and personality traits of an individual; study the dietary patterns of a population. It is effective when required information cannot be elicited by questioning.

There are two types of observation:

- **Participant Observation**– the researcher participates in the activities of the group being observed in the same manner as its members, with or without their knowing that they are being observed. Example – live in a prison in order to study the life of prisoners.
- **Non-Participant Observation**– researcher is a passive observer, without involving in the activities of the group.

There is a possibility that some respondents display change in behaviour when they are aware that they are being observed. This is known as 'Hawthorne effect'. Observation should be complete and free from observer bias.

In qualitative studies Narrative and descriptive recording of observation is used. Narrative recording provides a deeper insight into the interaction. Some researchers develop their own scales for recording observation.

(ii) The Interview

An interview is a person-to-person interaction between two or more individuals with a specific purpose in mind. Burns (1997) defines interview as 'a verbal interchange, often face-to-face, though the telephone may be used, in which the interviewer tries to elicit information, beliefs or opinions from another person.'

Unstructured Interview	Structured Interview
• Flexible content • Flexible sequence • Flexible design	• Rigid structure • Rigid questions • Rigid order

Figure 2.20. Characteristics of Structured and Unstructured Interviews

Figure 2.21. Types of Unstructured Interviews

- **In-Depth Interviews** It Is A Repeated Face-To-Face Interview Between The Interviewer And The Respondent. It is used to elicit respondent's perspective on their lives or experiences in their own words.

- **Focus Group Interviews** It is conducted in a group to understand the perceptions and experiences of a group of people who have some common experience with regard to a situation or event. Accurate recording of the interview is required.

- **Narratives** The researcher passively listens to a person's retelling of an incident in his/her life. The researcher only has to encourage the person occasionally. Narratives have a therapeutic effect on the narrator. Careful and accurate recording methods are required.

- **Oral Histories** It involves historical, social or cultural events. The researcher is involved in active and passive listening of a historical event that took place in the past to elicit information about a culture or custom that has been passed from generation to generation.

Advantages of interview	Disadvantages of interview
•more appropriate in complex situations •useful for collecting indepth information •questions can be explained •information can be supplemented	•time consuming and expensive •quality of data depends on the quality of interaction •bias of the interviewer •multiple interviewers yield varying data
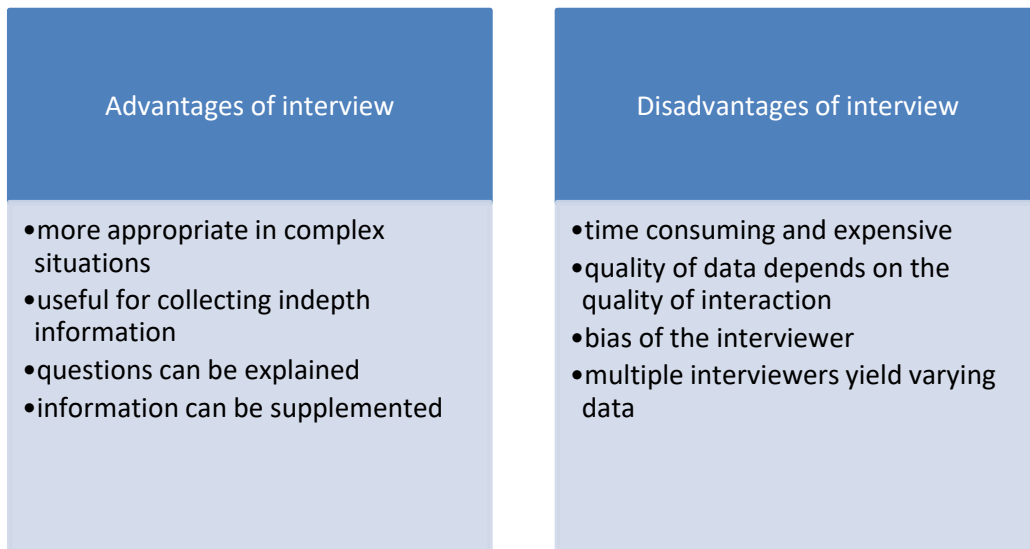
Figure 2.22. Advantages and Disadvantages of Interview

(iii)   The Questionnaire

It is a written list of questions where the answers are recorded by the respondents. It is important that the questions should be easy to understand and clear. A questionnaire can be administered in the following ways:

- **Mailed Questionnaire**– mailed to prospective respondents possibly with a prepaid self-addressed envelope for increased response rate.
- **Collective Administration**– administered to students in a classroom, participants in a program, people assembled in one place etc.
- **Administration in a Public Place**– administered in public places like hospitals, health centres, shopping malls etc.

Advantages of questionnaire	Disadvantages of questionnaire
•less expensive •greater anonymity	•limited application •low response rate •no space for spontaneous response •possible consultation with others
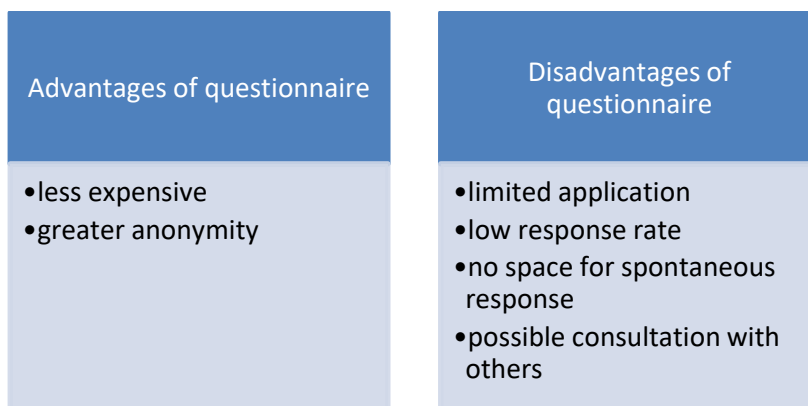
Figure 2.23. Advantages and Disadvantages of Questionnaire

Forms of Questions

- **Open-Ended Questions** the possible responses for the questions are not given. The respondents write down their responses in their own words.
- **Closed Questions** possible answers for the questions are set, respondents tick the right category.

Formulating Effective Questions

- Always use simple language
- Always use unambiguous questions

- Avoid double-barreled questions (a question within a question)
- Avoid leading questions (a question that leads answer in a certain direction)
- Avoid questions that are based on presumptions

Other Methods of Data Collection

These methods are especially used in marketing and business world.

- **Warranty Cards** postal sized cards used by businessmen to garner information regarding their products.
- **Distributor or Store Audits** conducted by distributors to estimate the market size, market share, seasonal purchase pattern etc.
- **Pantry Audits** to understand the consumer behaviour by studying the types of products and brands they purchase
- **Consumer Panels** a set of consumers who are interviewed over a period of time
- **Use of Mechanical Devices** use of eye camera, pupillometric camera, psychogalvanometer, audiometer etc. to collect information
- **Projective Techniques** used by psychologists to elicit the underlying motives, urges, or intentions which the respondents are unaware or resist revealing. It is especially used in motivational researches and attitude surveys. Important projective techniques are:
  (a) Word association tests
  (b) Sentence completion tests
  (c) Story completion tests
  (d) Verbal projection tests
  (e) Pictorial techniques – Thematic Apperception test, Rosenzweig test, Rorschach test, Holtzman Inkblot test, Tomkins-Horn picture arrangement test
- **Play Techniques**
- **Quizzes, Tests and Examinations**

Collection of Data Using Secondary Sources

Both qualitative and quantitative research studies use secondary data. Secondary data are already collected and analysed by someone else. It may be either a published data or unpublished data. The following are some of the sources of secondary data:

- **Government and Semi-Government Publications** includes census data, labour force surveys, health reports, economic forecasts, demographic information, educational reports etc.
- **Earlier Research** published reports of earlier studies, publications of foreign governments or of international bodies, international and national journals, published and unpublished articles and theses, reports published by research scholars, universities, economists etc.
- **Personal Records** personal records, diaries, letters, unpublished biographies and autobiographies etc.
- **Mass Media** reports published in print and electronic media

Researchers should be cautious in the following areas in using secondary data:

- Reliability of data
- Adequacy of data
- Personal bias

Summary

In this chapter, we have learnt about various types of sampling methods used in research, measurement and scaling procedure, various tools for data collection, and the importance of using primary and secondary data. Two types of sampling are probability sampling and non-probability sampling. In probability sampling, every item/unit of the universe has an equal chance of being included in the sample. In non-probability sampling there is no probability that each unit/element is included in the sample. Scaling is a procedure of assigning numbers to various degrees of attitudes, opinions and other related concepts. Scaling procedures tries to quantitatively measure abstract concepts like attitude, preferences etc. Measurement is a procedure for assigning symbols, letters, or numbers to empirical properties of variables according to rules. Numbers are assigned for two reasons: numbers permit statistical analysis of the resulting data and numbers facilitate the communication of measurement rules and results. The four types of measurement scales are nominal scale, ordinal scale, intervals scale and ratio scale. Data collection is a process of collecting information from all the relevant sources to find answers to the research problem, test the hypothesis and evaluate the outcomes. Primary data is collected from primary sources. It gives first - hand information. Secondary data is collected from secondary sources which includes data from sources like articles, journals, books, magazines etc. to get historical information, use of census data, voter's list, municipal records, hospital records etc. to obtain information about community.

Model Questions

1. What are the principles of sampling?
2. Differentiate between probability sampling and non-probability sampling.
3. Discuss the importance of scaling techniques.
4. What are the different measurement scales used in research?
5. Write briefly on the tests of validity and reliability.
6. List out the different methods of data collection.

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Chapter 3 Introduction to Statistics

Introduction

Our world and our lives are filled with counting and measuring. Statistics help us decide how best to count and measure, how to represent numerical information – especially information about groups – effectively and without misleading ourselves and others, and how to explore our ideas about relationships among factors that affect quantitative data. Statistics allow us to summarize large data sets in ways that let us make sense of what would otherwise be a web of detail. The term "statistics" is used in two senses: first in plural sense meaning a collection of numerical facts or estimates. Secondly, as a singular noun, 'statistics' denotes the various methods adopted for the collection, analysis and interpretation of the facts numerically represented.

Objectives

At the end of the chapter, students will be able to:

➢ Understand the concept of statistics in research
➢ Explain different measures of central tendency in research
➢ Describe various measures of dispersion

Structure

3.1	• Meaning and Definition of Statistics
3.2	• Measures of Central Tendency
3.3	• Probability
3.4	• Probability Distributions
3.5	• Testing of Hypotheses
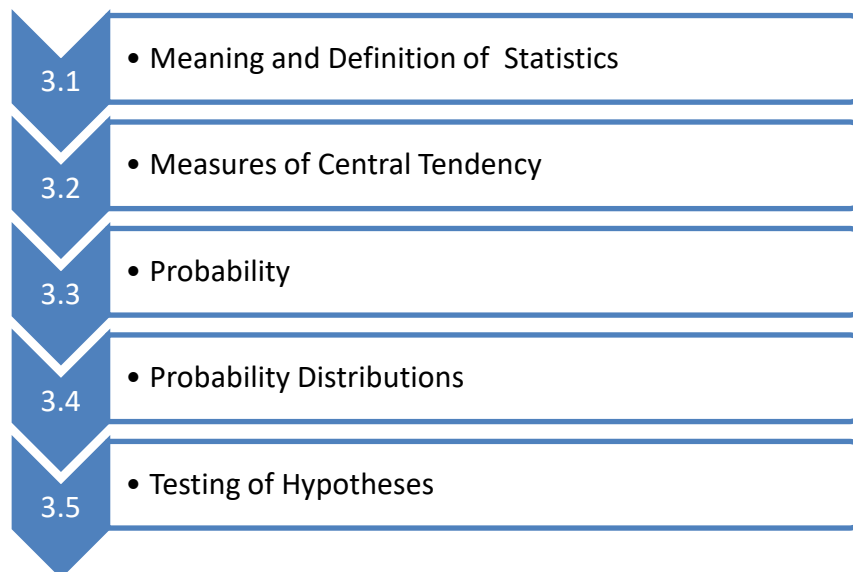
Figure 3.1 Chapter Flow

3.1. Meaning and Definition of Statistics

Definition

- "Statistics are numerical statements of facts in any department of enquiry placed in relation to each other." —A.L. Bowley
- "By statistics we mean aggregates of facts affected to a marked extent by multiplicity of causes, numerically expressed, enumerated or estimated according to reasonable standard of accuracy, collected in a systematic manner for a predetermined purpose, and placed in relation to each other."—Horace Sacrist

- "Statistics refers to the body of technique or methodology, which has been developed for the collection, presentation and analysis of quantitative data and for the use of such data in decision making." —Ncttor and Washerman
- "Statistics may rightly be called the science of averages." —Bowleg
- "Statistics may be defined as the collection, presentation, analysis, and interpretation of numerical data." —Croxton and Cowden

Functions of Statistics

- To present facts in a definite form: Without a statistical study our ideas are likely to be vague, but figures helps us to represent things in their true perspective.
- To simplify complex data: It is cumbersome to treat large numbers and hence they are simplified by taking a representative sample or by taking average to give a bird's eye view of the large masses.
- To use it as a technique for making comparisons: The significance of certain figures can be better appreciated when they are compared with other figures of the same type. The comparison between two different groups is best represented by certain statistical methods, such as averages, coefficients, rates, ratios, etc.
- To enlarge individual experience: An individual's knowledge is limited to what he can observe and see. His knowledge is extended in various ways by studying certain conclusions and results, based on numerical investigations.
- To provide guidance in the formulation of policies: The purpose of statistics is to enable accurate decisions, whether they are taken by a businessman or Government. Statistics is greatly employed in management, governance and development.
- To enable measurement of the magnitude of a phenomenon: it helps people to know the economic growth, agricultural production, health index, educational advancement etc. of a country.

Scope and Importance of Statistics

The development in statistical studies has considerably increased its scope and importance. The scope of statistics can be explained in the following areas:
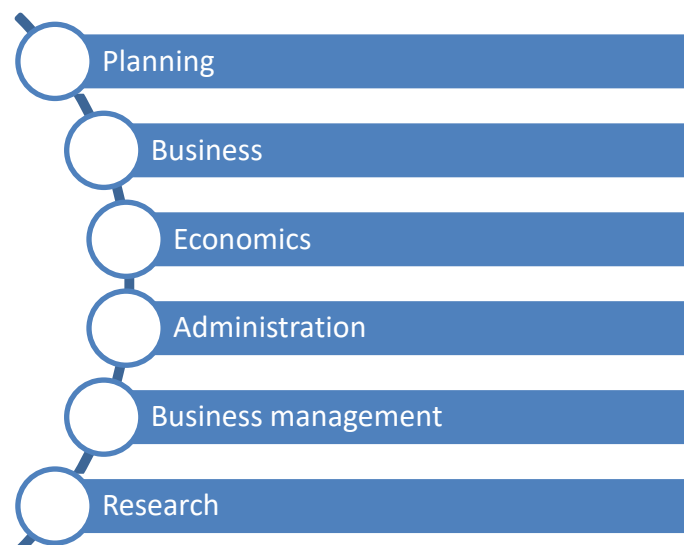
- Planning
- Business
- Economics
- Administration
- Business management
- Research

Figure 3.2. Scope of statistics

- Planning is necessary for efficient workmanship and in formulating future policies. Statistics provides the valued interpretation of facts and figures relevant to planning.
- Statistics helps business in forecasting the future trends and tendencies. To estimate the market fluctuations, changes in the demand conditions etc. statistical techniques are often used.
- Statistics is indispensable in economic studies. Statistical data and their analysis are used to solve a variety of economic problems such as in consumption, production, distribution of income and assets, poverty, unemployment etc. Use of statistics in Economics has led to the formulation of many economic laws like Engel's law of consumption, Pareto's Laws of distribution of income etc.
- Statistics has become indispensable for administrators. It was used to collect data relating to manpower, crimes, income etc. for formulating different policies. It is being widely used for formulating and forecasting different plans and policies of the state administration.
- Business managers take decisions in the face of uncertainty. Statistical tools like collection, classification, analysis and interpretation of data are essential in business management. The success of modem business primarily depends on accurate forecasting of the future demand and market trends.
- Statistics is vital for undertaking any research activities. Statistical techniques are used for collecting information in any research. It is also used for analysis and interpretation of research findings.

Limitations of Statistics
- The use of statistics is limited to numerical studies: Statistical methods cannot be applied to study the nature of all types of phenomena. Statistics deal with only such phenomena as are capable of being quantitatively measured and numerically expressed.
- Statistical methods deal with population or aggregate of individuals rather than with individuals.
- Statistics relies on estimates and approximations: Statistical laws are not exact laws like mathematical or chemical laws. They are derived by taking a majority of cases and are not true for every individual.
- Statistical results might lead to wrong conclusions by deliberate manipulation of figures and unscientific handling. This is so because statistical results are represented by figures, which are liable to be manipulated.
- Statistics is only one of the methods of studying a problem. Quite often it is necessary to consider a problem in the light of social considerations like culture, region, etc. Therefore, statistical conclusions need to be supplemented by other evidences.

Role of Statistics in Management Decisions
Operating a business of any size is a complex undertaking. A company must always engage in long-term planning, develop new products or services, streamline production or delivery and locate new customers while serving existing clients. Managers can make informed decisions by using Statistical methods and Statistical thinking. Statistics helps the managers in the following ways:
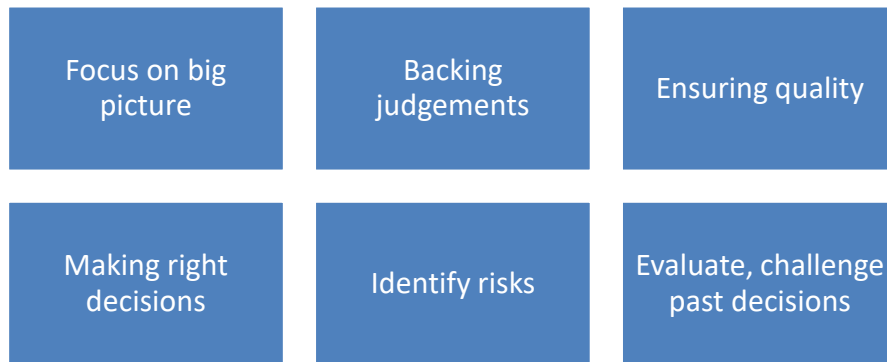
| Focus on big picture | Backing judgements | Ensuring quality |
| Making right decisions | Identify risks | Evaluate, challenge past decisions |

Figure 3.3. Role of Statistics

- **Focusing on Big Picture** Statistical analysis of a representative group of consumers can provide a reasonably accurate, cost-effective snapshot of the market with faster and cheaper statistics than attempting a census of every single customer a company may ever deal with. The statistics can also afford leadership an unbiased outlook of the market, to avoid building strategy on uncorroborated presuppositions.

- **Backing Judgments** Statistics back up assertions. Statistics can provide objective goals as well as hard evidence to substantiate positions or provide a level of certainty to directions.

- **Ensuring Quality** Statistics provide the means to measure and control production processes to minimize variations, which lead to error or waste, and ensure consistency throughout the process.

- Right data and information enable managers to make right decisions in strategic areas such as emerging technologies and helps them focus on strategy and policy issues in statutory and regulatory requirements.

- Statistics provide information for managers to identify risks, helps in prioritization of operations, management of resources etc.

- By using data and facts, managers can determine the effectiveness of their past decisions. They may be able to review, evaluate, challenge and change opinions and decisions.

3.2. Measures of Central Tendency

A measure of central tendency is a summary statistic that represents the centre point of a dataset. These measures indicate where most values in a distribution fall and are also referred to as the central location of a distribution. It tells the point about which items have a tendency to cluster. Measure of central tendency is also known as statistical average. In statistics, the three most common measures of central tendency are the mean, median, and mode.

The Frequency Distribution

Measurement in a research is conducted in several ways and provides various degrees of precision. The simple measurement occurs when people or objects are ranked or arranged in an ordinal series according to some attribute. Measurement of individual performance by means of tests is usually expressed as a *score*. When scores are expressed in equal units, they constitute an interval scale, but they do not possess a true zero. When measures are expressed in equal units, and are also taken from a true zero, they constitute ratio scales.

Continuous and Discrete Series

A continuous series is one which is capable of any degree of subdivision. For example, physical measures and mental test scores fall into a continuous series, i.e., within the given range, any score, integral or fractional, may exist and can have meaning. Series which exhibit real gaps are called discrete. Example: Salary scale of employees in an organization.

Meaning of Test Scores in a Continuous Series

Scores in a continuous series are thought to be as distances along a continuum, rather than as discrete points. Example:

Score 150

150

149.5 |_____^_____| 150.5
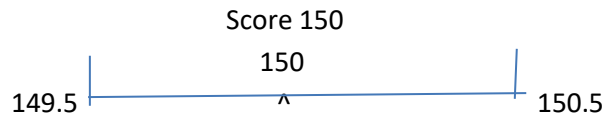
The mathematical meaning of a score is an interval which extends along some dimension from 0.5 units below to 0.5 units above the face value of the score.

Frequency distribution are also expressed graphically which aid in better analysis of numerical data. Some of the methods of representing frequency distribution graphically are:
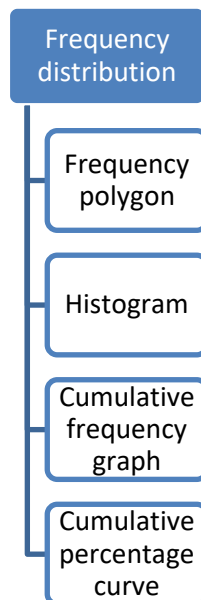
Figure 3.4. Graphical Representation of Frequency Distribution

Table 3.1. Measures of Central Tendency

Sl. No.	Measures of Central Tendency
1	Arithmetic Mean = $\bar{X} = \frac{\Sigma X}{N}$
2	Median is the $\left(\frac{n+1}{2}\right)^{th}$ measure in order of size
3	Mode is the score that occurs most frequently
4	Geometric Mean = G.M = $\sqrt[n]{\Pi X i}$ $= \sqrt[n]{X_1 . X_2 . X_3 \dots X_n}$
5	Harmonic Mean = Rec. $\frac{\Sigma Rec\ X_i}{n}$ $=$ Rec. $\frac{Rec X_1 + Rec X_2 + \cdots + Rec X_n}{n}$

The Arithmetic Mean

The value of a measure of central tendency is an 'average' which represents all of the scores made by the group and gives a concise description of the performance of the group. It also enables the researcher to compare two or more groups in terms of typical performance. The three 'averages' or measures of central tendency are the arithmetic mean, the median and the mode.

The arithmetic mean of a distribution is the arithmetic average. It is the most common measure of central tendency. It is calculated by dividing the sum of all the scores by the total number of scores. The formula for mean:

Mean or $\bar{X} = \frac{\Sigma X}{N}$ (for ungrouped data)

Where $\bar{X}$ = mean, Σ = symbol for summation, X= a score or other measure, N = total number of scores

Arithmetic Mean for Grouped Data

In case of data grouped into frequency distribution, the mean is calculated as follows:

$$\text{Mean} = \frac{\Sigma f X}{N}$$

Arithmetic Mean from Combined Samples or Groups

The formula for the weighted mean of *n* groups is

$M_{comb} = \frac{N_1 M_1 + N_2 M_2 + \cdots + N_n M_n}{N_1 + N_2 + \cdots + N_n}$ (weighted arithmetic mean obtained from combining n groups)

When only two groups are combined, the weighted mean is:

$M_{comb} = \frac{N_1 M_1 + N_2 M_2}{N_1 + N_2}$

Mean is used in summarizing the essential features of a series and enable the data to be compared. It is a relatively stable measure of central tendency. It is especially used on economic and social studies where direct quantitative measurements are possible.

The Median

Median is the value of the middle item of a series when it is arranged in ascending or descending order of magnitude. It is a point above and below which one-half of the scores fall. It is a measure of position rather than of magnitude and is frequently found by inspection rather than calculation. When there are odd number of scores, the median is the middle score, and if the number of scores is even, the median is the midpoint between the two middle scores.

Example: odd number of scores, first we arrange the scores in order.

7   6   5   (4)   3   2   1

Median is 4, three scores are above and three scores below, the score 4 covers the interval 3. 5 to 4.5, its mid-point is 4.

For even number of scores,

                    3.5

6   5   4   ↑   3   2   1

Median is 3.5, three scores above and three scores below. Formula for finding median in a series of ungrouped scores is

Median = the $\left(\frac{n+1}{2}\right)^{th}$ measure in order of size.

Formula for Median when the data have been classified into a frequency distribution is:

Median = $l + \left(\frac{\frac{N}{2} - F}{f_m}\right)$ I, where

l = exact lower limit of the class interval upon which the median lies

N/2 = one half of the total number of scores

F = sum of the scores on all intervals below 'l'

f_m = frequency (number of scores) within the interval upon which the median falls

i = length of class interval

Mean and median are generally used to represent the "typical" score. However, when the distribution of scores is such that most scores are at one end and relatively few are at the other (known as skewed distribution), the median s preferable because it is not influenced by extreme scores at either end of the distribution.

Median is a positional average and hence used only in the context of qualitative phenomena especially in sociological fields.

The Mode

The 'crude' mode is a score that occurs most frequently in a distribution. It is located by inspection. In grouped data distribution, mode is assumed to be the midscore of the interval in which the greatest frequency occurs. In some distributions there may be more than one mode. A two-mode distribution is termed as bimodal, and more than two, multimodal. When calculating mode from a frequency distribution, we distinguish between the 'true' mode and the crude mode. The true mode is the point of greatest concentration in the distribution.

When the frequency distribution is symmetrical, the formula for approximating true mode is:

Mode = 3 Median – 2 Mode

Mode is also a positional average and is not affected by values of extreme items. It is useful in all situations where we want to eliminate the effect of extreme variations.

Geometric Mean

It is defined as the nth root of the product of the values of *n* times in a given series.

Geometric mean or G.M = $\sqrt[n]{\Pi X i}$

$$= \sqrt[n]{X_1 . X_2 . X_3 \ldots X_n}$$

Where

G.M. = geometric mean

N = number of items

X_i = i^{th} value of the variable X

Π = conventional product notation

Harmonic Mean

It is defined as the reciprocal of the average of reciprocals of the values of items of a series.

Harmonic Mean (H.M.) = Rec. $\frac{\sum Rec\ X_i}{n}$

$$= \text{Rec.} \frac{RecX_1 + RecX_2 + \cdots + RecX_n}{n}$$

Where HM = harmonic mean

Rec = Reciprocal

X_i = i^{th} value of the variable X

n = number of items

To Do Activity

Calculate the mean, median and mode for the following frequency distributions.

Scores	f
0-9	6
10-19	8
20-29	10
30-39	15
40-49	25
50-59	30
60-69	21
70-79	19
80-89	14
90-99	9
100-109	5
	_____
	N = 162

Measures of Variability

Measures of variability is the measure of 'scatter' or 'spread' of the separate scores around their central tendency. Four measures that indicate the variability or dispersion within a set of measures are:
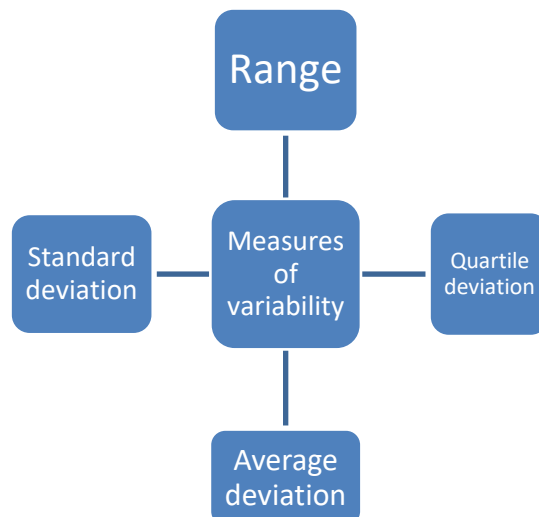

Figure 3.5. Measures of Variability

(a) The Range

The range is the interval between the highest and the lowest scores. For example, if the highest score of a test is 51 and the lowest score is 36, the range is 51 – 15 = 36. The range is the most general measure of the spread or scatter and is calculated when we wish to make a rough

comparison of two or more groups for variability.

(b) The Quartile Deviation (Q)

The quartile deviation or Q is one-half the scale distance between the 75th and 25th percentiles in a frequency distribution. The 25th percentile or Q_1 is the first quartile on the score scale, the point below which lie 25% of the scores. The 75th percentile or Q_3 is the third quartile on the score scale – the point below which lie 75% of the scores. When we have these two points the quartile deviation or Q is found from the formula

$Q = \frac{Q_2 - Q1}{2}$

(quartile deviation or Q calculated from a frequency distribution)

To find Q, we must first compute the 75th and 25th percentiles. These statistics are found in exactly the same way as was the median, which is the 50th percentile or Q_2.

The formulas are: $Q_1 = l + i \left(\frac{N/4 - Cum\, f_1}{f_q} \right)$

$Q_3 = l + i \left(\frac{3N/4 - Cum\, f_1}{f_q} \right)$

(quartiles Q_1 and Q_3 are computed from a frequency distribution)

Where l = the exact lower limit of the interval in which the quartile falls

     I = the length of the interval

  Cum f_1 = cumulative f up to the interval which contains the quartile

f_q = the f on the interval containing the quartile

(c) The Average Deviation or AD

The average deviation (or mean deviation) is the mean of the deviations of all the separate scores in a series taken from their mean. In averaging deviations to find the AD, signs are not considered, and all deviations whether plus or minus are treated as positive.

The formula for the AD when scores is ungrouped is:

    $AD = \frac{\Sigma\, |x|}{N}$

(average deviation when scores are ungrouped)

In which the bars I I enclosing the x indicate that the signs are disregarded in arriving at the sum.

x is a deviation of a score from the mean, X – M = x

The formula for calculating average deviation from grouped data is:

    $AD = \frac{\Sigma\, |fx|}{N}$

(average deviation from grouped data)

(d) The Standard Deviation

The standard deviation or SD is the most stable index of variability and is widely used in research studies. Standard deviation is symbolized using the Greek letter (σ).

The formula for standard deviation when scores is ungrouped is:

    $\sigma = \sqrt{\frac{\Sigma x^2}{N}}$

The formula for standard deviation when data are grouped into a frequency distribution is:

$$\sigma = \sqrt{\frac{\Sigma f x^2}{N}}$$

Table 3.2. Measures of Variability

Sl. No.	Measures of Central Tendency
1	Range = Highest Score -Lowest Score
2	Quartile Deviation, $Q = \frac{Q_2 - Q1}{2}$
3	Average Deviation, AD $= \frac{\Sigma \mid fx \mid}{N}$
4	Standard Deviation,$\sigma = \sqrt{\frac{\Sigma f x^2}{N}}$

When to Use Various Measures of Variability

(1) Range

(a) when the data are too scant or too scattered to justify the computation of a more precise measure of variability

(b) when we need the knowledge of extreme scores or of total spread

(2) Quartile Deviation

(a) When the median is the measure of central tendency

(b) When there are scattered or extreme scores which would influence the SD disproportionately

(c) When the concentration around the median is of primary interest

(3) Average Deviation

(a) When it is desired to weight all deviations from the mean according to their size

(b) When extreme deviations would influence SD unduly

(4) Standard Deviation

(a) When the statistic having greater stability is sought

(b) When extreme deviations should exercise a proportionately greater effect upon the variability

(c) When coefficients of correlation and other statistics are subsequently to be computed

Variance and Coefficient of Variation

Table 3.3. Variance and Coefficient of Variation

1	coefficient of standard deviation = SD/arithmetic average of the series
2	Coefficient of variation = Coefficient of SD multiplied by 100
3	Variance = square of standard deviation

Standard deviation, variance and coefficient of variation is used in research studies and is regarded as a satisfactory measure of dispersion in a series. Standard deviation is less affected by fluctuations in sampling. It is amenable to mathematical manipulation because the algebraic signs are not ignored in its calculation. This makes SD a popular measure of the scatteredness of a series. It is popularly used in the context of estimation and testing of hypothesis.

3.3. Probability

Probability theory plays a very important role in many areas of physical, social, biological, engineering and management sciences. It lays the foundations for a systematic study of mathematical statistics. Probability theory describes the occurrence or non-occurrence of some events. There are several ways of defining the probability of an event.

Meaning of Probability

The probability of an event is a quantitative measure showing the degree of belief which one has in the occurrence or non-occurrence of the event under consideration. There are several examples in experimental studies, where an experiment can be repeated a large number of times under identical conditions. In such cases, events exhibit a statistical regularity. The probability is a quantitative measure and therefore it allows us to compare the chances of occurrence of two or more events. For example, a businessman may like to estimate his expected profit in a new company.

Let A be an event in an experiment 'E'. Suppose it is possible to repeat the experiment E under identical conditions. If in first n repetitions of E, the event A occurs n (A) times, the n (A) is called the frequency of A and $\frac{n(A)}{n}$ is called the relative frequency of A. The probability of event A is then defined by

P(A) = $\lim_{n \to \infty} \frac{n\ (A)}{n}$, provided this limit exists.

According to the subjective definition, the probability of an event is assigned by an individual according to his subjective opinion or experience. These probabilities represent the degree of confidence and belief which one has in the occurrence of an event.

Axiomatic Definition of Probability– In 1933, Russian mathematician Kolmogorov gave the modern definition of probability. According to this definition, the probability P (A) of an event A is a function. To define a function, we need a domain space, a range space and a rule which assigns a value to every element of the domain space. For the probability function, we also need the same things. Now the domain space is a σ-field A of events, and the range space is the closed interval [0, 1] of the real line. In other words, starting with an experiment E and its associated sample space S, we first define a σ-field A of events in which we are interested. The probability is then a real valued function P (A) defined on A such that the following axioms are satisfied.

Axiom 1   P(A) ≥ 0, ∀A ∈ A

Axiom 2   P(S) = 1

Axiom 3   For any sequence of disjoint events A$_1$, A$_2$, ..,.. Belonging to A,
                     P [$\bigcup_{i=1}^{\infty} A_i$] = $\sum_{i=1}^{\infty} P\ (A_i)$
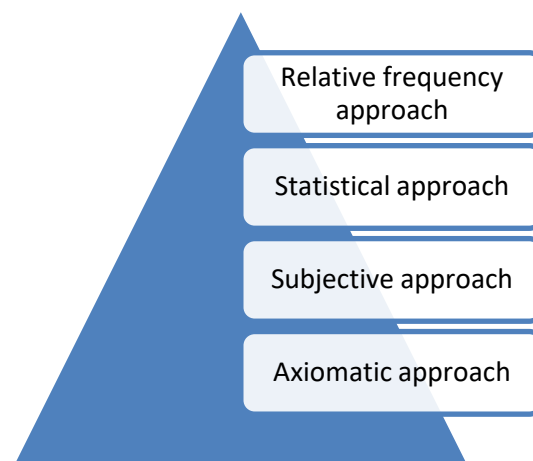
Different Approaches of Probability

Figure 3.6. Different Approaches of Probability

(a) The Relative Frequency Approach

Let us consider an example. Following table gives a distribution of daily solid waste production of some households.

Solid waste per day (in grams)	Below 100	100-150	150-200	> 200
households	20	40	50	15

If a household is selected at random from the above group of houses and we are interested in finding the probability that the amount of solid waste generated was under 150 grams, then as the number of households having solid waste less than 150 grams is 20 + 40 = 60 and the total number households is 20 + 40 + 50 + 15 = 125, therefore the relative frequency that the household generate solid waste less than 150 grams is $\frac{60}{125}$ = $\frac{12}{25}$

This relative frequency is nothing but the probability that the household selected is producing solid waste less than 150 grams.

(b) Statistical (or Empirical) Probability

If an event A happens m times in n trials of an experiment which is performed repeatedly under essentially homogeneous and identical conditions, then the probability of happening A is defined as:

$$P(A) = \lim_{n \to \infty} \frac{m}{n}$$

(c) Subjective Approach to Probability

This approach is applicable in the situations where the events do not occur at all or occur only once or cannot be performed repeatedly under the same conditions. Subjective probability is based on one's judgment, wisdom, intuition and expertise. It is interpreted as a measure of degree of belief or as the quantified judgment of a particular individual.

(d) Axiomatic Approach to Probability

Axiomatic approach defines the probability function as follows: Let S be a sample space for a random experiment and A be an event which is subset of S, then P(A) is called probability function if it

Satisfies the Following Axioms

(i) P(A) is real and $P(A) \geq 0$
(ii) P(S) = 1
(iii) If A_1, A_2, ... is any finite or infinite sequence of disjoint events in S, then
$P(A_1 \text{ or } A_2 \text{ or } ....A_n) = P(A_1) + P(A_2) + ... + P(A_n)$
If A and B are two events, then in terms of set theory, we write

   i) 'At least one of the events A or B occurs' as $A \cup B$
   ii) 'Both the events A and B occurs' as $A \cap B$
   iii) 'Neither A nor B occurs' as $\bar{A} \cap \bar{B}$
   iv) 'Event A occurs, and B does not occur' as $A \cap \bar{B}$
   v) 'Exactly one of the events A or B occurs' as $(\bar{A} \cap B) \cup (A \cap \bar{B})$
   vi) 'Not more than one of the events A or B occurs' as $(A \cap \bar{B}) \cup (\bar{A} \cap B) \cup (\bar{A} \cap \bar{B})$

Additive and Multiplicative Law of Probability

(a) **Additive Law of Probability**

The probability of the union of two events can be obtained by adding the individual probabilities and

subtracting the probability of their intersection:
P(A∪B) = P(A)+P(B)−P(A∩B)

In other words, the probability that either event A or event B occurs is equal to the probability that event A occurs plus the probability that event B occurs minus the probability that both occur.

(b) **Multiplicative Law of Probability**

The Multiplicative Rule of Probability says that the probability that both A and B occur equals the probability that B occurs times the conditional probability that A occurs, given that B has occurred.

(c) Conditional Probability Rule

The conditional probability of an event B is the probability that the event will occur given the knowledge that an event A has already occurred. This probability is written P(B|A), notation for the probability of B given A. In the case where events A and B are independent (where event A has no effect on the probability of event B), the conditional probability of event B given event A is simply the probability of event B, that is P(B).

If events A and B are not independent, then the probability of the intersection of A and B (the probability that both events occur) is defined by P(A and B) = P(A)P(B|A).

From this definition, the conditional probability P(B|A) is easily obtained by dividing by P(A):

$$P(B|A) = \frac{P\ (A\ and\ B)}{P\ (A)}$$ (This expression is only valid when P(A) is greater than 0)

Bayes' Theorem

The Bayes' theorem describes the probability of an event based on the prior knowledge of the conditions that might be related to the event. Mathematically, Bayes' theorem is stated as

$$P\ (A/B) = \frac{P\ (\frac{B}{A})}{P\ (B)} \times P(A),$$ where A and B are events and P(B) ≠ 0

P (A/B) is a conditional probability: the likelihood of event A occurring given that B is true.

P (B/A) is also a conditional probability: the likelihood of event B occurring given that A is true.

P (A) and P (B) are the probabilities of observing A and B independently of each other; this is known as the marginal probability.

3.4. Probability Distributions

The probability theory describes the fluctuations of chance errors of observation and measurement. It is necessary to understand the theory of probability and the nature of the curve of normal distribution to comprehend many important statistical concepts, particularly in the area of standard scores, the theory of sampling, and inferential statistics.

Normal Distribution

Understanding normal probability curve is through a consideration of the elementary principles of probability. In statistics, probability of a given event is defined as the expected frequency of occurrence of this event among events of a like sort. This expected frequency of occurrence may be based upon knowledge of the conditions determining the occurrence of the phenomenon, as in dice-throwing or coin-tossing, or upon empirical data, as in mental and social measurements. The normal distribution is not an actual distribution of test scores but is a mathematical model. Measurements of many natural phenomena and of many mental and social traits under certain conditions tend to be distributed symmetrically about their means in proportions which approximate those of the normal probability distribution. It has been found that the normal distribution serves to describe the

frequency of occurrence of many variables' facts with a relatively high degree of accuracy.

The Normal Probability Curve

The normal probability curve or simply normal curve is a bell-shaped figure. The characteristics of the curve:

- The curve is symmetrical around its vertical axis, 50% of the sores are above the mean and 50% below the mean
- The mean, median and mode of the distribution have the same value, they fall exactly at the midpoint of the distribution
- Most scores cluster near the mean, median and mode
- The curve has no boundaries in either direction, the curve never touches the base line
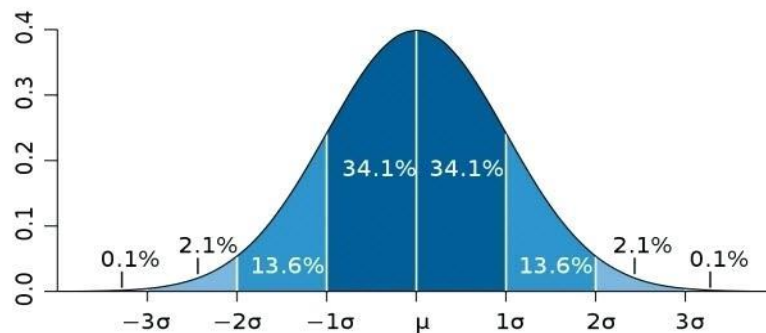
Figure 3.7. Normal Probability Curve

Non-Normal Distributions

Not all distributions especially of sample data are identical to normal curve. Two other types of distributions that occur are skewed and bimodal distributions.

Skewed Distributions in skewed distributions, majority of the scores are near the high or low end of the range with relatively few scores at the other end. The distribution is considered skewed in the Direction of the Tail (fewest scores).
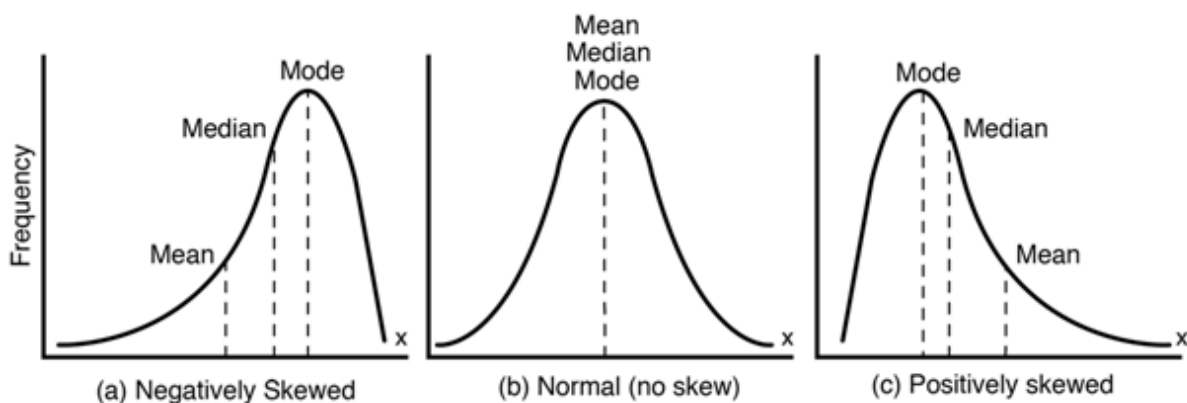
Figure 3.8. Normal Curve, Positive Skewness and Negative Skewness
(Souce:https://www.researchgate.net/figure/a-Negative-skewness-b-Normal-curve-c-Positive-skewness-Durkhure-and-Lodwal-2014_fig5_294890337)

Bimodal Distributions have two modes. This often is a result of a sample that consists of persons from two populations.

Figure 3.9. Bimodal Curve

Applications of the Normal Probability Curve

- To determine the percentage of cases in normal distribution within given limits
- To find the limits in any normal distribution which include a given percentage of the cases
- To compare two distributions in terms of "overlapping"
- To determine the relative difficulty of test questions, problems, and other test items
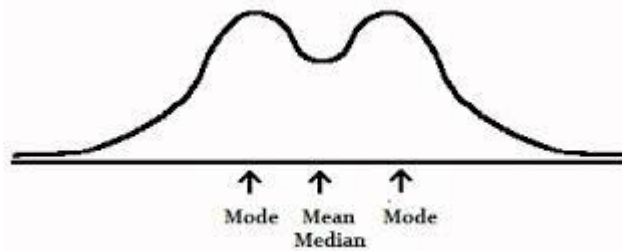- To separate given group into subgroups according to capacity when the trait is normally distributed

Binomial Distribution

Binomial distribution is a probability distribution that summarizes the likelihood that a value will take one of two independent values under a given set of parameters or assumptions. It is a common discrete distribution used in statistics, as opposed to a continuous distribution such as the normal distribution. The binomial distribution is often used in social science statistics as a building block for models for dichotomous outcome variables.
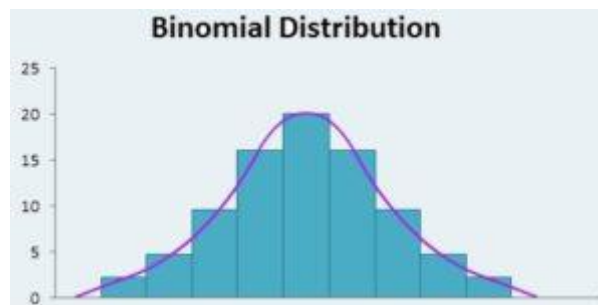
Figure 3.10. Binomial Distribution

The binomial distribution describes the behaviour of a count variable X if the following conditions apply:

1: The number of observations n is fixed.

2: Each observation is independent.

3: Each observation represents one of two outcomes ("success" or "failure").

4: The probability of "success" p is the same for each outcome.

If these conditions are met, then X has a binomial distribution with parameters n and p, abbreviated B(n,p). Generally, the binomial distribution should not be applied to observations from a simple random sample (SRS) unless the population size is at least 10 times larger than the sample size.

Bernoulli Trials

The binomial distribution is the total or the sum of a number of different independents and identically distributed Bernoulli Trials. In this experiment, the trials are to be random and could have only two outcomes whether it can be success or failure. The flipping of a coin is the best example of

Bernoulli trials; each trial can only produce one of the two values- heads or tails. Each time you flip the coin there is a 50% probability of the outcome. The outcome never affects or influences the other. The Bernoulli distribution is the part of binomial distribution where the number of experiments is one.

Examples: Let's take some real-life instances where you can use the binomial distribution. (1) If the WHO introduced a new cure for a disease, then there is an equal chance of success and failure. It can either cure the diseases or not. (2) If you are purchasing a lottery then either you are going to win money, or you are not. In other words, anywhere the outcome could be a success or a failure that can be proved through binomial distribution.

Poisson Distribution

The Poisson Distribution is a theoretical discrete probability distribution that is very useful in situations where the discrete events occur in a continuous manner. This has a huge application in many practical scenarios like determining the number of calls received per minute at a call centre or the number of unbaked cookies in a batch at a bakery etc.

In such cases, only the average number of successes (like the no. of calls received) for a sample space (like the duration of 1 hour) is known. It can sometimes range from 0 to the maximum value, but one doesn't know how many times it's going to be a failure (like you can't know how many calls will not come at a call centre at a given hour). In such cases, the Poisson Distribution is utilized to determine the probability of exactly x_0 number of successes taking place in unit time.

Properties of a Poisson Model
- The event or a success is something that can be counted in whole numbers.
- The probability of having a success in a time interval is independent of any of its previous occurrence.
- The average frequency of successes in a unit time interval is known. (λ in the above case)
- The probability of more than one success in a unit time is very low. (since $n \to \infty$ and $p \to 0$ anyway)

Characteristics of the Poisson Distribution
- It is uni-parametric in nature. As we can see, only one parameter λ is sufficient to define the distribution.
- The mean of $X \sim P(\lambda)$ is equal to λ.
- The variance of $X \sim P(\lambda)$ is also equal to λ. The standard deviation, therefore, is equal to $+\sqrt{\lambda}$.
- Depending on the value of the parameter λ, it may be unimodal or bimodal.

For a given frequency distribution of a quantity, if the range of that quantity starts from 0 and proceeds to a positive integer, then a Poisson Probability Distribution can be fitted to that data using the parameter = the observed mean frequency of that quantity.

3.5. Testing of Hypotheses

The main function of hypothesis is to suggest new experiments and observations. The testing of hypothesis is often used as a strategy for deciding whether a sample data offer support for a

hypothesis that generalization can be made. Testing of hypothesis enables us to make probability statements about population parameter(s). The hypothesis may not be proved absolutely, but in practice if it is accepted if it has withstood a critical testing. Hypothesis testing helps to decide on the basis of a sample data, whether a hypothesis about a population is likely to be true or false.

Hypothesis

Hypothesis is a mere assumption or some supposition to be proved or disproved. A hypothesis may be defined as a proposition or a set of propositions set forth as an explanation for the occurrence of some specified group of phenomena either asserted merely as a provisional conjecture to guide some investigation or accepted as highly probable in the light of established facts. A research hypothesis is a predictive statement, capable of being tested by scientific methods, that relates an independent variable to some dependent variable.

Characteristics of Hypotheses

Characteristics of hypotheses

- Clear and precise
- Capable of being tested
- State relationship between variables
- Limited in scope and must be specific
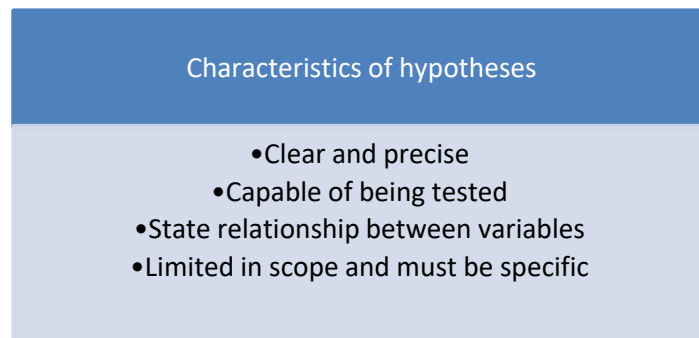
Figure 3.11. Characteristics of Hypotheses

Testing of Hypothesis
(a) Null Hypothesis and Alternative Hypothesis
The Null Hypothesis is the statement that there is no difference in true means or proportions of groups that are being compared. If we are to compare method A with method B about its superiority and if we proceed on the assumption that both methods are equally good, then this assumption is termed as the null hypothesis (H_0). If we think that method A is superior or the method B is inferior, this assumption is known as alternative hypothesis (H_a).

The null hypothesis and the alternate hypothesis are chosen before the sample is drawn. The following are to be considered for choosing a null hypothesis:

- Alternative hypothesis is the one we would like to prove, and the null hypothesis is the one we wish to disprove.
- If the rejection of a certain hypothesis when it is actually true involves great risk, it is taken as null hypothesis because then the probability of rejecting it when it is true is α (the level of significance) which is chosen very small.
- Null hypothesis should always be specific hypothesis.

For example, take the case of test of the hypothesis that the average amount of solid waste

produced in urban households (μ_U) is greater than the average amount of solid waste produced in rural households (μ_R). The claim in this case is $\mu_U > \mu_R$ and this forms the *alternative hypothesis*, H_a. The null hypothesis predicts that there is no difference in the amount of solid waste produced in urban and rural households and the null hypothesis, H_0 is that they are the same.

H_0 : $\mu_U = \mu_R$. Average amount of solid waste produced in urban and rural households is same.

H_a : $\mu_U > \mu_R$. Average amount of solid waste produced in urban household is greater than in rural households.

In general, the H_0 and H_a can be one sided or two sided. For example, alternative hypothesis may be H_a: $\mu_U \neq \mu_R$

(b). The level of significance: it is always taken as some percentage, say 5%. If we take the significance level at 5 percent, this implies that H_0 will be rejected when the sampling result has less than 0.05 probability of occurring if H_0 is true. 5 percent significance means that the researcher is willing to take as much as 5 percent risk of rejecting the null hypothesis when H_0 happens to be true.

(c) Decision rule or test of hypothesis: according to the decision rule, we accept H_0 (i.e., reject H_a) or reject H_0 (i.e., accept H_a). Example, if H_0 is that a certain lot is good, and H_a is that the lot is not good. In order to make the criterion for accepting or rejecting the hypothesis, we might test at least 10 items in the lot, and if there are none or only one defective item among the 10, we will reject H_0 (or accept H_a).

(d) Type I and Type II errors: Two common types of errors related to the testing of hypothesis are:

Type I Error: this occurs when the null hypothesis, H_0 is rejected when it is true, denoted by α (alpha), known as α error.

Type II Error: this occurs when the null Hypothesis H_0 is false and it is not rejected, denoted by β (beta), known as β error.

Table 3.4. Type I and Type II Error

	Decision	
	Accept H_0	**Reject H_0**
H_0 (true)	Correct decision	Type I error (α error)
H_0 (false)	Type II error (β error)	Correct decision

(e). **Two-Tailed and One-Tailed Tests**: A two-tailed test rejects the null hypothesis if the sample mean is significantly higher or lower than the hypothesized value of the mean of the population. Such a test is appropriate when the null hypothesis is some specified value and the alternative hypothesis is a value not equal to the specified value of the null hypothesis.

The two-tailed test is appropriate when we have H_0: $\mu = \mu_{H0}$ and H_a : $\mu \neq \mu_{Ho}$ which may mean $\mu > \mu_{Ho}$ or $\mu < \mu_{Ho}$. A one-tailed test would be used when we have to test whether the population mean is either lower than or higher than some hypothesized value.

Procedure for Hypothesis Testing

A hypothesis is tested to determine whether it is valid or not. The main issue is whether to accept the null hypothesis or to reject the null hypothesis. Various processes involved in hypothesis testing are (Kothari, 2004):
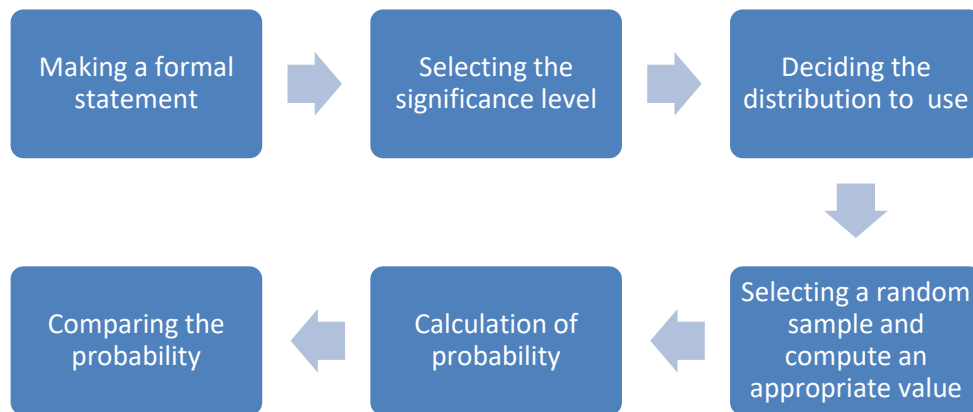
Figure 3.12. Processes in Hypothesis Testing

- **Making a Formal Statement** A formal statement of the null hypothesis (H_0) and the alternative hypothesis (H_a) is stated. It also indicates whether we should use one-tailed test or two-tailed test. If H_a is of the type greater than (or of the type lesser than), we use a one-tailed test, but when H_a is of the type "whether greater or smaller" then we use a two-tailed test.

- **Selecting the Significance Level** A pre-determined level of significance of either 5%level or 1% level is used. The following factors that affect the level of significance: magnitude of the difference between sample means, the size of the sample, the variability of measurements within samples and whether the hypothesis is directional or non-directional.

- **Deciding the Distribution to Use** The next step is to select the appropriate sampling distribution, may be a normal distribution or the t-distribution.

- **Selecting a Random Sample and Computing an Appropriate Value** Next step is to select a random sample and compute an appropriate value from the sample data concerning the test statistic utilizing the relevant distribution.

- **Calculation of the Probability** Calculate the probability that the sample result would diverge as widely as it has from expectations, if the null hypothesis was true.

- **Comparing The Probability** Compare the probability thus calculated with the specified value for α, the significance level. If the calculated probability is equal to or smaller than the α value in case of one-tailed test, then reject the null hypothesis. If the calculated probability is greater, then accept the null hypothesis.

Tests of Hypothesis

Tests of Hypotheses are also known as tests of significance. Statisticians have classified the tests of hypotheses as:
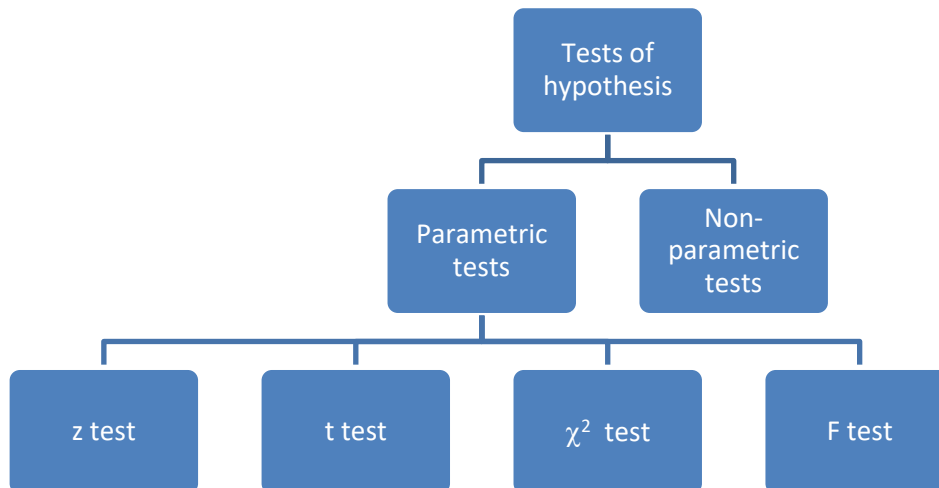
Figure 3.13. Tests of Hypothesis

Important Parametric Tests: All these tests assume that the source of data is normally distributed (Kothari,2004).

(a) ***z- test*** It is based on the normal probability distribution. It is used for judging the significance of statistical measures especially the mean. This test is used:

- when the binomial distribution or *t*-distribution is applicable on the presumption that such a distribution tends to approximate normal distribution as 'n' becomes larger

- For comparing the mean of a sample to some hypothesized mean for the population in case of large sample or when the population variance is known

- For judging the significance of difference between means of two independent samples in case of large samples or when population variance is known

- For comparing the sample proportion to a theoretical value of population proportion or for judging the difference in proportions of two independent samples when 'n' happens to be large

- For judging the significance of median, mode, coefficient of correlation etc.

(b) ***t*-Test** It is based on t-distribution and applies only for small samples when population variance is known. The relevant test statistic, *t,* is calculated from the sample data and then compared with its probable value based on *t*-distribution at a specified level of significance for concerning degrees of freedom for accepting or rejecting the null hypothesis. This test is used:

- For judging the significance of a sample mean or for judging the significance of difference between the means of two samples in case of small samples when population variance is not known

- Paired t-test is used for judging the significance of the mean of difference between the two related samples, if two samples are related

- For judging the significance of the coefficients of simple and partial correlations

(c) χ^2 **test** It is based on chi-square distribution. It is used for comparing a sample variance to a theoretical population variance.

Suppose X_1, X_2, …X_n be a random sample drawn from the normal distribution $N(\mu, \sigma^2)$. Then distribution of the statistic

$$\chi^2 = \frac{(X_1 - \bar{X})^2}{\sigma^2} = \frac{(n-1)\,S^2}{\sigma^2}$$

where χ^2 is called chi-square distribution with $U = n-1$ degree of freedom.

- Chi-square is always positive
- Chi-square distribution is not symmetrical and is skewed
- As U increases, the shape of distribution approaches the shape of the normal curve

(d) **F-Test** It is based on F-distribution. Test statistic, F, is calculated and compared with its probable value for accepting or rejecting the null hypothesis. This test is used:

- To compare the variance of the two independent samples
- For judging the significance of more than two sample means at one and the same time in the context of analysis of variance (ANOVA)
- For judging the significance of multiple correlation coefficients

Use of Parametric Tests in Hypothesis Testing

Table 3.5. Hypothesis Testing of Means

S.No.	Population	Sample size	Ha	Test
1	Normal, infinite	Large or small, variance of the population is known	One-sided or two-sided	z- test $$z = \frac{\bar{X} - \mu Ho.}{\sigma_p/\sqrt{n}}$$
2	Normal, finite	Large or small, variance of population is known	One-sided or two-sided	z- test $$z = \frac{\bar{X} - \mu Ho.}{\left(\frac{\sigma_p}{\sqrt{n}}\right) X \sqrt{\frac{(N-n)}{(N-1)}}}$$
3	Normal, infinite	Small, variance of the population unknown	One-sided or two-sided	t-test $$t = = \frac{\bar{X} - \mu Ho.}{\sigma_s/\sqrt{n}}$$ with d.f.= (n-1) $$\sigma_s = \sqrt{\frac{\Sigma(Xi - X^-)^2}{(n-1)}}$$
4	Normal, finite	Small, variance of the population unknown	One-sided or two-sided	t- test $$t = \frac{\bar{X} - \mu Ho}{\left(\frac{\sigma_s}{\sqrt{n}}\right) X \sqrt{\frac{(N-n)}{(N-1)}}}$$ with d.f. = (n-1) $$\sigma_s = \sqrt{\frac{\Sigma(Xi - X^-)^2}{(n-1)}}$$
5	May not be normal	Large, variance of population may be known or unknown	One-sided or two-sided	z- test $$z = \frac{\bar{X} - \mu Ho.}{\sigma_p/\sqrt{n}}$$ (when infinite population, variance of population is known) $$z = \frac{\bar{X} - \mu Ho.}{\left(\frac{\sigma_p}{\sqrt{n}}\right) X \sqrt{\frac{(N-n)}{(N-1)}}}$$ (when finite population, variance of population is known)

Table 3.6. Hypothesis Testing for Differences Between Means

S. No.	Population	Sample size	Conditions	Test
1	Variances are known	large		$$z = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{\sigma_{p1}^2}{n_1} + \dfrac{\sigma_{p2}^2}{n_2}}}$$
	do	do	σ_{p1} and σ_{p2} are not known, use $\sigma\,s_1$ and $\sigma\,s_2$ respectively	$$\sigma_{s_1} = \sqrt{\dfrac{\sum(X_{1i} - \overline{X}_1)^2}{n_1 - 1}} \quad \text{and}$$ $$\sigma_{s_2} = \sqrt{\dfrac{\sum(X_{2i} - \overline{X}_2)^2}{n_2 - 1}}$$
2	Variance is known	large	Sample drawn from the same population whose variance is known	$$z = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\sigma_p^2\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$$
	do	do	σ_p is not known, use $\sigma_{S1.2}$ (combined standard deviation of the two samples)	$$\sigma_{s1.2} = \sqrt{\dfrac{n_1(\sigma_{S_1}^2 + D_1^2) + n_2(\sigma_{S_2}^2 + D_2^2)}{n_1 + n_2}}$$ Where $D_1 = (\overline{X}_1 + \overline{X}_2)$ $$D_2 = (\overline{X}_1 - \overline{X}_{1.2})$$ $$\overline{X}_{1.2} = \dfrac{n_1\overline{X}_1 + n_2\overline{X}_2}{n_1 + n_2}$$
3	Variance not known	small	Use t test	$$t = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{\sum(X_{1i} - \overline{X}_1)^2 + \sum(X_{2i} - \overline{X}_2)^2}{n_1 + n_1 - 2}} \times \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$ with d.f. = $(n_1 + n_2 - 2)$
	do	do	do	or $$t = \dfrac{\overline{X}_1 - \overline{X}_2}{\sqrt{\dfrac{(n_1-1)\sigma_{S_1}^2 + (n_2-1)\sigma_{S_1}^2}{n_1 + n_1 - 2}} \times \sqrt{\dfrac{1}{n_1} + \dfrac{1}{n_2}}}$$ with d.f. = $(n_1 + n_2 - 2)$

Summary

This chapter introduces the scope and importance of statistics in research. Various measures of central tendency are discussed in detail. Measure of central tendency is also known as statistical average. In statistics, the three most common measures of central tendency are the mean, median, and mode. Measures of variability is the measure of 'scatter' or 'spread' of the separate scores around their central tendency. Four measures that indicate the variability or dispersion within a set of measures are Range, Quartile Deviation, Average Deviation and Standard Deviation. The probability of an event is a quantitative measure showing the degree of belief which one has in the occurrence or non-occurrence of the event under consideration. The probability theories are used in research and the four different approaches of probability are relative approach, statistical approach, subjective approach and axiomatic approach. The probability theory describes the fluctuations of chance errors of observation and measurement. Different probability distributions include normal probability curve and skewed curves. This block provides the details on hypothesis, null and alternate hypotheses, and testing of hypothesis, Type I and Type II errors. Important parametric tests for hypothesis testing are *z* test, *t* test, χ^2 test and *F* test.

Model Questions

1. Describe the scope of statistics in research.
2. Explain the role of statistics in management decisions.
3. Discuss the important measures of central tendency. Explain the situations where one measure of central tendency is considered relatively more appropriate than other measures.

References

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2. Garrett, H E (2004). *Statistics in Psychology and Education*. Paragon International.
3. Kothari CR (2004). Research Methodology, Methods and Techniques. New Age International Publishers, Delhi.

Chapter 4 Correlation Analysis

Introduction

In statistics, we measure the performance of an individual or a group in some defined trait. But it is more important to examine the relationship of one variable to another to study whether certain abilities are related, or certain traits are independent. For example, is there a relation between a person's intelligence and his scholastic achievement? Problems like these can be studied using the method of correlation. Regression analysis is a form of predictive modelling technique which investigates the relationship between a dependent (target) and independent variable (s) (predictor). This technique is used for forecasting, time series modelling and finding the causal effect relationship between the variables.

Objectives

At the end of the block, the students will be able to:

- Understand the concept of correlation and various measures used in correlation
- Comprehend regression analysis and time series analysis
- Describe participatory action research

Structure
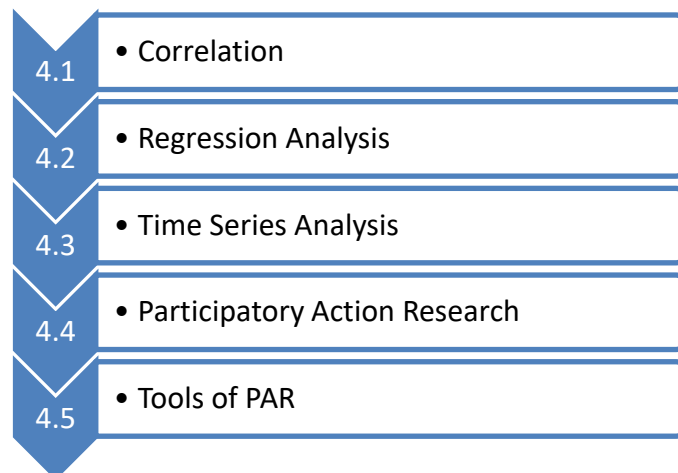
Figure 4.1 Chapter Flow

4.1. Correlation

Meaning of Correlation

Correlation is the relationship between two or more paired variables or two or more sets of data. If a change in one variable result in a corresponding change in the other, the two variables are correlated. The degree of relationship is measured and represented by coefficient of correlation. This coefficient is identified by the letter r, or the Greek letter rho(ρ).

Positive and Negative Correlation

- If the values of the two variables deviate in the same direction, i.e., if an increase in the value of one variable results in a corresponding increase in the value of the other, or if decrease in the value of one variable results in a decrease in the value of the other, then it is a positive correlation.
- If the variables deviate in the opposite directions, i.e. if an increase (decrease) in the value of one variable, results in a decrease (increase) in the value of the other variable, it is a negative correlation

The Coefficient of Correlation

The correlation between any two variables is expressed in terms of a number, which is known as correlation coefficient. Perfect relationship is expressed by a coefficient of 1.0, and no relationship by a coefficient of 0.00. A coefficient of correlation falling between 0.00 and 1.00 indicates some degree of positive association. For a perfect negative relationship, r = -1.00. negative coefficients may range from -1.00 to 0.00.

The Scatter Gram and Linear Regression Line

When the relationship between two variables is plotted graphically, paired variable values are plotted against each other on the X and Y axis. The line drawn through, or near, the coordinate points is the 'regression line.' On this line the sum of the deviations of all the coordinate points has the smallest possible value. As the coefficient approaches zero (0), the coordinate points fall further from the regression line.
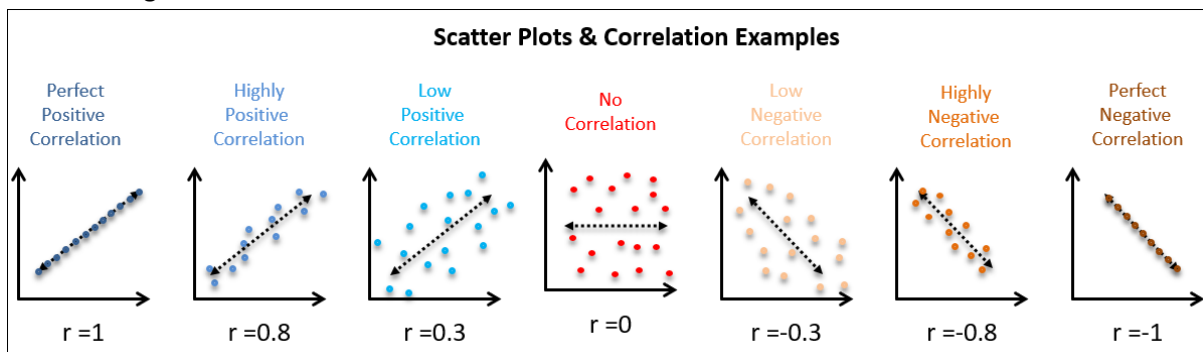

Scatter Plots & Correlation Examples

| Perfect Positive Correlation | Highly Positive Correlation | Low Positive Correlation | No Correlation | Low Negative Correlation | Highly Negative Correlation | Perfect Negative Correlation |
| r =1 | r =0.8 | r =0.3 | r =0 | r =-0.3 | r =-0.8 | r =-1 |

Figure 4.2. Scatter Diagrams Illustrating Different Coefficients of Correlation

(Source: http://www.cqeacademy.com/cqe-body-of-knowledge/continuous-improvement/quality-control-tools/the-scatter-plot-linear-regression/)

Pearson's Product Moment Coefficient of Correlation (r)

This is the most precise coefficient of correlation. This coefficient is calculated by converting the raw scores to sigma scores and finding the mean value of their cross-products.

$$r = \frac{\Sigma(Z_x)(Z_y)}{N}$$

Another method for finding r is the Deviation Method, and $r = \frac{\Sigma xy}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$

where Σx^2 = the sum of the $\overline{X}$ subtracted from each X score squared $(X - \overline{X})^2$,

Σy^2 = the sum of the $\overline{Y}$ subtracted from each Y score squared $(Y - \overline{Y})^2$

Σxy = the cross product of the mean subtracted from that score $(X - \overline{X})(Y - \overline{Y})$

The third method is the Raw Score method and the formula for r is

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{N\Sigma X^2 - (\Sigma X)^2}.\sqrt{N\Sigma Y^2 - (\Sigma Y)^2}}$$

where ΣX = sum of the X scores, ΣY = sum of the Y scores

ΣX^2 = sum of the squared X scores, ΣY^2= sum of the squared Y scores

ΣXY = sum of the products of paired X and Y scores, N = number of paired scores

Spearman Rank Order Coefficient of Correlation (ρ)

It is a type of Pearson product moment correlation that can be used with ordinal data. The paired variables are expressed as ordinal values (ranked) rather than as interval or ratio values.

The formula for Spearman rank order coefficient of correlation is:

$$\rho = 1 - \frac{6\,\Sigma D^2}{N\,(N^2 - 1)}$$

where D = the difference between paired ranks

ΣD^2 = the sum of the squared differences between ranks

N= number of paired ranks

Spearman's rank order coefficient of correlation is acceptable when the data are available only in ordinal form.

Phi Correlation Coefficient (ϕ)

When both variables are dichotomous (e.g., male/female, pass/fail), the resultant Pearson product moment correlation is known as phi (ϕ) coefficient. Both the variables take the value of either 0 or 1.

Prediction

An important use of the coefficient of correlation and the Y on X regression line is for prediction of unknown Y values from known X values. Since it is a method for estimating future performance of individuals on the basis of past performance of a sample, prediction is an inferential application of correlation analysis.

Standard Error of Estimate

When the coefficient of correlation based on a sufficient body of data has been determined as ~ 1.00, there will be no error of prediction. Perfect correlation indicates that for every increase in X, there is a proportional increase or proportional decrease in Y. But when the magnitude of r is less than +1.00 or -1.00, error of prediction is inherent because there have been exceptions to a consistent orderly relationship. A measure for estimating this prediction error is known as the standard error of estimate (S_{est}).

The Coefficient of validity

A test is said to be valid to the degree that it measures what it claims to measure. Tests are often validated by correlating test scores against some outside criteria, which may be scores on tests of accepted validity, successful performance or behaviour, or the expert judgement of recognized authorities.

The Coefficient of Reliability

A test is said to be reliable to the degree that it measures accurately and consistently, yielding comparable results when administered several times. Different ways of using the process of correlation to evaluate reliability are:

- Test-retest – correlating the scores on two or more administrations of the test

- Equivalent forms – correlating the scores when groups of individuals take equivalent forms of the test
- Split halves – correlating the scores on the odd items of the test against the even items

4.2. Regression Analysis

Regression analysis estimates the relationship between two or more variables. For example, we want to estimate growth in *e waste* based on current economic conditions. With the help of growth in sales data of electronic goods based on economy, we can predict future growth of the *e waste.*

Benefits of using regression analysis:
- It indicates the significant relationships between dependent variable and independent variable.
- It indicates the strength of impact of multiple independent variables on a dependent variable.
- It helps us to compare the effects of variables measured on different scales
- It helps market researchers / data analysts / data scientists to eliminate and evaluate the best set of variables to be used for building predictive models

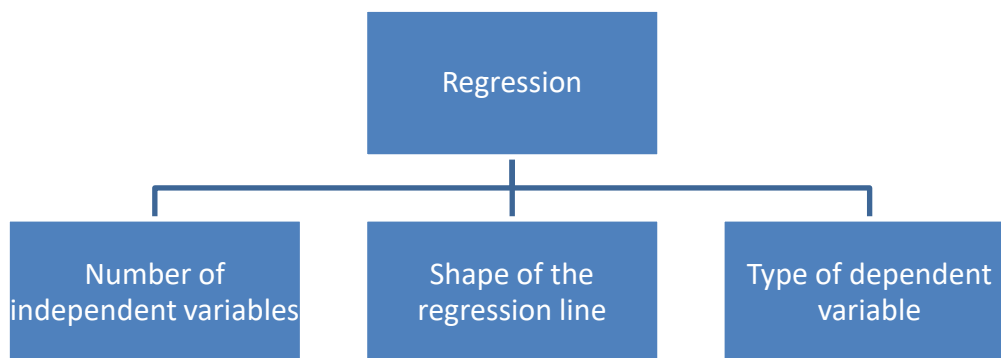Regression techniques are classified based on the following:

Figure 4.3. Classification of Regression Techniques
(Source: https://www.analyticsvidhya.com/blog/2015/08/comprehensive-guide-regression/)

Linear Regression

In linear regression, the dependent variable is continuous, independent variable(s) can be continuous or discrete, and nature of regression line is linear. Linear Regression establishes a relationship between dependent variable (Y) and one or more independent variables (X) using a best fit straight line (also known as regression line). It is represented as Y = a + b X + e, where Y is dependent variable, X is independent variable, "a" is the y-intercept of the regression line for the sample or regression constant and "b" is the slope of the regression line or regression coefficient in sample, e is the error in prediction of the scores. It measures the change in Y corresponding to a change in X.

The difference between simple linear regression and multiple linear regression is that, single linear regression has only one independent variable whereas multiple linear regression has more than one independent variables.

Significant Features

- There must be linear relationship between independent and dependent variables
- Multiple regression suffers from multicollinearity, autocorrelation, heteroskedasticity
- Linear Regression is very sensitive to Outliers. It can severely affect the regression line and eventually the forecasted values
- Multicollinearity can increase the variance of the coefficient estimates and make the estimates very sensitive to minor changes in the model. The result is that the coefficient estimates are unstable
- In case of multiple independent variables, we can go with forward selection, backward elimination and step wise approach for selection of most significant independent variables

Logistics Regression

Logistic regression is used to find the probability of event=Success and event=Failure. Logistic regression is used with binary dependent variables (e.g., 0/ 1, True/ False, Yes/ No). Here the value of Y ranges from 0 to 1.

Significant Features

- It is widely used for classification problems
- Logistic regression doesn't require linear relationship between dependent and independent variables. It can handle various types of relationships because it applies a non-linear log transformation to the predicted odds ratio.
- It requires large sample sizes because maximum likelihood estimates are less powerful at low sample sizes than ordinary least square
- The independent variables should not be correlated with each other i.e. no multi collinearity.
- If the values of dependent variable is ordinal, then it is called as Ordinal logistic regression
- If dependent variable is multi class, then it is known as Multinomial Logistic regression.

Multiple Linear Regression

Multiple linear regression is the most common form of linear regression analysis. It is used to explain the relationship between one continuous dependent variable and two or more independent variables. The independent variables can be continuous or categorical. At the centre of the multiple linear regression analysis is the task of fitting a single line through a scatter plot. More specifically the multiple linear regression fits a line through a multi-dimensional space of data points. The simplest form has one dependent and two independent variables. The dependent variable may also be referred to as the outcome variable or regress and. The independent variables may also be referred to as the predictor variables or regressors.

A multiple linear regression equation is represented as $Y = a + b_1 X_1 + b_2 X_2 + ... b_n X_n$ where, Y is dependent variable, X_1, X_2, ….X_n are independent variables, "a" is regression constant, b_1, b_2, …..b_n are respective regression coefficients.

The uses of multiple linear regression analysis are given below:

Identify the strength of variables

To identify the strength of the effect that the independent variables have on a dependent variable.

To forecast effects or impacts of changes

Helps us to understand how much the dependent variable change when we change the independent variable.

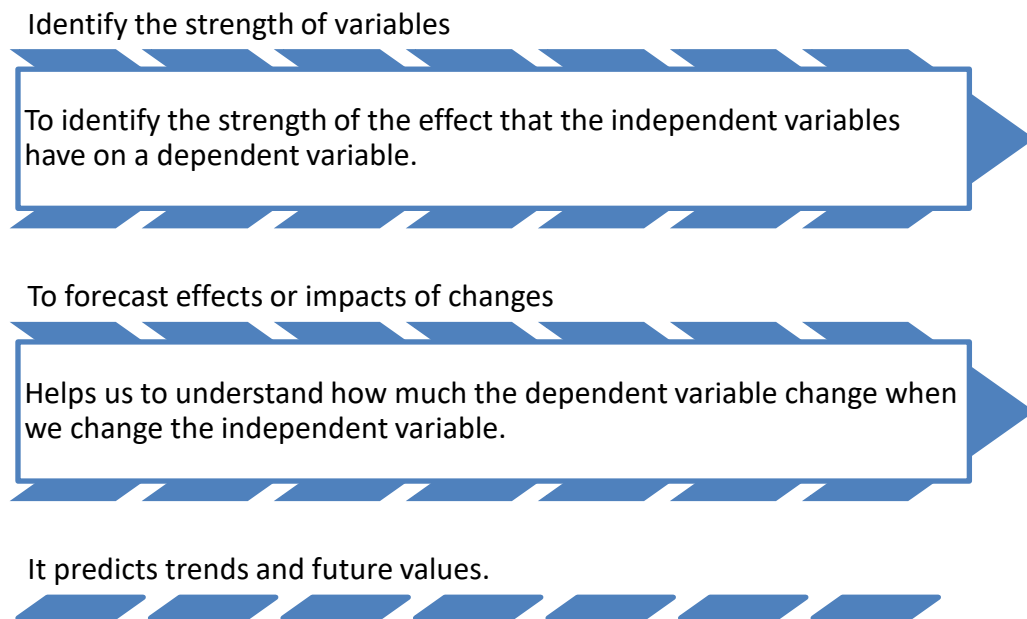It predicts trends and future values.

Figure 4.4. Uses of Multiple Linear Regression Analysis

Regression Lines

When we make a distribution in which there is an involvement of more than one variable, then such an analysis is Regression Analysis. It generally focuses on predicting the value of the variable that is dependent on the other. Let there be two variables: x & y. If y depends on x, then the result comes in the form of simple regression. y – Regression or Dependent Variable or Explained Variable and x – Independent Variable or Predictor or Explanator.

If we use a simple linear regression model where y depends on x,

then the regression line of y on x is: $y = a + bx$

Regression Coefficient: The two constants a and b are regression parameters. Furthermore, we denote the variable b as b_{yx} and we term it as regression coefficient of y on x.

Also, we can have one more definition for the regression line of y on x. We can call it the best fit as the result comes from least squares. This method is the most suitable method for finding the value of y on x i.e. the value of a dependent variable on an independent variable.

Least Squares Method

$$\Sigma\, e_i^2 = \Sigma\, (y_i - y\wedge_I)^2 = \Sigma\, (y_i - a - bx_i)^2$$

Variable y_i is the actual value or the observed value, $y\wedge_I = a + bx_i$ denotes the estimated value of y_i for a given random value of a variable of x_i; e_i = Difference between observed and estimated value and is the error or residue. The regression line of y or x along with the estimation errors are as follows:
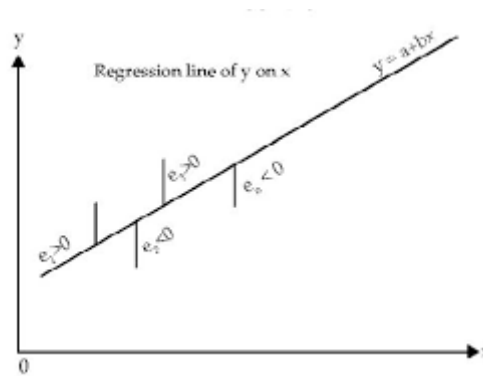
Figure 4.5. Regression Line of y on x

(Source: https://www.toppr.com/guides/business-mathematics-and-statistics/correlation-and-regression/regression-lines-equations-coefficients/)

On minimizing the least squares equation, we get Normal Equations.

$$\Sigma y_i = na + b \Sigma x_i$$

$$\Sigma x_i y_i = a \Sigma x_i^2 + b \Sigma x_i$$

We get the least squares estimate for a and b by solving the above two equations for both a and b.

$$b = Cov(x,y)/S_x^2$$

$$= (r.S_x. S_y)/ S_x^2$$

$$= (r.S_y)/S_x$$

The estimate of a, after the estimation of b is:

$$a = \overline{y} - b\overline{x}$$

On substituting the estimates of a and b is:

$$[y - \overline{y}]/ S_y = r (x - \overline{x})/ S_x$$

Sometimes, it might so happen that variable x depends on variable y. In such cases, the line of regression of x on y is: x = a ^ + b^y

Regression Equation

The standard form of the regression equation of variable x on y is:

$$[x - \overline{x}]/ S_x = r [y - \overline{y}]/S_y$$

Properties of Regression Lines

Some of the important properties of regression lines are as follows:

- The value of the regression coefficient doesn't change. This is because of the shifting of the origin. The change takes place because of the change of scale. According to the property, if the variables (x,y) which are the original variables changes to (u,v), then:

  $u = (x - a)/p$

  $v = (y - c)/q$

  $b_{yx} = \frac{q}{p} X \, b_{vu}$

  Also, $b_{xy} = \frac{p}{q} X \, b_{uv}$

- There are two lines of regression. Both these lines are known to intersect at a specific point [$\overline{x}$, $\overline{y}$]. Here the variables under consideration are x and y. As per this property, the intersection of both the lines of regression i.e. of y on x and x on y is [$\overline{x}$, $\overline{y}$]. Hence, this is the solution for both the equations of x and y.

- The correlation coefficient between the two variables i.e. x and y is the GM (geometric mean) of both the coefficients. The sign over the values of correlation coefficients will be a common sign of both the regression coefficients. According to this property, if we denote the regression coefficients as b_{yx} (=b) and b_{xy} (=b'), then the correlation coefficient is: $r = \pm\sqrt{b_{yx} + b_{xy}}$. In a case, where both these coefficients give a negative value, then 'r' will be negative as well. However, if both the values of coefficients are positive, then 'r' will be a positive value.

Relationship between Correlation and Regression Coefficients

Correlation quantifies the degree to which two variables are related. Correlation does not fit a line through the data points. We are computing a correlation coefficient (r) that tells us how much one variable tends to change when the other one does. When r is 0.0, there is no relationship. When r is positive, there is a trend that one variable goes up as the other one goes up. When r is negative, there is a trend that one variable goes up as the other one goes down. Linear regression finds the best line that predicts Y from X. Correlation does not fit a line.

The correlation coefficient is simply a way to describe how two variables vary together, so it can be computed and interpreted for any two variables. Further inferences, however, require an additional assumption -- that both X and Y are measured, and both are sampled from Gaussian distributions. This is called a bivariate Gaussian distribution. If those assumptions are true, then we can interpret the confidence interval of r and the P value testing the null hypothesis that there really is no correlation between the two variables (and any correlation we observed is a consequence of random sampling).

With linear regression, the X values can be measured or can be a variable controlled by the experimenter. The X values are not assumed to be sampled from a Gaussian distribution. The vertical distances of the points from the best-fit line (the residuals) are assumed to follow a Gaussian distribution, with the SD of the scatter not related to the X or Y values.

Correlation computes the value of the Pearson correlation coefficient, r. Its value ranges from -1 to +1. Linear regression quantifies goodness of fit with r^2. If we put the same data into correlation (which is rarely appropriate), the square of r from correlation will equal r^2 from regression.

4.3. Time Series Analysis

Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values. The analysis of time series is based on the assumption that successive values in the data file represent consecutive measurements taken at equally spaced time intervals.

Identifying Patterns in Time Series Data

Two main goals of time series analysis are:
- identifying the nature of the phenomenon represented by the sequence of observations
- forecasting (predicting future values of the time series variable)

Both these goals require that the pattern of observed time series data is identified and formally described. Once the pattern is established, we can interpret and integrate it with other data.

Systematic Pattern and Random Noise

In time series analysis it is assumed that the data consist of a systematic pattern (usually a set of identifiable components) and random noise (error) which usually makes the pattern difficult to identify. Most time series analysis techniques involve some form of filtering out noise in order to make the pattern more salient.

Two General Aspects of Time Series Patterns

Two basic classes of components of time series patterns are: trend and seasonality.

Trend represents a general systematic linear or (most often) nonlinear component that changes over time and does not repeat or at least does not repeat within the time range captured by our data (e.g., a plateau followed by a period of exponential growth). On the other hand, seasonality repeats itself in systematic intervals over time (e.g., a plateau followed by a period of exponential growth).

Trend Analysis

There are no "automatic" techniques to identify trend components in the time series data; however, if the trend is monotonous (consistently increasing or decreasing) data analysis is not very difficult. If the time series data contain considerable error, then the first step in the process of trend identification is smoothing.

Smoothing

Smoothing always involves some form of local averaging of data such that the non-systematic components of individual observations cancel each other out. The most common technique is moving average smoothing which replaces each element of the series by either the simple or weighted average of 'n' surrounding elements, where n is the width of the smoothing "window" (Box & Jenkins, 1976; Velleman&Hoaglin, 1981). Medians can be used instead of means. The main advantage of median as compared to moving average smoothing is that its results are less biased by outliers (within the smoothing window). Thus, if there are outliers in the data (e.g., due to measurement errors), median smoothing typically produces smoother or at least more "reliable" curves than moving average based on the same window width. The main disadvantage of median smoothing is that in the absence of clear outliers it may produce more "jagged" curves than moving average and it does not allow for weighting.

In the relatively fewer common cases (in time series data), when the measurement error is very large, the distance weighted *least squares smoothing* or *negative exponentially weighted smoothing* techniques can be used. All those methods will filter out the noise and convert the data into a smooth curve that is relatively unbiased by outliers. Series with relatively few and systematically distributed points can be smoothed with bicubic splines.

Fitting a Function

Many monotonous time series data can be adequately approximated by a linear function; if there is a clear monotonous nonlinear component, the data first need to be transformed to remove the nonlinearity. Usually a logarithmic, exponential, or (less often) polynomial function can be used.

Analysis of Seasonality

This is another general component of the time series pattern. It is defined as correlational dependency of order k between each ith element of the series and the $(i\text{-}k)^{'th}$ element (Kendall, 1976)

and measured by autocorrelation (i.e., a correlation between the two terms); *k* is usually called the *lag*. If the measurement error is not too large, seasonality can be visually identified in the series as a pattern that repeats every *k* elements.

Autocorrelation Correlogram. Seasonal patterns of time series can be examined via correlograms. The correlogram (autocorrelogram) displays graphically and numerically the autocorrelation function (ACF), that is, serial correlation coefficients (and their standard errors) for consecutive lags in a specified range of lags (e.g., 1 through 30). Ranges of two standard errors for each lag are usually marked in correlograms but typically the size of auto correlation is of more interest than its reliability because we are usually interested only in very strong (and thus highly significant) autocorrelations.

Partial Autocorrelations. Another useful method to examine serial dependencies is to examine the partial autocorrelation function (PACF) - an extension of autocorrelation, where the dependence on the intermediate elements (those within the lag) is removed. That is, the partial autocorrelation is similar to autocorrelation, except that when calculating it, the (auto) correlations with all the elements within the lag are partialled out (Box & Jenkins, 1976).

Removing Serial Dependency. Serial dependency for a particular lag of *k* can be removed by differencing the series, that is converting each *i*'th element of the series into its difference from the (*i-k*)''th element.

Arima Methodology
The modelling and forecasting procedures discussed above involved knowledge about the mathematical model of the process. However, in real-life research and practice, patterns of the data are unclear, individual observations involve considerable error, and we still need not only to uncover the hidden patterns in the data but also generate forecasts. The ARIMA methodology developed by Box and Jenkins (1976) helps us to do just that.

Autoregressive Process. Most time series consist of elements that are serially dependent in the sense that you can estimate a coefficient or a set of coefficients that describe consecutive elements of the series from specific, time-lagged (previous) elements. Each observation is made up of a random error component (random shock,) and a linear combination of prior observations.

Stationarity Requirement An autoregressive process will only be stable if the parameters are within a certain range; for example, if there is only one autoregressive parameter then it must fall within the interval of $-1 < \phi < 1$. Otherwise, past effects would accumulate and the values of successive x_t' s would move towards infinity, that is, the series would not be stationary. If there is more than one autoregressive parameter, similar (general) restrictions on the parameter values can be defined.

Moving Average Process Independent from the autoregressive process, each element in the series can also be affected by the past error (or random shock) that cannot be accounted for by the autoregressive component. In other words, each observation is made up of a random error component (random shock,) and a linear combination of prior random shocks.

Invertibility Requirement There is a "duality" between the moving average process and the autoregressive process (Box & Jenkins, 1976; Montgomery, Johnson, & Gardiner, 1990). However,

analogous to the stationarity condition described above, this can only be done if the moving average parameters follow certain conditions, that is, if the model is invertible. Otherwise, the series will not be stationary.

ARIMA Methodology - Autoregressive Moving Average Model Box and Jenkins (1976) introduced this model which includes autoregressive as well as moving average parameters, and explicitly includes differencing in the formulation of the model. Specifically, there are three types of parameters in the model: the autoregressive parameters (p), the number of differencing passes (d), and moving average parameters (q). In the notation introduced by Box and Jenkins, models are summarized as ARIMA (p, d, q); so, for example, a model described as (0, 1, 2) means that it contains 0 (zero) autoregressive (p) parameters and 2 moving average (q) parameters which were computed for the series after it was differenced once.

Identification The input series for ARIMA needs to be stationary, that is, it should have a constant mean, variance, and autocorrelation through time. Therefore, the series first needs to be differenced until it is stationary. The number of times the series needs to be differenced to achieve stationarity is reflected in the d parameter. In order to determine the necessary level of differencing, you should examine the plot of the data and auto-correlogram. Significant changes in level (strong upward or downward changes) usually require first order non-seasonal (lag=1) differencing; strong changes of slope usually require second order non-seasonal differencing. Seasonal patterns require respective seasonal differencing. If the estimated autocorrelation coefficients decline slowly at longer lags, first order differencing is usually needed.

Estimation and Forecasting At Estimation, the parameters are estimated (using function minimization procedures), so that the sum of squared residuals is minimized. The estimates of the parameters are used in the last stage (Forecasting) to calculate new values of the series (beyond those included in the input data set) and confidence intervals for those predicted values. The estimation process is performed on transformed (differenced) data; before the forecasts are generated, the series needs to be integrated (integration is the inverse of differencing) so that the forecasts are expressed in values compatible with the input data. This automatic integration feature is represented by the letter I in the name of the methodology (ARIMA = Auto-Regressive Integrated Moving Average).

The Constant in Arima Models ARIMA models may also include a constant. The interpretation of a (statistically significant) constant depends on the model that is fit. Specifically, (1) if there are no autoregressive parameters in the model, then the expected value of the constant is the mean of the series; (2) if there are autoregressive parameters in the series, then the constant represents the intercept. If the series is differenced, then the constant represents the mean or intercept of the differenced series.

Identification Phase Number of parameters to be estimated - majority of empirical time series patterns can be sufficiently approximated using one of the five basic models that can be identified based on the shape of the auto-correlogram (ACF) and partial auto correlogram (PACF) based on recommendations of Pankratz (1983):
- One autoregressive (p) parameter: ACF - exponential decay; PACF - spike at lag 1, no correlation for other lags.

- Two autoregressive (p) parameters: ACF - a sine-wave shape pattern or a set of exponential decays; PACF - spikes at lags 1 and 2, no correlation for other lags.
- One moving average (q) parameter: ACF - spike at lag 1, no correlation for other lags; PACF - damps out exponentially.
- Two moving average (q) parameters: ACF - spikes at lags 1 and 2, no correlation for other lags; PACF - a sine-wave shape pattern or a set of exponential decays.
- One autoregressive (p) and one moving average (q) parameter: ACF - exponential decay starting at lag 1; PACF - exponential decay starting at lag 1.

Exponential Smoothing

Exponential smoothing was developed by Brown and Holt during World War II. It is a forecasting method for a wide variety of time series data. A simple model for a time series would be to consider each observation as consisting of a constant (b) and an error component ε (epsilon), that is: $X_t = b + \varepsilon_t$. The constant b is relatively stable in each segment of the series but may change slowly over time. If appropriate, then one way to isolate the true value of b, and thus the systematic or predictable part of the series, is to compute a kind of moving average, where the current and immediately preceding ("younger") observations are assigned greater weight than the respective older observations. Simple exponential smoothing accomplishes exactly such weighting, where exponentially smaller weights are assigned to older observations. The specific formula for simple exponential smoothing is:

$$S_t = \alpha * X_t + (1-\alpha) * S_{t-1}$$

When applied recursively to each successive observation in the series, each new smoothed value (forecast) is computed as the weighted average of the current observation and the previous smoothed observation; the previous smoothed observation was computed in turn from the previous observed value and the smoothed value before the previous observation, and so on. Thus, in effect, each smoothed value is the weighted average of the previous observations, where the weights decrease exponentially depending on the value of parameter α (alpha). If α is equal to 1 (one) then the previous observations are ignored entirely; if α is equal to 0 (zero), then the current observation is ignored entirely, and the smoothed value consists entirely of the previous smoothed value (which in turn is computed from the smoothed observation before it, and so on; thus all smoothed values will be equal to the initial smoothed value S_o). Values of α in-between will produce intermediate results.

4.4. Participatory Action Research

Participatory action research (PAR) is an approach to research in communities that emphasizes participation and action. It seeks to understand the world by trying to change it, collaboratively and following reflection. PAR emphasizes collective inquiry and experimentation grounded in experience and social history. Participatory Action Research has been used since the 1940s. It involves researchers and participants working together to understand a problematic situation and change it for the better.

The purpose of action research is to bring change directly and to understand what provokes change and what does not. It is a way to understand a certain situation or problem, change the situation and empower the persons engaged in that particular situation. It brings together communities affected by a certain situation or problem to understand what is going on as a group and do something about

it. The "research" and the "action" are related and feed each other through an iterative reflective process.

Definitions of Action Research: Action research is "research on the conditions and effects ofvarious forms of social action and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action and fact-finding about the result of the action" (Lewin, 1946)'Action research is an experiment in design and involves implementing an action to study its consequences' (Centre for Collaborative Action Research).
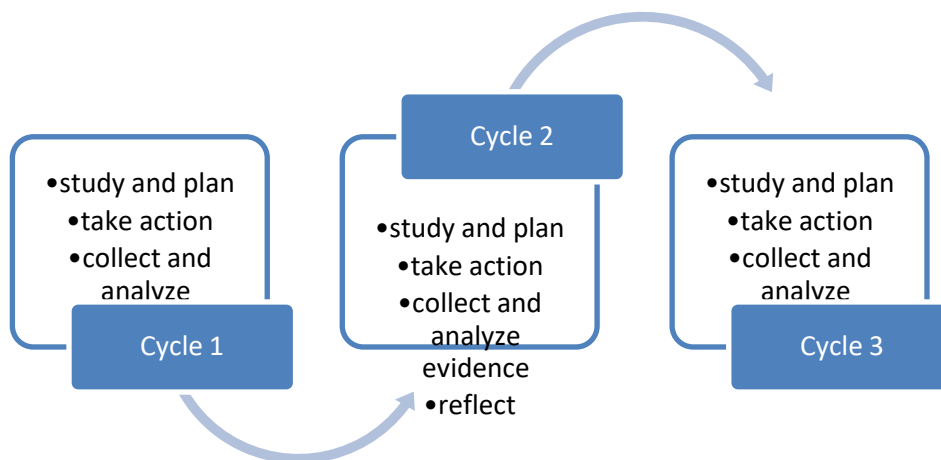

Figure 4.6. Multiple Loop Learning vs Single Loop Learning (Chris Argyris)
(Source: Centre for Collaborative Research, 2014)

Multiple loop learning is a dynamic process in which the methods and types of actions develop over time through iterative process of research, action and reflection. As illustrated in the diagram above, repeating cycles of studying and planning, action, collecting and analyzing evidence, and reflecting allow continual development and improvement of the analysis, even as they prompt continuous change in the circumstances and problems.

Meaning and Principles of Participatory Action Research (PAR)

Participatory action research is defined as a "participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview….[and bringing] together action and reflection, theory and practice, in participation with others in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and communities." (Reason & Bradbury, 2001). Participatory research methods include: participatory observation, community meetings, resource mapping, problem identification and visioning, transect walks, testimonials, theatre, personal / family / community diaries, timeline analysis, public dialogues, engagement with state authorities / investors / others, events and processes to reflect and learn from these, use of media, community exchange, using multi-media as inputs into these (or creating them from these), re-strategizing, documenting. Participatory action research rests on two principles: the pursuit of social change and the democratization of the knowledge process.

Key components of Participatory Action Research:

- A focus on change – commitment to participate with people to improve and understand the world by changing it (McIntyre, 2008)
- Context-specific – it is generally targeted around the needs of a particular group although this can vary in size from small teams to projects encompassing entire communities
- Emphasis on collaboration – researchers and participants working together to examine a problematic situation or action to change it for the better, although there are differences in opinion as to how much collaboration is possible or necessary
- A cyclical process – an iterative cycle of research, action and reflection (Kindon et al, 2007) underpins the research process although it is not always clear how this happens in practice
- Participants are competent and reflexive and capable of participating in the entire research process although researchers may adopt different standards as to the level of participation that 'qualifies' as PAR
- Knowledge is generated through participants' collective efforts and actions
- Liberatory – PAR seeks to 'liberate' participants to have a greater awareness of their situation in order to take action, although for some researchers the emphasis on liberation will be tempered
- PAR is not just another method – more an orientation to inquiry – this means that many different methods are possible (quantitative and qualitative)
- Success is some personal or collective change – for some researchers it "depends on the credibility/validity of knowledge derived from the process according to whether the resulting action solves problems for the people involved and increases community self-determination" (Kindon et al, 2007) but for others the emphasis is on developing theories and practices that can be shared.

Distinctiveness of Participatory Action Research (Baum, MacDougall & Smith, 2006)

- It focuses on research whose purpose is to enable action. Action is achieved through a reflective cycle, whereby participants collect and analyse data, then determine what action should follow. The resultant action is then further researched, and an iterative reflective cycle perpetuates data collection, reflection, and action as in a corkscrew action.
- PAR pays careful attention to power relationships, advocating for power to be deliberately shared between the researcher and the researched: blurring the line between them until the researched become the researchers. The researched cease to be objects and becomes partners in the whole research process: including selecting the research topic, data collection, and analysis and deciding what action should happen as a result of the research findings.
- PAR contrasts with less dynamic approaches that remove data and information from their contexts. PAR advocates that those being researched should be involved in the process actively.

Drawbacks of Participatory Action Research (Bennett, M., 2004)

- Working with local people is far from easy. Not everyone within the community will want to partake in participatory research. Local people may be skeptical about the perceived benefits of the research and as such, may not want to invest their time and energy into any research project.

- Most individuals, especially those living within oppressed economies, are too busy trying to secure the basic necessities of life to participate in research activities (Cornwall and Jewkes 1995)
- Involvement by the community members may not always be continuous or predictable. Participants can experience task exhaustion and the composition of the research group(s) can fluctuate over time. Researchers must be careful to tread softly between the need to generate sufficient interest for the research project and at the same time avoid raising false hopes within the community.
- Community people are not academics, and they will not take seriously or get involved in a research project that they do not understand

Dangers of PAR
- Social science researchers often gravitate toward participatory research as a way to get people to agree to a position, an action, or a policy, which others (e.g. social workers, adult educators, etc.) feel is important to their purposes. These purposes are not necessarily the same purposes of the participants or communities. In this way PAR can be used as an effective and manipulative "tool" for getting the predominant views of the state into the heart and minds of those that oppose the predominant views (Hall 1981, St. Denis 1992).
- Researchers who utilize participatory methods must be very careful to recognize that no two groups of peoples or communities are ever homogenous. Within groups and/or communities, there exists a multitude of interrelated axes of differences, including wealth, gender, age, religion, health, ethnicity and power (Cornwall and Jewkes 1995).
- Research has been noted to be more easily facilitated if it is organized through the medium of dominant stakeholders or "leaders," who are often most able to mobilize resources, interest and articulate concerns about the research project. However, the problem with utilizing these individuals may mean, "inviting manipulation of the research according to the agendas of the powerful" (Cornwall and Jewkes 1995: 1673). On the other hand, working outside the power structures can weaken both the potential impact of the project at a wider level, as well as invite continued marginalization of the people and goals of the project (Cornwall and Jewkes 1995).
- Participatory action research can also bring other unintended negative consequences to those who participate. Participants may become alienated from their community by virtue of their association with the research project.
- Researchers must be aware of the local constraints that enable class systems to exist. And further, that the participatory process can be affected by such factors as class tensions, factionalism and ethnicity, which can have direct impact upon participatory research.

Applications of PAR in Rural and Urban Setting
Community development and sustainable livelihoods - PAR emerged as an important contribution to intervention and self-transformation within groups, organizations and communities. It has left a singular mark on the field of rural and community development, especially in the Global South. Tools and concepts for doing research with people, are now promoted and implemented by many international development agencies, researchers, consultants, civil society and local community organizations around the world. PAR applications in the following fields are committed to problem solving and adaptation to nature at the household or community level, using friendly methods of

scientific thinking and experimentation adapted to support rural participation and sustainable livelihoods:

- Fisheries
- mining
- forestry
- plant breeding
- agriculture
- farming systems research and extension
- watershed management
- resource mapping
- environmental conflict and natural resource management
- land rights
- local economic development
- communication
- tourism
- leadership for sustainability
- biodiversity
- climate change
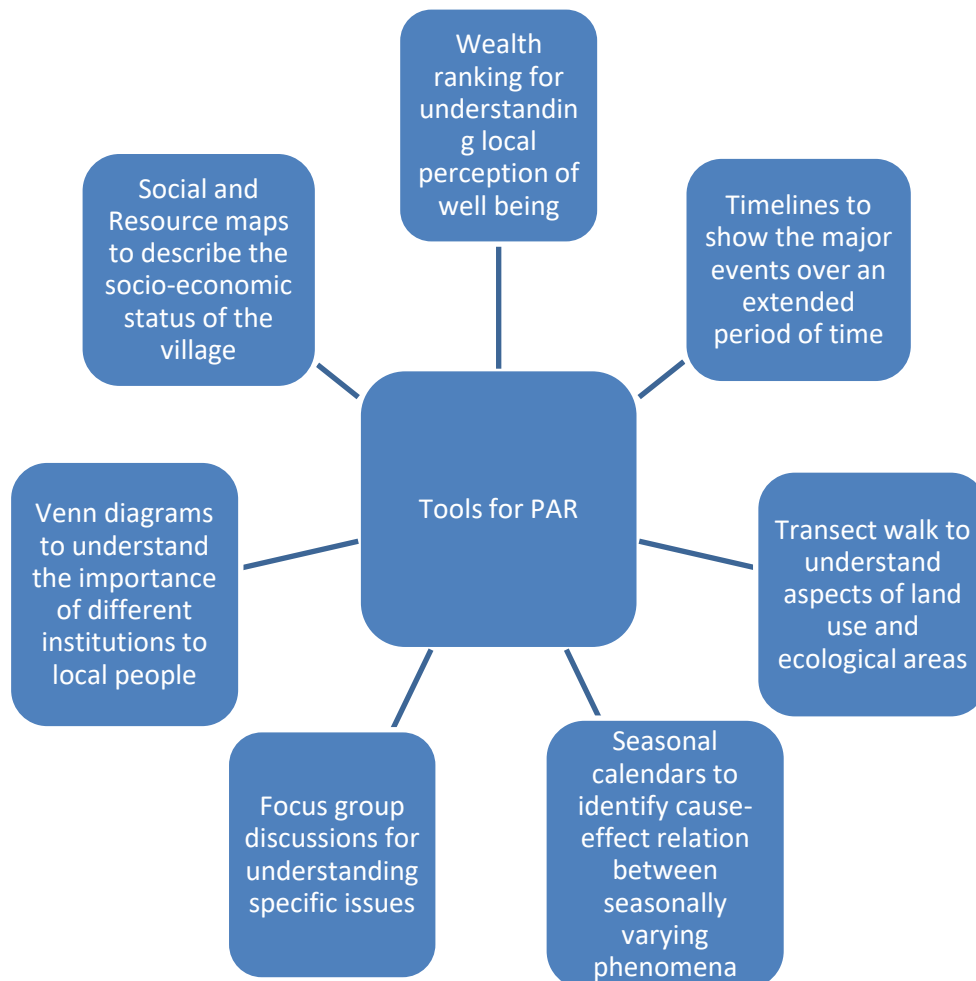
4.5. Tools of Participatory Action Research

Wealth ranking for understanding local perception of well being

Social and Resource maps to describe the socio-economic status of the village

Timelines to show the major events over an extended period of time

Tools for PAR

Venn diagrams to understand the importance of different institutions to local people

Transect walk to understand aspects of land use and ecological areas

Focus group discussions for understanding specific issues

Seasonal calendars to identify cause-effect relation between seasonally varying phenomena

Figure 4.7. Tools for PAR

Wealth Ranking

Participatory wealth ranking is a tool that captures differences in standards of living as perceived by the community themselves, thus making it possible to gain insight into relative social stratification.

Wealth ranking is used to understand the people's perceptions of wealth and welfare in their own village. Most research agencies use Social Map of the village as a basis for sample selection. Wealth-ranking not only helps us identify the rich and poor families of the village but also gives us an insight into what constitutes wealth and what constitutes poverty as far as the people are concerned.

The purpose of wealth ranking is to learn the meaning of wealth, poverty and vulnerability in the view of the community members, and to get their ideas on what indicators (beyond cash income) define those who are most needy. It is important to explain the purpose and goal of the exercise very clearly before beginning. Otherwise, the community may draw the conclusion that special benefits will flow to those who are ranked lowest in the exercise.

> **To Do Activity**
> - Does your village have two extreme classes of people, the richest and the poorest?
> - Are there people who fall in between these categories? If yes what are the various categories? note the number of categories mentioned by the group)
> - Why is a person rich? Or poor? Or any other category? (Enter the information below the names in quantifiable manner; E.g. Ram has two cows, Lakshmi has a large family size of 8 members, etc.)

Timelines

Timelines are people's own account of their history.
- It is a graphic technique that is used to show significant and non-repetitive changes or events which have taken place in a village over time.
- This not only helps in identifying and representing sequences of key events and major changes but also helps in tracking changes in specific issues related to climatic conditions over time and predicting future events based on past experiences.
- It tells us about the historical upheavals and the downfalls or lows that a village/community has experienced and their responses to them which could also lead to finding solutions to current problems

The purpose of carrying out this exercise is to find out the main events which have influenced the community over time. This could be some good as well as bad events. Timelines can include general trends with approximate dates (e.g. from 2010-2015, declining of ground water, from 2000 onwards – increased use of plastic during social events) or specific events (e.g. drought year in 2013). It is important to note that some 'events' occur over a number of years, others might be linked to a year, while others can be more specific, like a month or even day.

Transect Walk

It is a tool involving systematic walking along with the local people as part of understanding aspects of land use and ecological areas through discussions across an identified locality. ☐ It helps in identifying and explaining the cause and effect relationships among topography, soils, natural

vegetation, cultivation, and other production activities and human settlement patterns, in addition to major problems and possibilities perceived by different groups.

It may be a joint walk which is based on the concept of 'seeing is believing' such walks relates to learning from the local communities through undertaking joint walks with them, helping in the 'on-site' observation of different aspects of a selected area/s which require simultaneous in–depth discussions with the community members.

Steps in a Transect Walk


```
                    steps in a transect walk

the researcher should be      Identify and have an       Have selection criteria
clear on the issue of focus    overview of the area to    which can be based on
that needs to be covered            be visited           zones, distance and land
   as part of the walk                                    use or soil conditions.
```
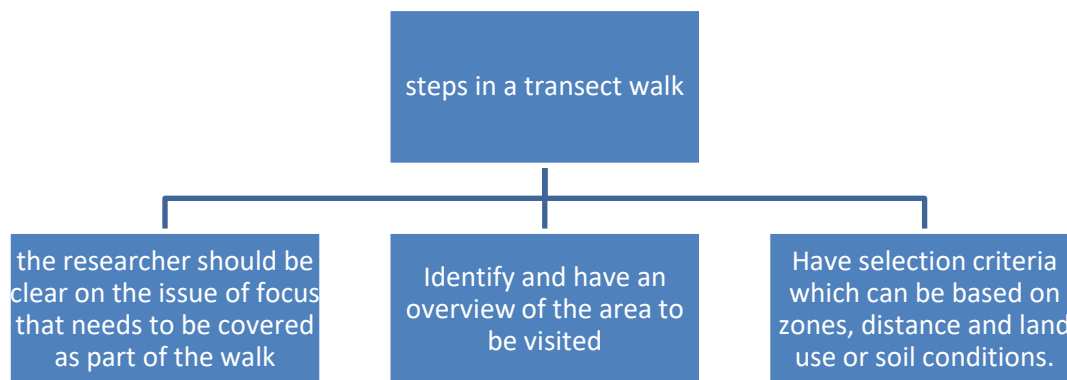
Fig 4.8 Steps in a Transect Walk

Focus Group Discussion

It is a semi-structured group meeting during which participants contribute to the generation of data on specific issues of concern to a community, stakeholders, projects or policies; it may be questions related to the perceptions of people on the use of plastics, alternatives to plastic, dumping of waste in the community, recycling of waste at homes, community etc. The meetings serve as a platform to address a particular concern and reach consensus with regards to a research topic/inquiry (e.g. recycling of waste at home) in terms of socio-economic and institutional capacity of the community to adapt certain strategies. It is also a good way of capturing reactions to a given phenomenon in a community. A series of focus groups is not only a rapid way of collecting comparative data but is also a reliable method of cross-checking information got from other sources.

Steps in a Focus Group Discussion

- Assemble a group of 8-12 members. Depending on the issues that are discussed it can be a mixed group or specific groups of men/women/ caste-based groups. The smaller number of participants ensures that there is more interaction, communication and sharing of information.
- Keep in mind that the members of the group should have something in common depending on the profession, socio-economic status or a group which has been the part of implementation of some programs in the villages.
- Introduce the topic and explain in detail the objective of the discussion.
- Have a well-prepared question guide so that important points are not missed out.
- Facilitate the discussion and make sure that all members are participating as much as possible.
- It is important to conduct more than five focus group discussions to establish the validity of the data collected.

Social and Resource Mapping

- It is a visual technique through which a map is created by the villagers for the researchers to understand the community layout, in terms of its infrastructural facilities, demography, the existing ethno-linguistic groups along with the occurrence, distribution, access and the use of resources

- It is used to identify the different social groups/institutions and the perceptions that the community/villagers have of them. In addition, it helps in recognizing different features and the significance it has attached to the community along with the problems, possibilities and the opportunities these social groups and institutions have attached with them ⬚

- It helps the community in communicating the perceptions that they have of their community structures, the interactions that exist between different social groups, the distribution of the community in terms of class and caste and the analyses of the resources found and how they are used.

Steps in Mapping

- Ask the participants to draw a map of the village, showing all households. For orientation it will be helpful first to draw roads and significant landmarks of the village.

- Discuss whether the total number of households has increased or shrunk during recent years. If there were any changes, ask why and whether this has caused any problem for certain families or for the village.

- Ask the participants to also show institutions and places that offer some kind of social service, or which are popular places to meet (e.g. schools, churches, health service, traditional healers, local administration office, village leaders, shops, places where people frequently meet to socialize, etc.). Box 4 and 5 has some additional key questions for probing while drawing social and resource maps.

- Ask to show on the map which different ethnic or religious groups live in the area.

Key Questions for Probing
- What are the major resources in the village? (E. g: Water Tank, School, etc.)
- In which year was it established?
- Who benefits from these resources and who does not? Why/why not?
- Are there any resources that existed earlier, which are not present today?
- What was the reason for their closure?
- Are there any resources in the village that are harmful? In what way?
- What additional resources are required in the village?

Resource Map

 The resource map of a village usually overlaps with the time line as it maps various resources available to the villagers and its impacts on the development of the village over all.   The process of drawing a resource map is similar to a social map but the focus here instead is on the key resources that are available and located in the village. The village takes a lesser focus, but the fields and the surrounding areas come into larger focus. Some questions include whose fields are located where; what are the soil types of the fields surrounding the village; what crops are grown, where and why?

Who owns fields closer to the village? etc.

Venn Diagram

A Venn diagram is an illustration that utilizes circles, either overlapping or non-overlapping, to depict a relationship between finite groups of things. It is a visual method of identifying and representing perceptions of key institutions (formal and informal) and individuals inside and outside a community, their relationships, and importance associated with the same.

- It is an instrument which helps identify potential entry points for strengthening or improving relationships between key social actors.
- It helps understand how different community members perceive institutions both in terms of participation, decision making, accessibility to and delivery of services within and outside the community
- Provides an insight into the existing institutions in a community and their relation to each other and to external agencies involved in the delivery of services and the administration of programs

School   Govt Schemes   Gram Panchayat   PDS

SHG   Anganwadi   PHC
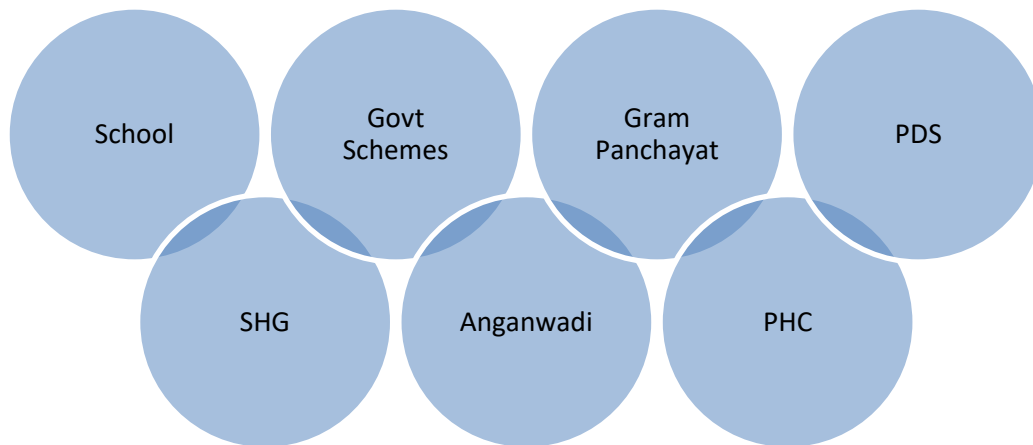
Fig 4.9. Venn Diagram Showing Networks &Programs in a Village

To Do Activity
- Identify the institutions in a village.
- Classify them according to their importance.
- Identify the institutions which can play a key role in reduce wastage and conserve the nature.

Seasonal Calendars

It is a method for visual demonstration of the distribution of seasonal phenomena over time. It helps understand the seasonal differences in livelihoods and vulnerability analysis as it illustrates the dynamic dimension of wellbeing which is often not clearly represented or shown through conventional techniques of vulnerability assessment with respect to climate change. it also helps to identify the coping strategies that people use to manage the risks along with hardships that people face so that appropriate safety nets can be set, and remedial actions can be taken. It helps in

Identifying cause-and-effect relationships between seasonally varying phenomena ⬜ Understanding the time of the year when different social groups are more or less vulnerable

Types of seasonal calendars		
Seasonal livelihood calendar - shows the source of livelihood for both men and women against different months in a year	Seasonal disease calendar - Is useful in carrying out an analysis of seasonal diseases that a community is faced with and could be used and linked with health intervention measures	Seasonal food calendar - Seasonal variations in food availability both in terms of quantum and quality can be assessed through a seasonal food calendar.

Fig 4.10. Types of Seasonal Calendars

Summary

This chapter introduces the correlation analysis in statistics. Correlation is the relationship between two or more paired variables or two or more sets of data. The correlation between any two variables is expressed in terms of a number, which is known as correlation coefficient. The graphical representation of relationship between variables is given by scattergrams. Other methods of calculating coefficient of correlation are Pearson's Product Moment Coefficient of Correlation (r), Spearman Rank Order Coefficient of Correlation (ρ) and Phi Correlation Coefficient (φ). Regression analysis estimates the relationship between two or more variables. The block also describes time series analysis and its components trend and seasonality. Participatory action research (PAR) is an approach to research in communities that emphasizes participation and action. Different tools for PAR are wealth ranking, timelines, transect walk, focus group discussion, social and resource mapping, Venn diagram and seasonal calendars.

Model Questions

1. Differentiate between positive and negative correlation.
2. Explain rank correlation.
3. Explain the managerial uses of correlation analysis and regression analysis.
4. What are the key components of participatory action research?

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Chapter 5 Data Analysis

Introduction

The data collected from the field should be processed and analyzed using appropriate statistical techniques as indicated in the research plan. The data collected should be made available to researchers, the business community and entrepreneurs to support their investment and to make appropriate decisions and to evaluate their investment decisions. Data processing primarily involves editing, coding, classification and tabulation of data so that it facilitates data analysis. This block discusses on various aspects of data processing. The processing of data can either be in the form of tables or in the form of' graphs. The block also deals with report writing, its significance, layout of the report and different precautions to be followed while writing the report.

Objectives

At the end of the block, the students will be able to:

➢ Understand the processes of editing, coding, classification and tabulation of data
➢ Comprehend the types of charts and diagrams used in data analysis
➢ Learn various statistical tests used for hypothesis testing
➢ Master the art of report writing

Structure

5.1	• Editing, coding, classification and tabulation of data
5.2	• Data presentation
5.3	• Data analysis and testing of hypothesis
5.4	• Report writing
5.5	• Layout of research report
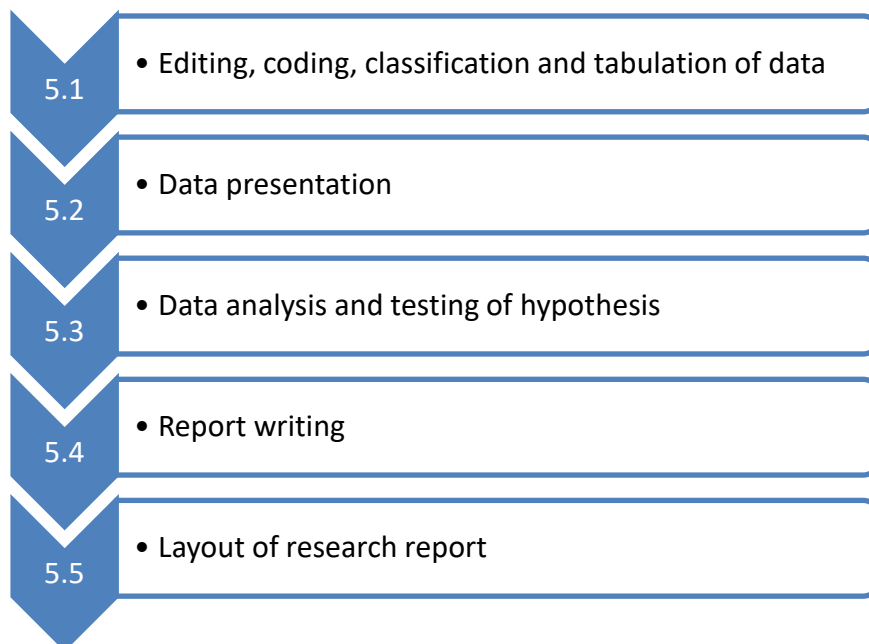
Figure 5.1. Block Flow

5.1. Editing, Coding, Classification and Tabulation of Data

Editing of Data

Data editing is the process of reviewing the data for consistency, detection of errors and correction of errors, in order to improve the quality, accuracy and adequacy of the data and make it suitable for the purpose for which it was collected. Before doing data collection, a plan for the methodological aspects of the collection process must be set. It must indicate the intended purpose from collecting

the data, identify the targeted statistical population, the variables for which the data will be collected, and the outputs desired from this data. Data editing is important as it helps to maximize the usefulness of data and it ensures that the data used is coherent, consistent and free of the errors in order to maintain quality of the output of such data, which in turn reflects positively on the quality of the decisions based on the data in question.

In order to facilitate coding of data, the recorded data must be legible and complete. Completeness involves that all the items in the questionnaire must be fully completed. If some questions are not answered, the interviewers may be contacted to find out the reason. In this case, the respondent may be approached again, or it may be treated as missing data.

Questionnaire checking	Treatment of missing responses	Ethical concerns in cleaning data
•Checked for completeness, interviewing quality •Completed questionnaires from the field are again checked for completeness •Identify partial responses and missing responses	•Substitute a neutral value - mean is substituted for missing value •Substitute an imputed response •Case-wise deletion •Pair-wise deletion if sample size is more and with few missing responses	•If data is of questionable quality, discarding such respondents is an ethical concern •Eliminating respondents with unsatisfactory data after analysing the data is an ethical issue

Figure 5.2. Editing Process

Field editing

In-house/central editing

Editing for consistency

Editing for completeness
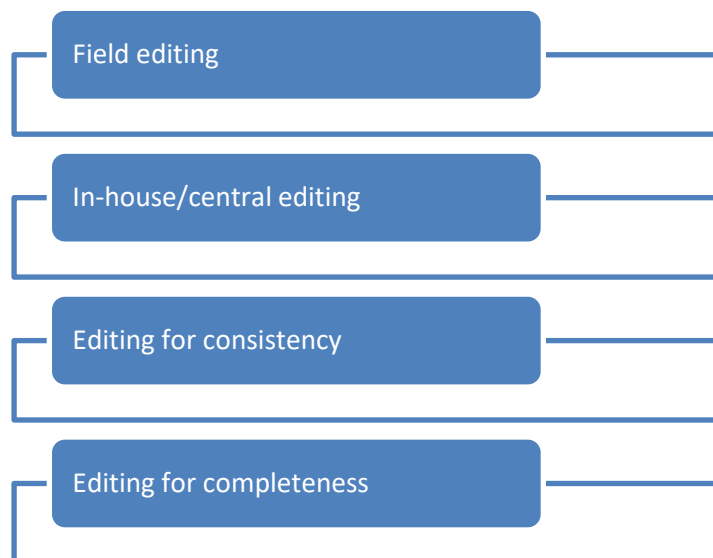
Figure 5.3. Types of Editing

Field Editing Daily field editing by field supervisors helps in identifying omissions in responses and increases the possibility of contacting the respondents again.

In-House Editing/Central Editing If the research is done across the country where responses may

reach after some time, daily field editing may not be possible. In such cases, the staff in the research office may investigate the data and conduct the editing. All the forms are thoroughly edited by a single person (editor) in a small field study or a small group of persons in case of a large field study. The editor may correct all the obvious errors.

Editing for Consistency The in-house editor must use discretion to ensure that the inconsistent or contradictory responses are adjusted and make them ready for coding.

Editing for Completeness Incomplete responses may be properly handled by the editor according to the rules set for the editor. If there are too many missing responses, the editor may decide whether to use the responses or not.

> **To Do Activity**
> A marketing research organization is conducting a survey to determine the consumption pattern of packed food items by households in Hyderabad. The filled-up sets of questionnaires are sent to you. If you are responsible for editing the raw data from the questionnaires and analyzing the same, list out the points on which you would like to concentrate while editing the raw data.

Coding of Data

Coding is the process of assigning some symbols to the edited data. It may be alphabetical or numerals or both. It facilitates the recording of data into classes or categories. The classes should be appropriate to the research problem being studied. The coding is necessary for the efficient analysis of data. The coding decisions should be taken at the designing stage of the questionnaire so that the likely responses to questions are pre-coded. This simplifies computer tabulation of the data for further analysis.

Guidelines for Coding

- Appropriate plan should be developed for coding the entire data to retain maximum information
- The category codes determined by the researcher should be mutually exclusive
- Separate codes should be assigned for all responses in the case of multiple responses
- Respondent code and record number should appear on each record in the data
- Additional codes like project code, interviewer code, field code, code for missing data, date and time code etc. may also be included.

Example: Closed Ended Questions

What is your gender? ☐ Male ☐ Female ☐ Neuter

We may assign a code of '0' to male, '1' to female and '2' to neuter respondent.

The same approach could also be used for coding numerical data. For example,

What is your monthly income?

☐ < Rs. 10,000
☐ Rs. 10, 000 – Rs. 25,000
☐ Rs. 25, 000 – Rs. 50, 000
☐ Rs. 50, 000 and above

We may assign a code of '1' to less than Rs.10, 000, '2' to Rs. 10, 000 – Rs. 25, 000, '3' to Rs. 25, 000 – Rs. 50, 000 and `4' to Rs. 50, 000 and above.

Coding of open-ended questions is more complex. The researcher may select at random 40-50 of the responses to a question and list them. After examining the list, the researcher may decide the appropriate number of categories to summarize the data. A column of "any other" should also be added to include categories which do not fall into the designated categories.

Classification and Tabulation of Data
In order to analyze the collected data, the first step in the analysis is to classify and tabulate the information collected. The first step in tabulation of data is classification. Classification is the process of arranging data in groups or classes on the basis of some characteristics. Classification helps to study comparisons, relationships and also facilitates statistical treatment of data. The classification should be unambiguous, mutually exclusive, collectively exhaustive and flexible. Classification can be done in two ways:

- **Classification According to Attributes** Here we use the descriptive characteristics like gender, caste, marital status, educational qualifications, user of a product etc. The descriptive characters cannot be measured quantitatively. We can either record its presence or absence. The classification according to attributes may be of two types.

    i) **Simple Classification**: In simple classification, each class is divided into two sub classes and only one attribute is studied viz, user of a product or non-user of a product, married or unmarried, employed or unemployed etc.

    ii) **Manifold Classification**: In manifold classification more than one attributes are considered for the study. For example, the respondents in a study may be classified as user of a particular brand of a product and non-user of particular brand of product. Both user and non-user can be further classified into male and female. Further one can classify male and female into below 25 years of age and above 25 years and further into married and unmarried and may be again into professionals at non-professionals.

- **Classification According to Numerical Characteristics or Quantitative Classification** When the data has numerical characteristics such as sales, profits, height, weight, income etc., they are classified according to class intervals. For example, the people in a panchayat may be classified according to their income as follows:

Table 5.1. Quantitative Classification of Data

Monthly income (in Rs)	No. of people (in thousands)
0 – 10,000	20
10,000 – 25,000	50
25,000 – 50,000	20
Above 50,000	10
Total	100

The following are two examples of discrete and continuous frequency distributions:

Table 5.2. Discrete and continuous frequency distribution

Discrete Frequency Distribution		Continuous Frequency Distribution	
No. of children	No. of families	Monthly income	No. of families
0	10	0 – 10,000	100
1	200	10,000 – 25,000	200
2	400	25,000 - -50,000	400
3	100	50,000 – 100,000	100
4	50	Above 100,000	60
Total	760	Total	760

5.2. Data Presentation

Tabulation is used for summarization and condensation of data. The data can be presented:

- Tabular form
- Graphical form

Tabulation helps in analysis of relationships, trends and summarization of the given data. Simple tabulation results in one-way tables, and complex tabulation usually results in two-way tables or three- way tables which give information about interrelated characteristics of data.

State/UT	Population			Number of literates			Literacy Rate		
	Total (millions)	Males (millions)	Females (millions)	Total literates (millions)	Males (millions)	Females (millions)	Total (%)	M (%)	F (%)
J & K	10.1	5.4	4.8	4.8	3.1	1.7	55.5	66.6	43.0
HP	6.0	3.1	3.0	4.0	2.3	1.8	76.5	85.3	67.4
Punjab	24.3	13.0	11.4	14.8	8.4	6.3	69.7	75.2	63.4
Chandigarh	0.9	0.5	4.0	0.6	3.8	0.3	81.9	86.1	76.5
Uttaranchal	8.5	4.3	4.2	5.1	3.0	2.1	71.6	83.3	59.6
Haryana	21.1	11.4	9.8	12.1	7.5	4.6	67.9	78.5	55.7
Delhi	13.9	7.6	6.2	9.7	5.7	3.0	81.7	87.3	74.7
Rajasthan	56.5	29.4	27.1	27.7	18.0	9.7	60.4	75.7	43.9

Figure 5.4. Example of a Tabular form of Data

Characteristics of a Table

- Every table should have a clear title to make it understandable. This title should always be just above the body of the table.
- Every table should be given a distinct number to facilitate easy reference.
- Every table should have captions (column headings) and stubs (row headings) and they should be clear and brief.
- The units of measurements used must always be indicated.
- Source from where the data in the table have been obtained must be indicated at the bottom of the table.
- Abbreviations should be used to the minimum possible extent.

- The arrangement of the data categories in a table may be a chronological, geographical, alphabetical or according to magnitude to facilitate comparison.

To Do Activity
Prepare a table showing the types of wastes generated in a municipal area. The municipality has several function halls, religious worship places and hospitals.
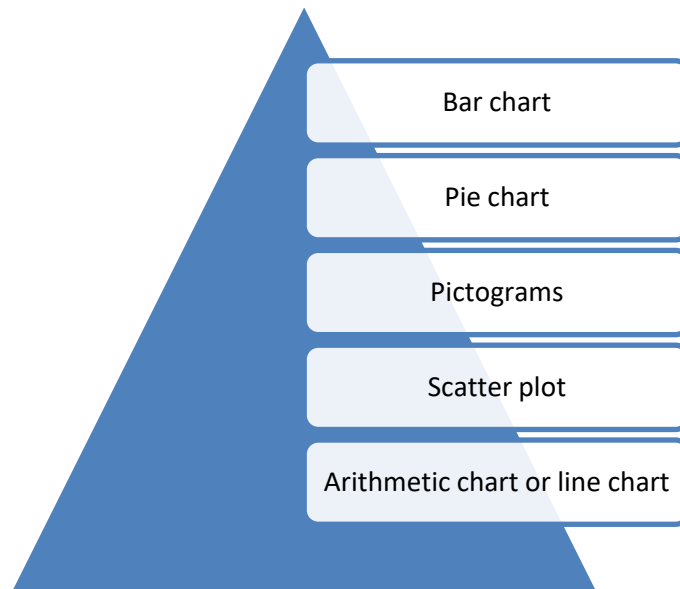
Graphical Presentation of Data

Figure 5.5. Graphical Presentation of Data

Bar Chart

A bar chart shows data in separate columns. It should be used for comparison between discrete categories. Example:
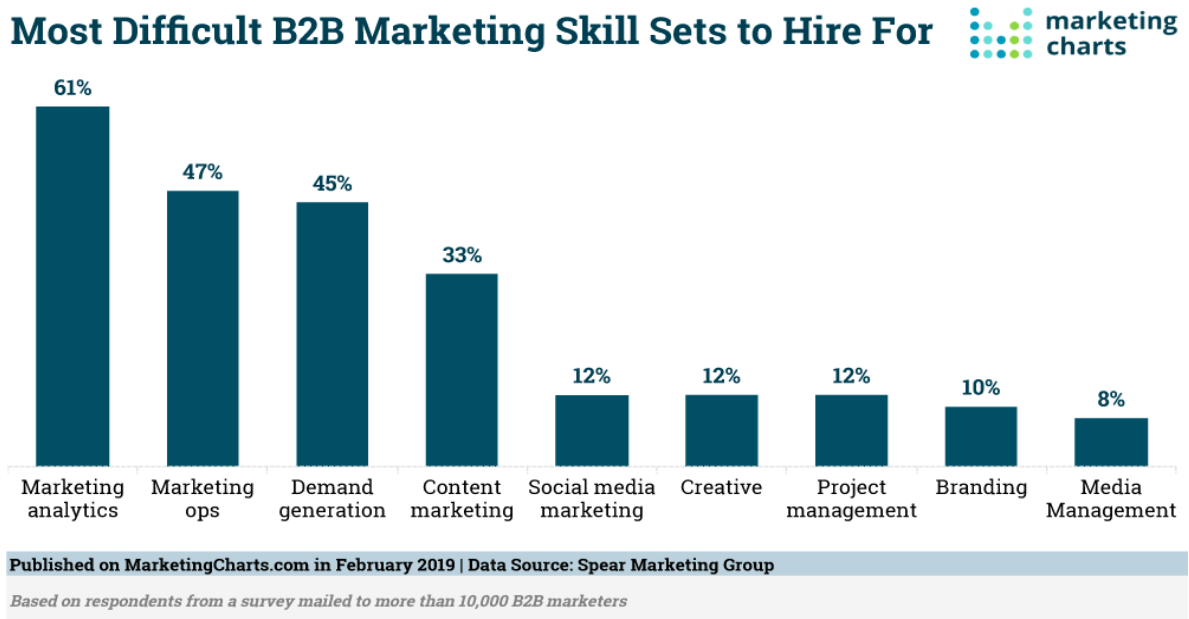
Figure 5.6. Bar Chart

(Source: https://www.marketingcharts.com/business-of-marketing/staffing-107257)

Pie Chart

A pie chart shows data as a percentage of the whole.
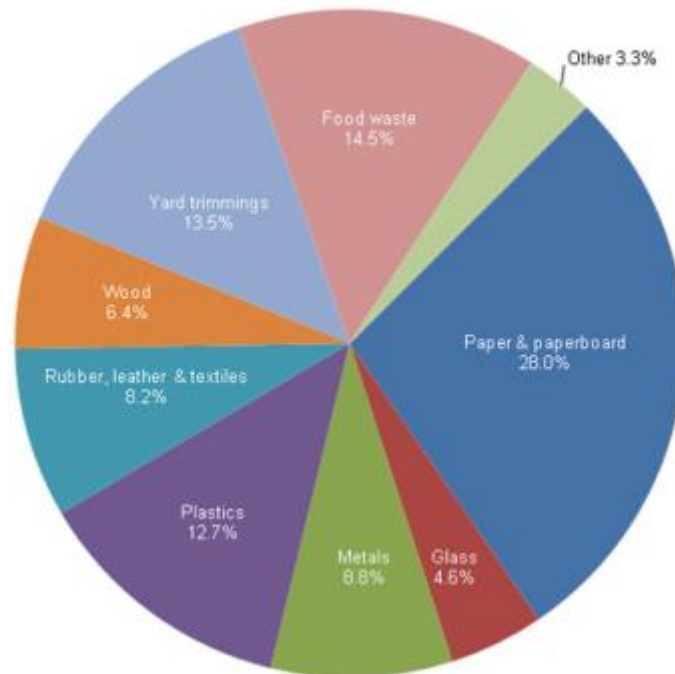
Figure 5.7. Pie Chart

(Source: https://anth102spring2016.wordpress.com/2016/05/02/time-is-running-out/)

Pictogram

In pictograms, data are represented by a picture.
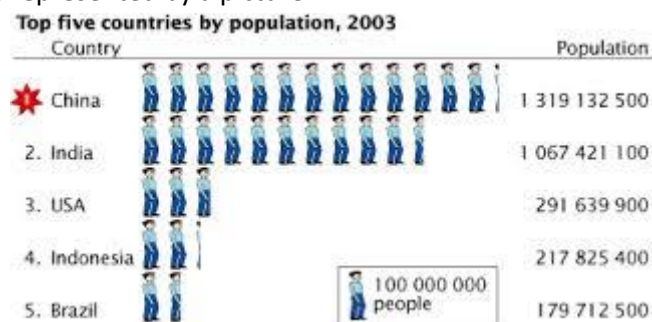
Figure 5.7. Pictogram

(Source: http://www.jaconline.com.au/downloads/sose/2004-09-pictogram.pdf)

Scatter Plot

A scatter plot displays all data as single points. It is a two-dimensional data visualization that uses dots to represent the values obtained for two different variables - one plotted along the x-axis and the other plotted along the y-axis.

Weight and Height of Children
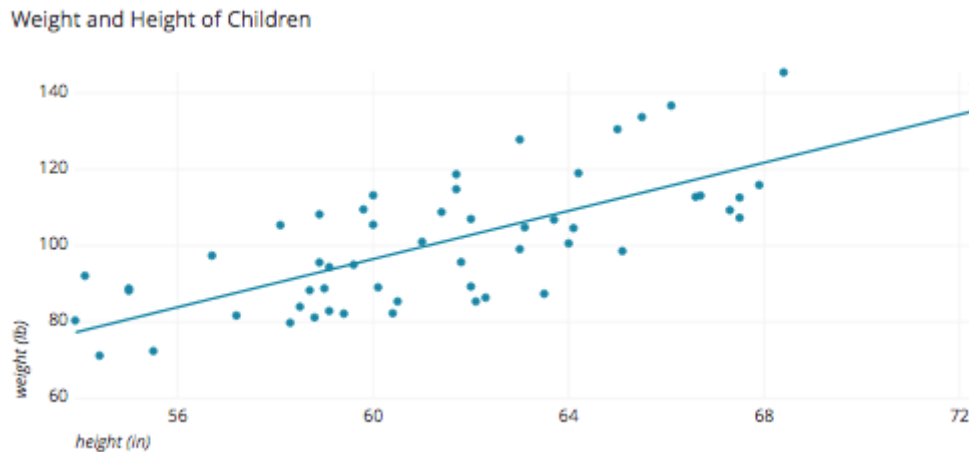
Figure 5.9. Scatter Plot

(Source: https://chartio.com/learn/dashboards-and-charts/what-is-a-scatter-plot/)

Line Chart

A line chart plots data in order and joins them with a line.
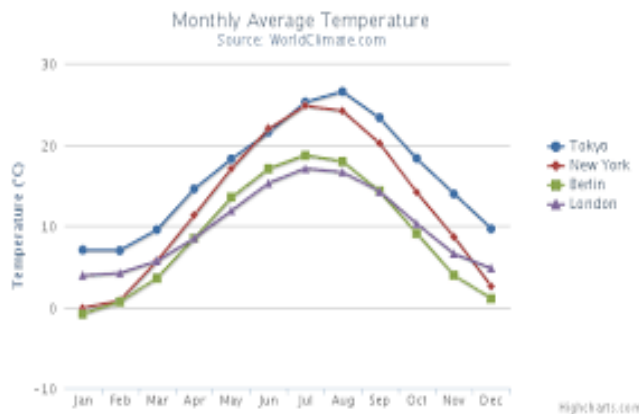
Figure 5.10. Line Chart

(Source: https://www.highcharts.com/docs/chart-and-series-types/line-chart)

5.3. Data Analysis and Hypothesis Testing

Data analysis is the process of inspecting, cleaning, transforming and modelling data to elicit useful information, arrive at conclusions and support the decision-making process. Initially simple procedures are used by the researcher to understand the basic relationships among variables. This leads to a rigorous analysis of data in later stages. The following aspects are to be considered by the researcher to apply proper statistical tools to data and for the selection of appropriate data analysis strategy.

- **Objectives and Hypotheses**– The research design prepared by the researcher may include the definition of the problem, objectives, hypotheses and a proper approach for data analysis. In the backdrop of additional information obtained, modifications should be done for this initial proposal.
- **Known Characteristics Of The Data**– The scales of measurement (nominal, ordinal, interval or ratio) and the type of research design influence the choice of a statistical technique for data analysis.

- **Properties of Statistical Techniques**– Based on the applications of statistical techniques, whether to find differences in the variables or to make predictions, appropriate statistical techniques should be chosen.

Descriptive Statistics

In descriptive statistics, data is presented in the form of averages, percentages and variances.

Simple Tabulation – number of responses to a question are counted and put them in a frequency distribution table. Percentages and cumulative percentages associated with the variable are also given in a tabular form. This frequency distribution table can be used to infer about the central tendency, variability etc.

Table 5.3. Frequency Table

Month	Frequency (No. of toy cars sold)	Percentage
January	20	12.5
February	30	18.75
March	25	15.63
April	10	6.25
May	40	25
June	35	21.87
Total	**160**	**100**

From the table, it is obvious that the sale of toy cars was maximum in the month of May with a percentage of 25%. In most of the researches, simple tabulation may not yield desired results. In that case, data can be cross tabulated by analyzing the results by groups, categories or classes.

Measures of Central Tendencies

The most commonly used measures of central tendencies are mean, median and mode. The mean is the average of responses, median is the middle value of the data when the data is arranged in ascending or descending order and mode is the most commonly given response.

Hypothesis Testing

Cambridge Dictionary defines hypothesis as an idea or explanation for something that is based on known facts but has not yet been proved. Hypothesis testing is a statistical method that is used in making statistical decisions using experimental data. Hypothesis Testing is basically an assumption that we make about the population parameter.

Key terms in hypothesis testing:

- **Null Hypothesis**: Null hypothesis is a statistical hypothesis that assumes that the observation is due to a chance factor. The null hypothesis states that a population parameter (such as the mean, the standard deviation and the like) is equal to a hypothesized value. The null hypothesis is often an initial claim that is based on previous analyses or specialized knowledge. Null hypothesis is denoted by H_o: $\mu_1 = \mu_2$, which shows that there is no difference between the two population means.
- **Alternative Hypothesis**: Contrary to the null hypothesis, the alternative hypothesis shows that observations are the result of a real effect. The alternative hypothesis states that a population parameter is smaller, greater, or different than the hypothesized value in the null

hypothesis. The alternative hypothesis is what you might believe to be true or hope to prove true. The alternative hypothesis can be either one-sided or two sided.

- **Two-Sided Alternative Hypothesis** (also known as a nondirectional hypothesis) is used to determine whether the population parameter is either greater than or less than the hypothesized value. Example: A researcher has the results of the amount of solid waste generated in a month for a sample of villagers. The researcher wants to know if the results of that village differ from the national average. A two-sided alternative hypothesis (also known as a non-directional hypothesis) is appropriate because the researcher is interested in determining whether the results are either less than or greater than the national average.

- **One-Sided Alternative Hypothesis** (also known as a directional hypothesis) is used to determine whether the population parameter differs from the hypothesized value in a specific direction. You can specify the direction to be either greater than or less than the hypothesized value. Example: A researcher has conducted an awareness program on reducing solid waste in a particular village and now he wants to know if the amount of waste generated is below the national average. A one-sided alternative hypothesis (also known as a directional hypothesis) can be used because the researcher is specifically hypothesizing that the waste generated in the village after the awareness campaign is lower than the national average.

- **Level of Significance**: Refers to the degree of significance in which we accept or reject the null-hypothesis. 100% accuracy is not possible for accepting or rejecting a hypothesis, so we therefore select a level of significance that is usually 5%.

- **Type I Error:** When we reject the null hypothesis, although that hypothesis was true, it is Type I error. The probability of making a type I error is α, which is the level of significance you set for your hypothesis test. An α of 0.05 indicates that you are willing to accept a 5% chance that you are wrong when you reject the null hypothesis.

- **Type II Error**: When we accept the null hypothesis when it is false, it is Type II error. The probability of making a type II error is β, which depends on the power of the test. The probability of rejecting the null hypothesis when it is false is equal to $1-\beta$. This value is the power of the test.

- **Power**: Usually known as the probability of correctly accepting the null hypothesis. $1-\beta$ is called power of the analysis.

- **One-Tailed Test**: If we are using a significance level of .05, a one-tailed test allots all of the alpha to testing the statistical significance in the one direction of interest. This means that .05 is in one tail of the distribution of your test statistic. When using a one-tailed test, we are testing for the possibility of the relationship in one direction and completely disregarding the possibility of a relationship in the other direction.

- **Two-Tailed Test**: If we are using a significance level of 0.05, a two-tailed test allots half of the alpha to testing the statistical significance in one direction and half of the alpha to testing statistical significance in the other direction. When using a two-tailed test, regardless of the direction of the relationship we hypothesize, we are testing for the possibility of the relationship in both directions.
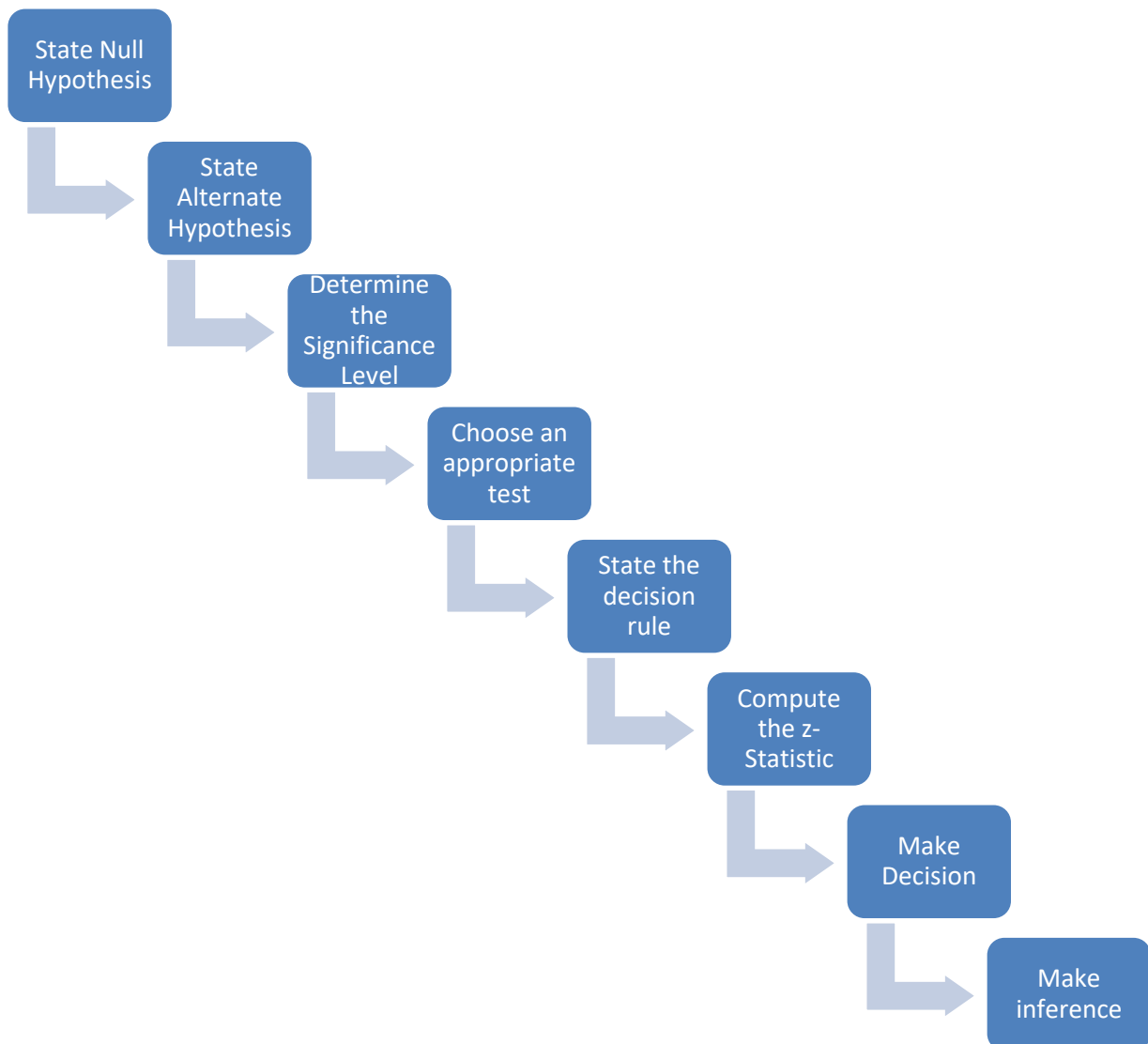
Process of Hypothesis Testing

Figure 5.11. Steps in Hypothesis Testing

> **To Do Activity**
> Read five research articles in your area of research where the use of different hypothesis testing procedures is employed. Prepare a detailed report on hypothesis testing.

5.4. Report Writing

Research report is the systematic and orderly presentation of research work in a written form. It contains key aspects of the research project. The practical utility of research study depends on the way it is presented to those who are expected to act based on research findings.

Significance of Report Writing

Research report is considered as a major component of the research study. The study remains incomplete without a written report. Unless the researcher makes the findings known to others, his

purpose is not met. All research results must enter the general store of knowledge.

Steps in Writing a Report
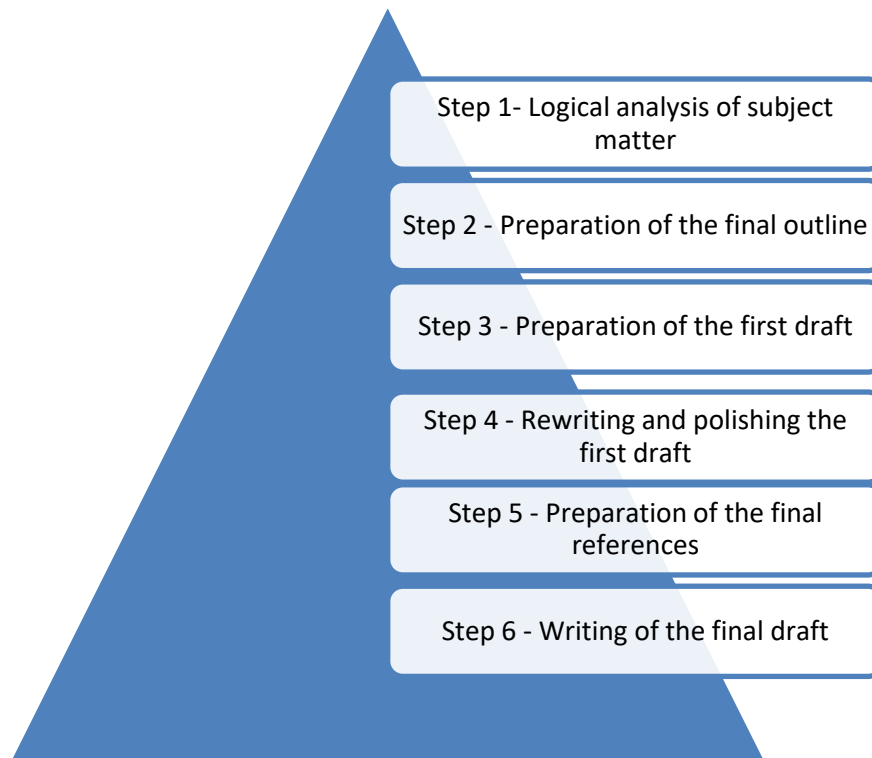
Figure 5.12. Steps in Writing a Report

The steps in writing a report are given below in detail (Kothari, 2004):

- **Logical Analysis of the Subject Matter** a subject is developed either logically or chronologically. Logical development is based on mental connections and associations between one thing and another by means of analysis. Here the subject is developed from simple to complex structures. Chronological development is based on a connection or sequence in time or occurrence.

- **Preparation of the Final Outline** outlines are frameworks for writing and helps in the logical organization of the material.

- **Preparation of the First Draft** the researcher prepares the report which includes the data collection procedure, limitations of the study, data analysis techniques used by the researcher, findings and generalizations of the study and suggestions.

- **Rewriting and Polishing the First Draft** Careful revision is made in the first draft. Researcher should keep in mind the logical presentation of the study and maintain unity and cohesion in the report. Final editing is also done at this stage.

- **Preparation of the Final References** It includes all the books, articles and other materials referred by the researcher. It has to be alphabetically arranged. Example:

a) Book – Single Author, Jarvis, C. L. (2000). Physical examination and health assessment. Philadelphia: Saunders.

b) Book – More than one author, Zarcadoolas, C., Pleasant, A. F., & Greer, D. S. (2006). Advancing health literacy: A framework for understanding and action. San Francisco: Josey-Bass.

c) Book – Electronic (use the doi if available, if no doi use the URL), Mayer, G. G. (2007). Health literacy in primary care: A clinician's guide. Retrieved from http://site.ebrary.com

d) Journal Article-- Electronic (use doi if available, if no doi use the URL of the journal), Doran, K. M., &Kirley, K. R. (2008). Developing a novel poverty in healthcare curriculum for medical students. Academic Medicine: Journal of the Association of Medical Colleges, 83(1), 5-13. Retrieved from http://www.aamc.org/

e) Journal Article– print only, Herbst-Damm, K. L., & Kulik, J. A. (2005). Volunteer support, marital status, and the survival times of terminally ill patients. Health Psychology, 24, 225-229.

- **Writing of the Final Draft**– the final draft should be written in a concise and objective style and in a simple language. Avoid all abstract terminology and technical jargons. Illustrations and examples based on common experiences must be incorporated. The research report must enthuse people and must show originality.

5.5. Layout of the Research Report

A comprehensive layout of the research report should comprise three parts.
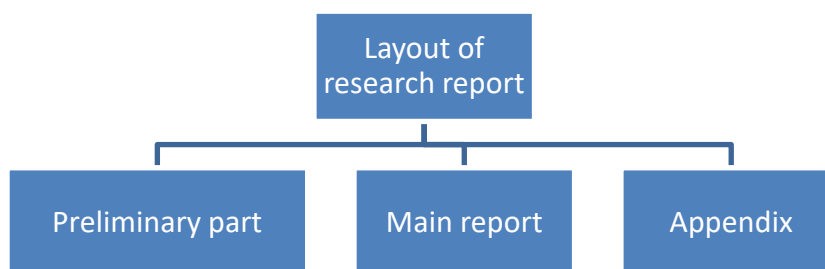
Figure 5.13. Layout of Research Report

1.Preliminary Part
- Cover page
- Title page
- Certificate or statement
- Index (brief contents)
- Table of contents (detailed index)
- Acknowledgement
- List of tables and figures used
- Preface or Foreword
- Abstract or Summary of report

2. The Main Report
- Statement of objectives
- Review of Literature
- Methodology and research design
- Types of data and its sources
- Sampling decisions

- Data collection methods
- Data collection tools
- Fieldwork
- Analysis and interpretation (including tables, charts, figures, etc.)
- Findings
- Limitations
- Conclusions and recommendations
- Any other relevant detail

2. **Appendix**
   - Copies of forms used
   - Tables not included in findings
   - A copy of questionnaire
   - Details of sampling and rate of response
   - References – list of books, magazines, journals, and other reports
   - Any other relevant information

> Report should be long enough to cover the subject but short enough to maintain interest.

> Report should have lucid style avoiding abstract terms and jargons.

> Charts, graphs and statistical tables should be used to convey the findings clearly to readers.

> Index, Appendices and References must be given in the report.

> Report must state the policy implications relating to the problem of the study.

> Research report should show originality. It must contribute to the store of knowledge

> Report should strictly follow the rules in adding quotations, abbreviations, footnotes etc.

> Layout of the report should be appropriate and in accordance with the objective of the research problem.

Precautions for Writing Research Reports

Figure 5.14. Precautions in writing a Report

Summary

In this chapter, various aspects of data processing namely editing, coding, classification and presentation of data are discussed. Editing is of two types namely field editing and central editing. Coding involves assigning of some symbols or numerals or both to the answers of the questions in a questionnaire so that the responses can be categorized. Classification is the process of arranging data in groups based on certain characteristics. Classification can be according to attributes or

numerical characteristics. The data may be presented in the form of tables or graphs. The graphical presentation of data is done by using pie chart, line chart, etc.

Model Questions

1. Define field editing and in-house editing.
2. Write briefly about the different forms of data presentation devices.
3. What are the different measures used for hypothesis testing?
4. Write down the steps involved in writing a research report.
5. Describe briefly the layout of a research report.

Suggested Readings

1. Agarwal, B.L. (2006). Basic Statistics. New Age International Publishers, New Delhi.
2. Asthana, H.S. and Bhushan, B. (2007). Statistics for Social Sciences (with SPSS applications). Prentice-Hall of India, New Delhi.
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6. Ranjit Kumar (2011). Research Methodology, a step by step guide for beginners, 3rd ed. Sage, South Asia Edition.
7. Young, P.V. (1939). Scientific Social Surveys and Research. Prentice Hall Inc., NY.

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1. https://www.slideshare.net/manumelwin/scope-of-research-research-methodology-manu-melwin-joy
2. https://www.questionpro.com/blog/qualitative-research-methods/
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   http://www.universityofcalicut.info/SDE/Social_Research_Methods_on25Feb2016.pdf
3. www.ascd.org/publications/books/100047/chapters/What-Is-Action-Research¢.aspx
   https://www.sisinternational.com/what-is-quantitative-research/
4. http://www.businessdictionary.com/definition/attitude.html
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11. www.stat.yale.edu/Courses/1997-98/101/binom.htm

12. Videos-https://www.coursera.org/learn/descriptive-statistics-statistical-distributions-business-application?specialization=business-statistics-analysis
13. https://www.toppr.com/guides/business-mathematics-and-statistics/theoretical-distributions/poisson-distribution/
14. Centre for Collaborative Action Research http://cadres.pepperdine.edu/ccar/ 3
15. http://www.cs.uccs.edu/~jkalita/work/cs586/2010/CoolidgeChapter6.pdf
16. https://www.analyticsvidhya.com/blog/2015/08/comprehensive-guide-regression/
17. https://www.graphpad.com/support/faq/what-is-the-difference-between-correlation-and-linear-regression/
    http://www.statsoft.com/textbook/time-series-analysis
18. https://participaction.wordpress.com/whatpar/defining-par/
19. egyankosh.ac.in/handle/123456789/10421

Block 2
Creativity and Innovation

Contents

Chapter 1 Introduction to Creativity and Innovation Management

Introduction

This Chapter will provide introduction to creativity and innovation management in business organization set up. The essence of creativity is to bring out new business ideas in terms of products, service and processes. Innovation management transforms the idea into a business level implementation that benefit improved market share, sustain customer satisfaction or gain competitive advantage. This Chapter will discuss about the creativity and innovation management, New product development, the process of divergent-convergent and creativity for business. The key objectives of the Chapters are given below. Figure 1.1 represents the Chapter flow.

Objectives

- To introduce creativity management
- To explore the innovation of products/services in an organization
- To process of developing new products and services for successful business setup
- To understand the convergent - divergent process and thinking for creative ideas
- To develop the scenario for creativity in modern businesses

1.1	• Introduction to Creativity
1.2	• Introduction to Innovation
1.3	• Importantance of New Product/Service Development
1.4	• The Divergent - Convergent Process
1.5	• Business and Creativity

Figure 1.1 Chapter flow - Introduction to Creativity and Innovation Management

1.1 Introduction to Creativity

The meaning of creativity is to think or do or execute differently. It is a kind of fantasy in which new ideas are promoted. The new ideas are essential to the advancement of either business need or social need.

Creativity is defined as the tendency to generate ideas for the existing process/products by identifying alternatives. It may be useful in solving problems, communicating with others and entertaining. In other words, it can be said that creativity is the strength or capacity to inflict and create any something new. Although novelty is given special importance in creativity, yet a creative person can present old objects in new forms instead of inventing any new object. The key attributes of creative thinking are provided in the figure 1.2. The impact and levels of creative solutions are briefed in figure 1.3.
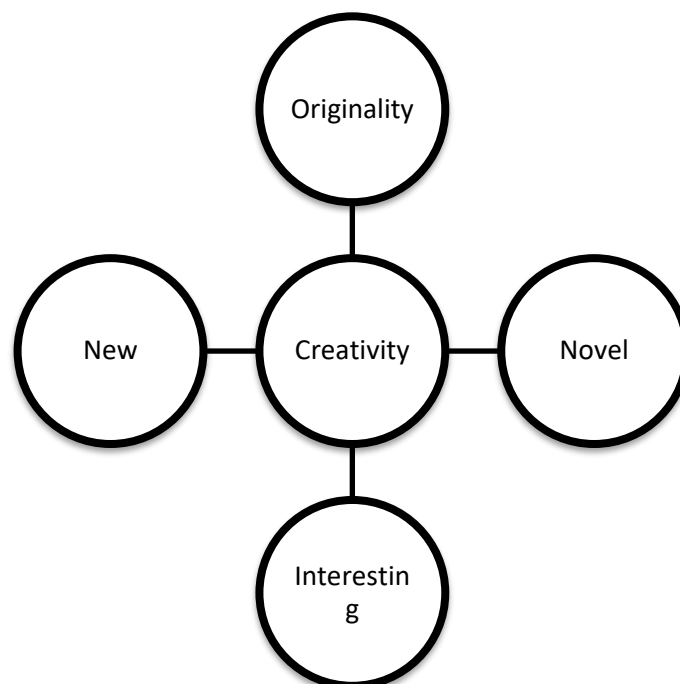

Figure 1.2 Attributes of Creativity

Creativity is defined as the tendency to generate ideas for the existing process/products by identifying alternatives. It may be useful in solving problems, communicating with others and entertaining. In other words, it can be said that creativity is the strength or capacity to inflict and create any something new.
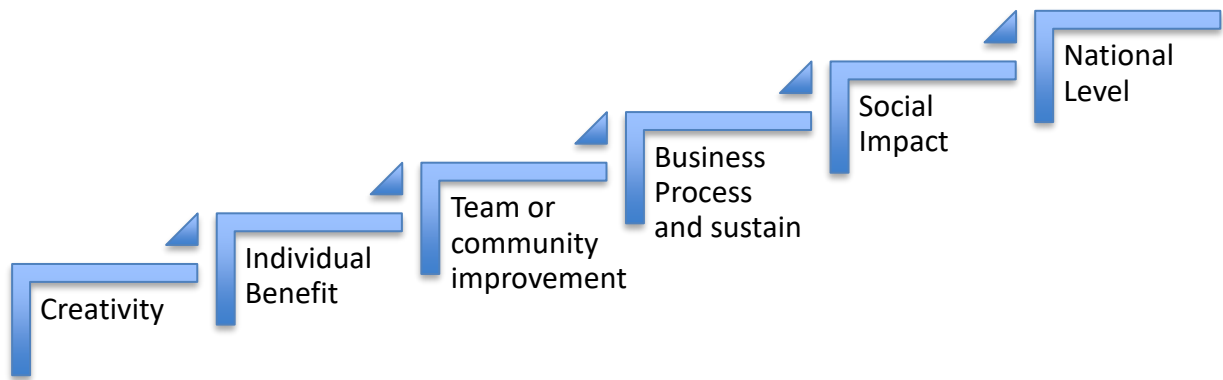
Figure 1.3 Need for Creative Ideas

It is not necessary that intelligent people are more creative. The training and thinking process will facilitate anyone to think out-of-the-box solutions. Different types of thoughts were expressed to understand its different aspects. Many psychologists agree with the fact that creativity has an important place in giving birth to new thoughts, turning old things into new and building relationship with irrelevant objects.
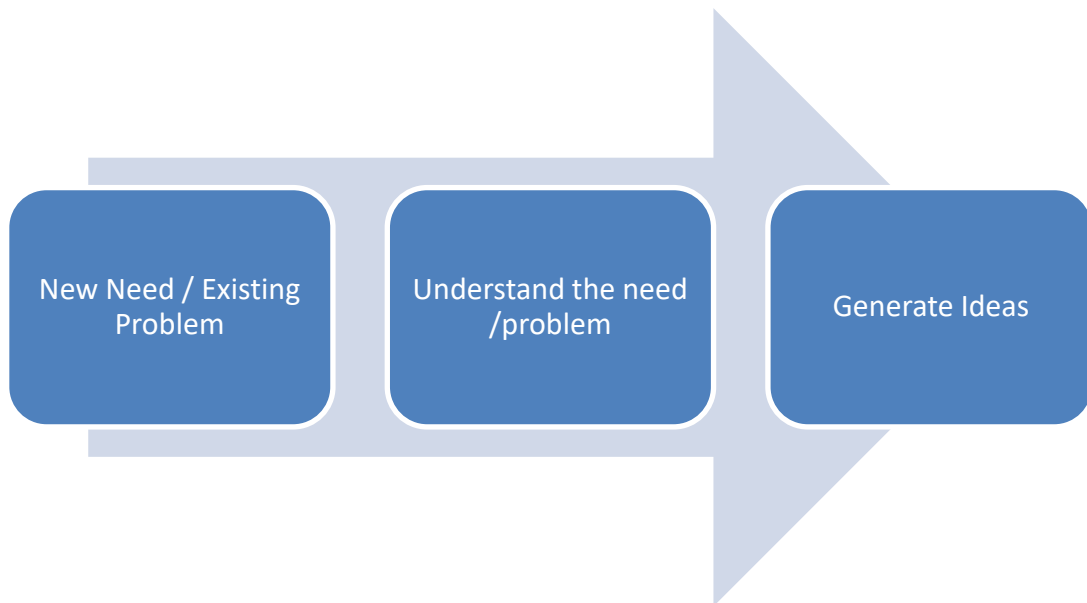

Figure 1.4 Creativity Brief

Many researchers have identified the key definition of creativity. Table 1.1 briefs the different perspective of creativity.

Table 1.1 Creativity Definitions

Researcher	Definition of Creativity
Thurston (1955)	Any action is to be creative if it has immediate solution to the kind of thinking which has always been innovative.
Baron (1961)	Creativity is the essence of making pre-existing objects and elements as new one.
E.P. Torrance (1965)	Creative thinking is the process of understanding errors un received, and rare elements, making concepts in their relationship imagining notions and making tests, carrying results to other persons and making improvement by reviewing the concepts."
Bertlet	Creativity is bold thinking. Bold thinking means the ability of thinking beyond the mainstream, receiving new experience and adding the present relationship with that of the future. Bold thinking or creativity is to work or think with new attitude by going beyond mutual thinking
Rollo May	Creativity is the process of bringing something new in human being. Creativity requires passion and commitment. It brings to our awareness what was previously hidden and points to new life. The experience is one of heightened consciousness ecstasy
James Drever	Creativity is the ability to create new objects. Creativity in the broad sense refers to the imagination of the sum of new ideas and talents. (If the self-motivated, do not follow others) and synthesis of ideas and where mental functions are not only the sum of the other's views
Dr. Passi	Creative power is a multi-faceted trait and power. The verbal and nonverbal traits and power are distributed in different proportion in different human beings. The main factors responsible for it are eloquence, flexibility or morbidity, curiosity or proneness to invention and toughness and good trend

After studying all the above definitions, it can be said that, creativity is an ability in which innovative ideas have significance that takes the help of new methods and situations to present a proper solution for any problem. Creativity is a mixture of several abilities or traits. Such as originality of ideas, flexibility, changes for innovation, awareness towards problems etc. These qualities or abilities are called the components of creativity.

1.2 Introduction to Innovation

Innovation is generally regarded in two main kinds, relating to products and processes. This type of innovation appears to be of particular importance for economic growth and for international competition which is very relevant to new product / service development. Product innovation is mentioned through the development of new products, changes in design of established products, or use of new materials or components in the manufacture of established products.

> Product / service/ process innovation is defined as the entire spectrum of activities necessary to provide new value to customers and a satisfactory return to the company or entrepreneur. Innovation is neither science nor technology, although these are, of course, vital parts.

New product / service development phases provide platform for product innovation especially the front-end activities. Product / service/ process innovation is defined as "the entire spectrum of activities necessary to provide new value to customers and a satisfactory return to the company or entrepreneur. Innovation is neither science nor technology, although these are, of course, vital parts. Figure 1.5 briefs the innovation types.
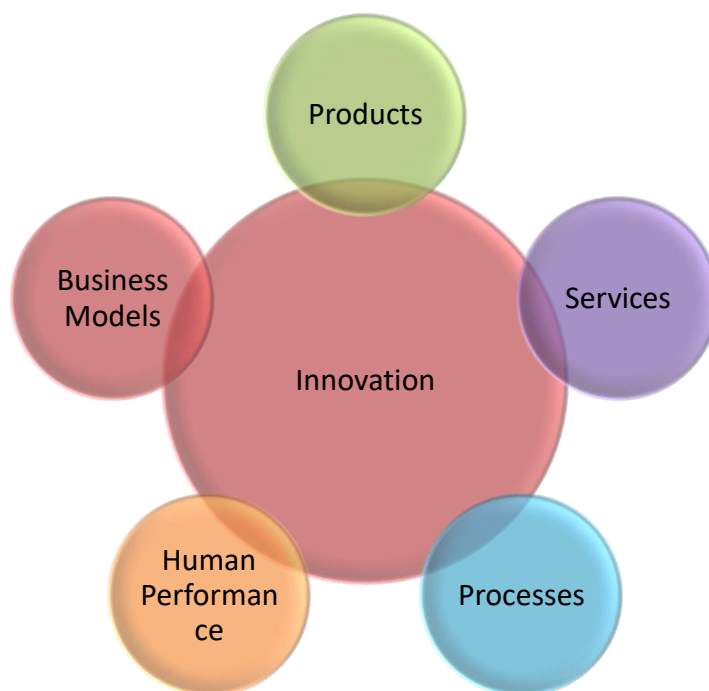

Figure 1.5 Innovation Types

Innovation is not an invention; only a small percentage of inventions actually get to be used commercially. Creative ideas that are transformed into commercially viable business are known as innovation. Any innovation should bring in revenues to the organization. The success of the innovation can be measured in multiple ways. Figure 1.6 briefs the effectiveness of innovation in an organization.
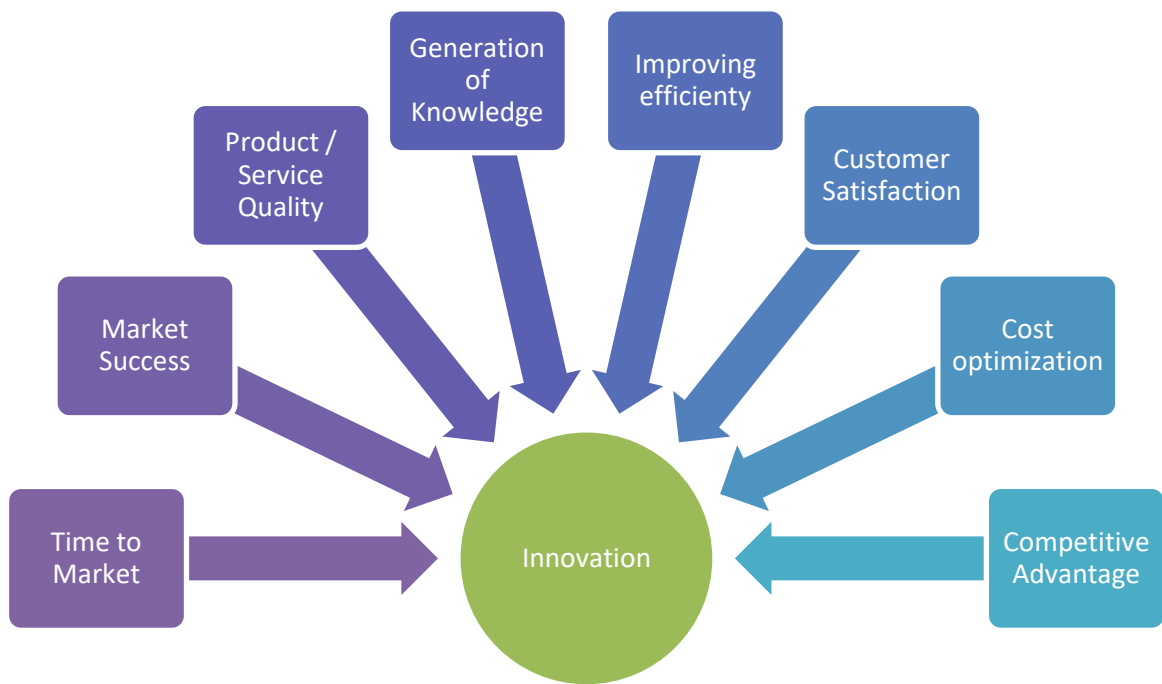
Figure 1.6 Innovation Benefits

Technology platform facilitates innovative products, which hold higher chance of success in the market.   The 'perceived value of the product' is an important factor, which generally refers to "high performance to cost". However, customers may have difficulty in actually differentiating performance among competing alternatives in technologically sophisticated areas, and it may take years for the market to sort out the differences. The relationship between innovativeness and commercial success is not linear but U-shaped (Figure 1.7).   A single relationship between innovativeness and commercial success, therefore, is still uncertain.
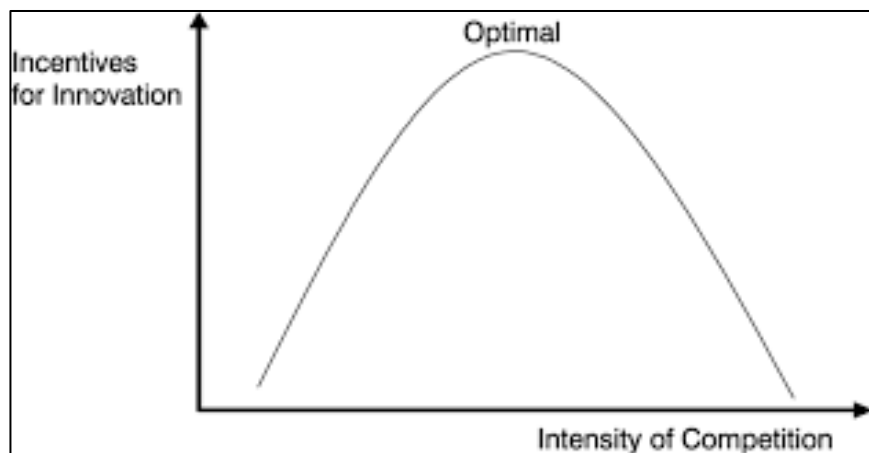

Figure 1.7 Relationship between Innovation and Success

Initial phases of innovation are built with so much fuzziness. Hence it is called as 'fuzzy front end". The clarity of the innovation happens over the period after the fuzzy front-end activities. The characteristics of fuzziness are provided in figure 1.8 and table 1.2 provides briefs about each phase of fuzziness.
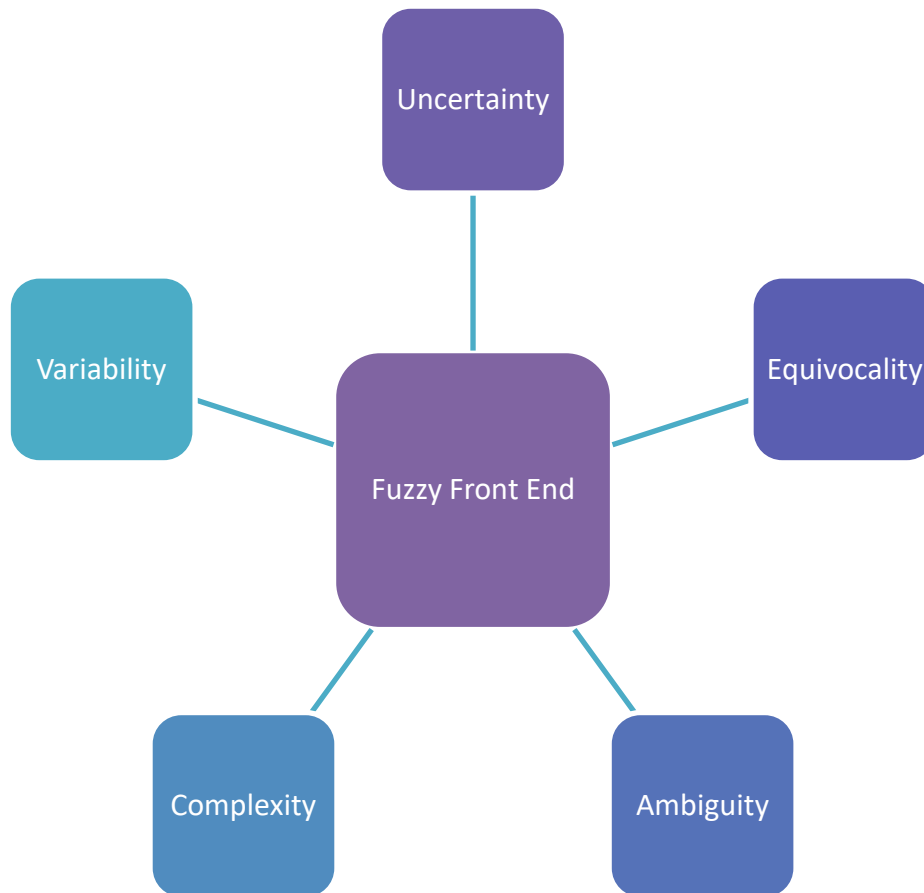

Figure 1.8 Fuzzy Front End of Innovation

Table 1.2 Definition of Fuzziness and Interpretation

Interpretation	Definition
Ambiguity	State where the basic assumptions behind the view of uncertainty are challenged
Uncertainty	The absence of information and knowledge
Equivocality	Diversity of interpretations
Complexity	Range of differences
Variability	Rate of change

The following Chapters will discuss in detail about the innovation and its key process steps along with developing a business case for an organization.

1.3 Importance of New Product / Service Development

New product / service development plays a vital role in organization's long term sustainability in the market. Organization gains competitive advantage with the introduction of new products. Innovative product solutions enable the new product success in the market. New product is said to be successful when it attains the required specification. Product specifications are established by understanding the customer/user requirements, which is transformed into the product functionality. Product functionalities are demonstrated through the product features, which are prioritized through frequent customer interaction and proof of concept. Table 1.3 provides key difference of innovation fuzzy phase and development phase.

Table 1.3 Innovation Fuzzy Phase vs. Development Phase

Factors	Fuzzy Phase	Development phase
State of an idea	Probable fuzzy, easy to change	Determined to develop, clear, specific, difficult to change
Features of information for decision making	Qualitative, informal and approximate	Quantitative, formal and precise
Outcome	A blue print (sketch or descriptive form)	A product
Width and depth of the focus	Broad but thin	Narrow but detailed
Degree of formalization	Low	High

To meet the end customer requirements, products are developed based on the available technology platform or newly developed technology based on the time target. Along with this manufacturability is considered so as to facilitate product development. Apart from manufacturability, consideration of supply chain requirement such as outsource-able services, purchasing of standard parts, packaging and transportation pave way to product success. The success rates are high when these stakeholders' requirements are identified and incorporated earlier.

New product / service development project is initiated with the identification of opporty. This follows the concept development phase in which concepts are generated, screened and selected. In this phase creative ideas are evaluated and filtered to convert into business innovation. In product development phase the selected concept is developed, tested and launched in the market. The following figure 1.9 and 1.10 illustrates the new product / service development Project and its phases.
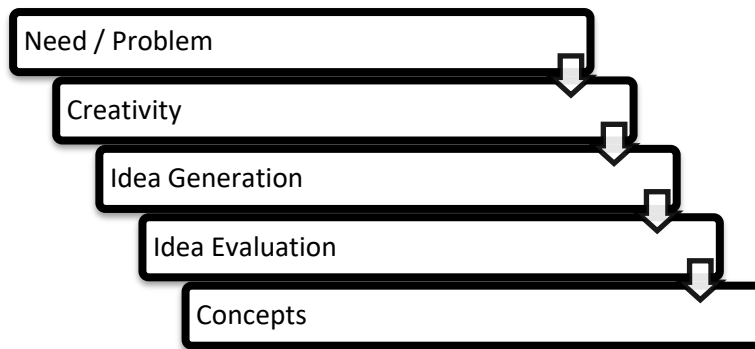
Figure 1.9 Creativity to Innovation

```
Need / Problem
    Creativity
        Idea Generation
            Idea Evaluation
                Concepts
```

Figure 1.9 Creativity to Innovation

```
Concepts Screening
    Concept Development Process
        Proto Typing
            Product Development Process
                Revenue Generation
```
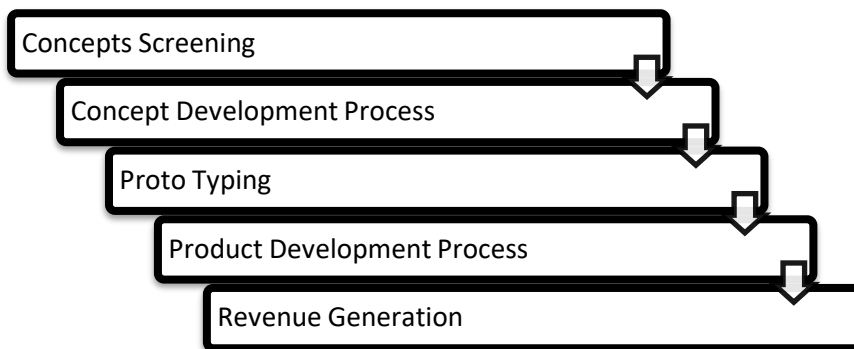
Figure 1.10 Innovation Phases

Ideas are generated in FFE to fulfil the identified opportunity. The company builds the credibility for the idea, with the justified business plan. Concepts are generated in line with the creative idea, which is expected to fulfil the stakeholders' specifications. Challenges are faced during product development phase if the concept potentially misses a key criterion and thus tighter situation in terms of quality, time and cost. New product / service development and success is depending on the various factors. Figure 1.11 represents the key factors that determine the success of the innovation.
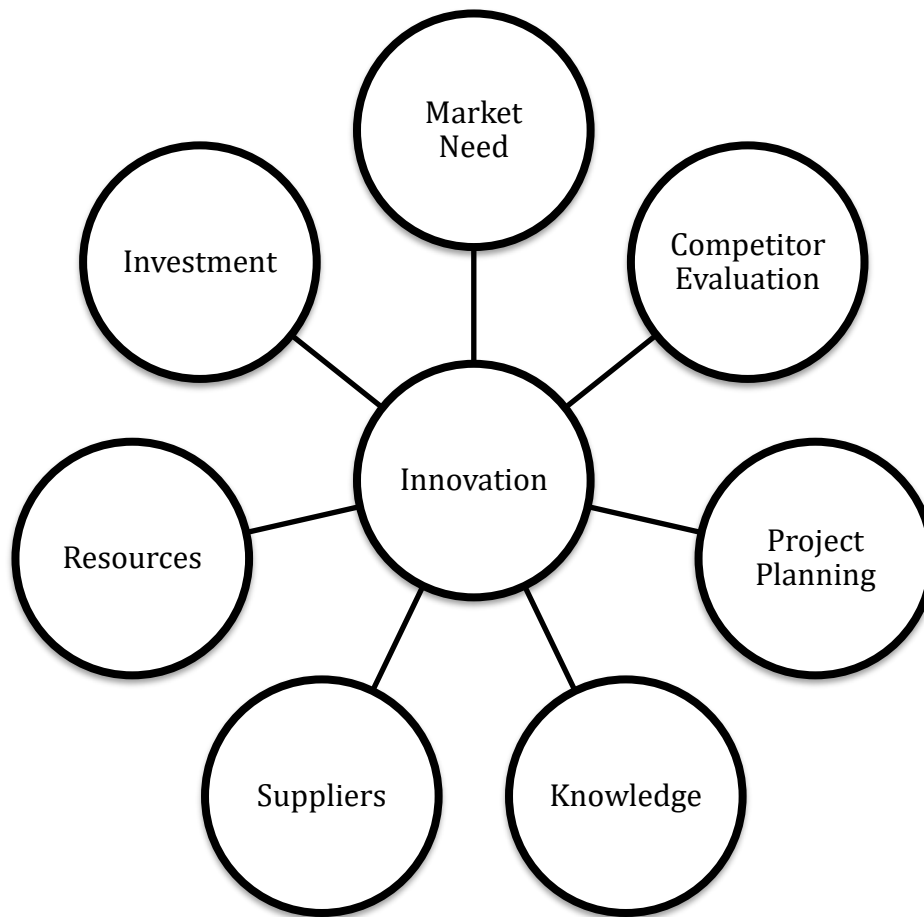
Figure 1.11 Key Success Factors for Innovation

These factors further studied under internal to organization and external to organization based on the organizational control. Other factors such as team involvement, environment, creativity and innovation also play a key role in success. Understanding of these factors before concept generation argued for innovative solutions and close to reality concepts.

New product / services development is initiated through identifying opportunity in the market. Opportunity identification is defined as business or technology gap, that a company or individual realizes, that exists between the current situation and an envisioned future in order to capture competitive advantage, respond to a threat, solve a problem, or ameliorate a difficulty. Ideas are generated to capture the opportunity through products. Idea is the most embryonic form of a new consists of a high-level view of the solution envisioned. Not all gathered ideas are transformed into concepts and product. There exists large amount of filtration between ideas to concepts than concepts to actual product. Concept is defined as well-defined form, including both a written and visual description that includes its primary features and customer benefits combined with a broad understanding of the technology needed.

Market activities are classified into customer requirements, market size assessment and competitor analysis. Preliminary market assessment is defined as an early and relatively simple, nonscientific market appraisal, checking out the market validity of the proposed product. They identified

preliminary market assessment, technical assessment, market test yield better results in new product success. Market size, competitive situation customer needs, wants and preferences; and customer reaction are studied under market assessment. Technical assessment was performed by understanding the available technology platforms by understanding merits and difficulties of the project. With the limited customer selection a test market or trial sell was established to understand the product acceptance. For high technology product customer verification facilitate to prioritize the customer requirements. Customer experience with the earlier products, usage pattern and value addition are missed in this study.

Researchers identified that lack of creativity and innovation in new product / service development results in low value generation to the consumer and the products belongs to "me-too" category. These products were most likely to be in the failure side. The successful products were developed with higher technical clarity even if is a product improvement. Marketing and business competence were also recommend for product success predictors. Organizations' success is based on its ability to process customer interactions in appropriate way. Two-way interaction represents an interactive exchange where plans and issues are communicated and analyzed, and feedback is provided. This is followed in lead users in developing product concepts, or use of focus groups in evaluating a product concept. The impact of creativity and innovation in a new product results in incremental or revolutionary value addition (figure 1.12).
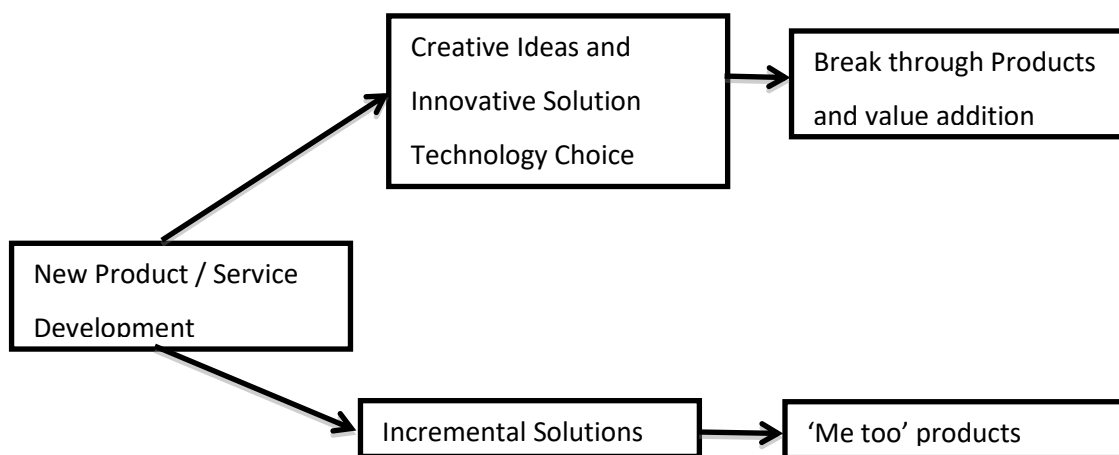

Figure 1.12 Impact of Creativity and Innovation in New Product Development

Team member tends to demonstrate outstanding concept with their participation. Their domain and creative skills are moderated with teams' participation to bring out best product. Team involvement made novel concept by allowing them to take risk. Some team members meet customers before concept generation to capture the voice of the customer. They were in search of novel ideas and looked out for inspirational design to fulfil the design requirements. Due to the high level of

involvement, they tend to experiment with the ideas to realize as a product, which enable them to acquire new knowledge. Role of organizational team is explained in the following s.

1.4 The Divergent – Convergent Process

When trying to solve any problem through creative and innovation thinking, there are two basic ways we can think about the possible solution. These two types of thinking are called convergent and divergent thinking (Figure 1.13 and 1.14).
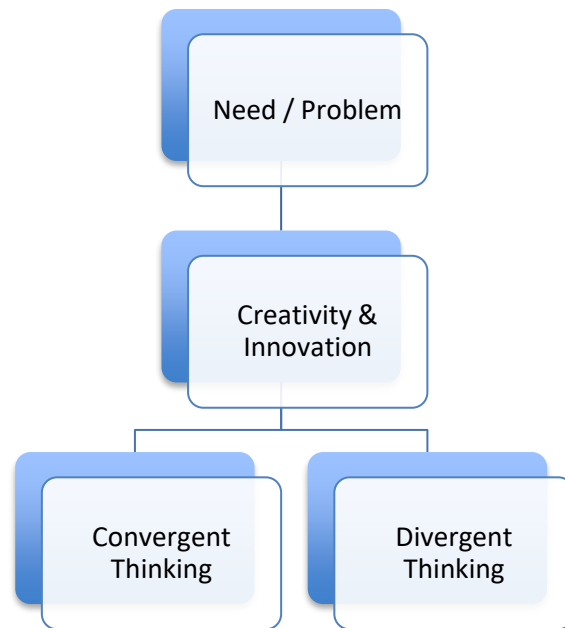

Figure 1.13 Creativity and Innovation Thinking Process
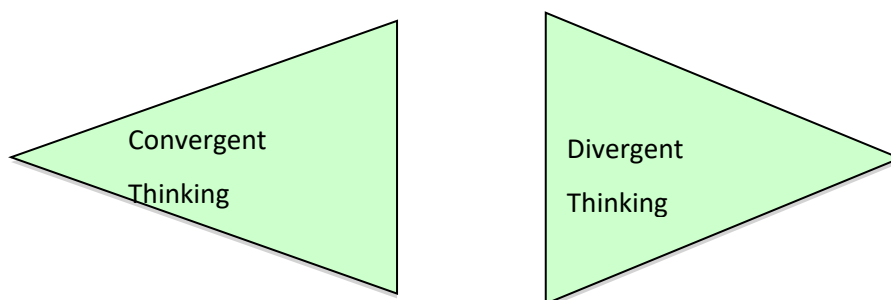

Figure 1.14 Representation of Convergent and Divergent Thinking

Convergent thinking, converts the multiple solutions to specific solutions. It is deployed when solving a well-defined, straightforward, correct answer to a problem. Convergent thinking is used when there is a simple, correct answer to a question. For example, what's the capital of India? The answer is New Delhi. If one knew the answer, it is used convergent thinking. Creativity is not relevant to convergent thinking because it doesn't have to be creative to know the answer to this problem. It is to come up with the stated, factual answer (Figure 1.15 and 1.16).

'Convergent thinking is a term coined by Joy Paul Guilford' (who also coined the term for the 'opposite' way of thinking, 'Divergent Thinking').

'It generally means the ability to give the "correct" answer to standard questions that do not require significant creativity, for instance in most tasks in school and on standardized multiple-choice tests for intelligence.
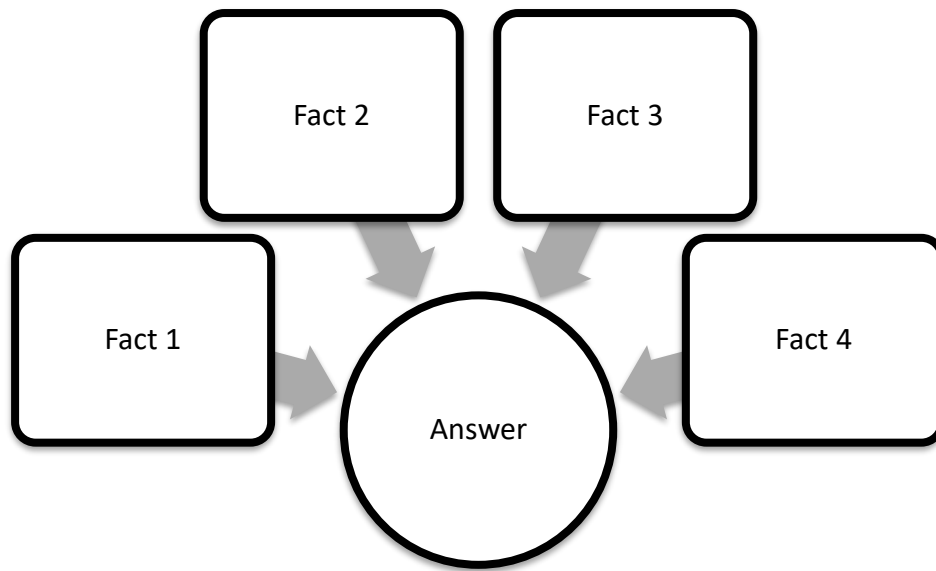
Figure 1.15 Convergent Thinking Process
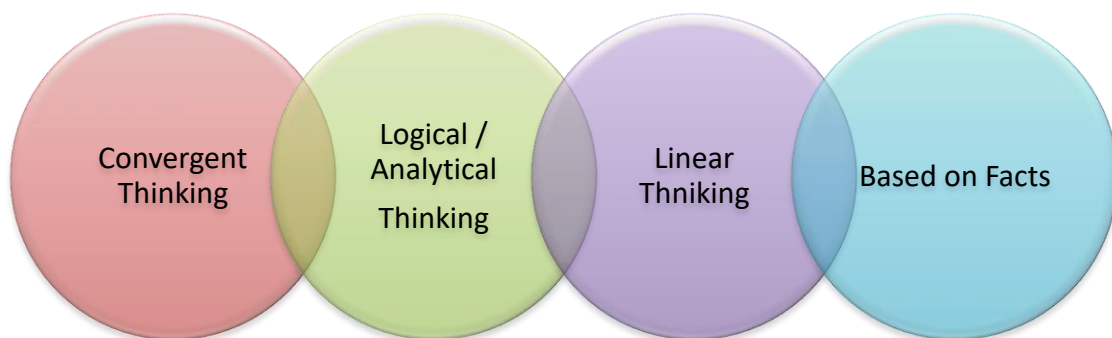
Figure 1.16 Characteristics of Convergent Thinking

Convergent thinking is often used in conjunction with divergent thinking. Convergent thinking is the type of thinking that focuses on coming up with the single, well-established answer to a problem. Convergent thinking is used as a tool in creative problem solving. When an individual is using critical thinking to solve a problem they consciously use standards or probabilities to make judgments. This contrasts with divergent thinking where judgment is deferred while looking for and accepting many possible solutions.'

The divergent thinking process facilitates is solving an abstract or new problem that has many possible answers, solutions, or outcomes. There are many possible structures could make, so coming up with that solution required creativity, or divergent thinking. The answers are not direct, logical or factual basis (Figure 1.17 and Figure 1.18).
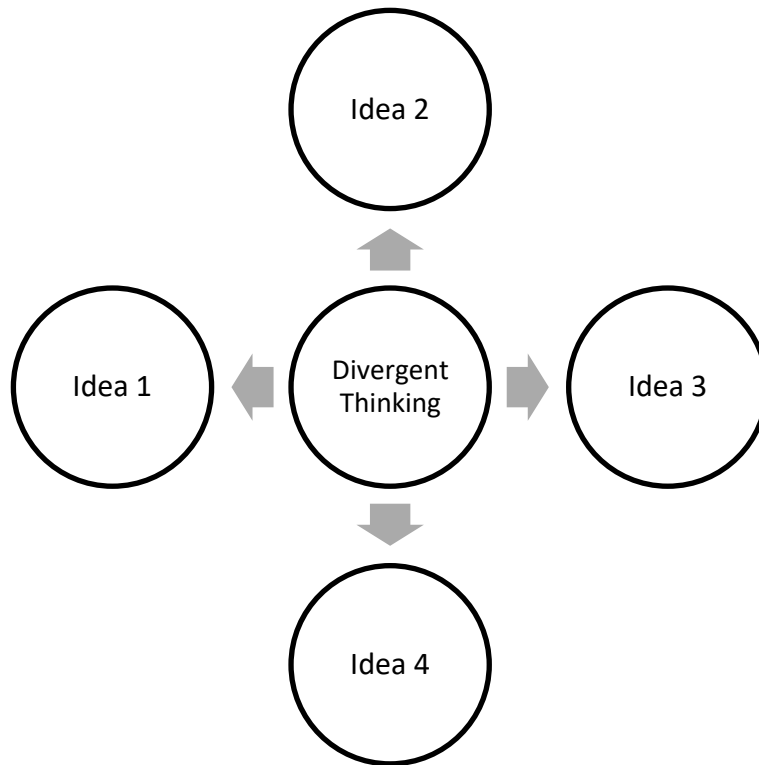
Figure 1.17 Divergent Thinking Process

'Divergent thinking is a thought process or method used to generate creative ideas by exploring many possible solutions. It is often used in conjunction with its cognitive colleague, convergent thinking, which follows a particular set of logical steps to arrive at one solution, which in some cases is a 'correct' solution. By contrast, divergent thinking typically occurs in a spontaneous, free-flowing.

Figure 1.18 Divergent Thinking Characteristics

Many possible solutions are explored in a short amount of time. The unexpected and non-logical connections are made to provide creative solutions. Generally, after the process of divergent thinking has been completed, ideas and information are organized and structured using convergent

thinking. Yet another process is also generally used which is called as lateral thinking process. It solves the problem by combining both divergent and convergent thinking process. It uses creative thinking to explore poss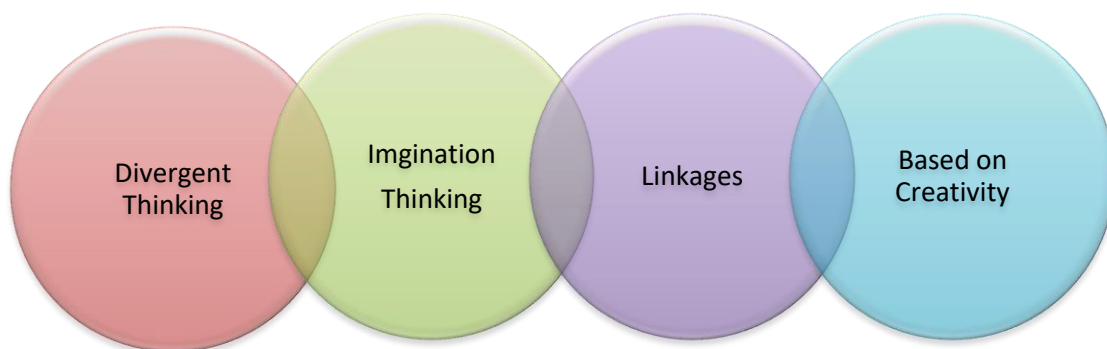ible solutions. The creative solutions are judged or evaluated based on the feasibility of solution through convergent process (figure 1.19).
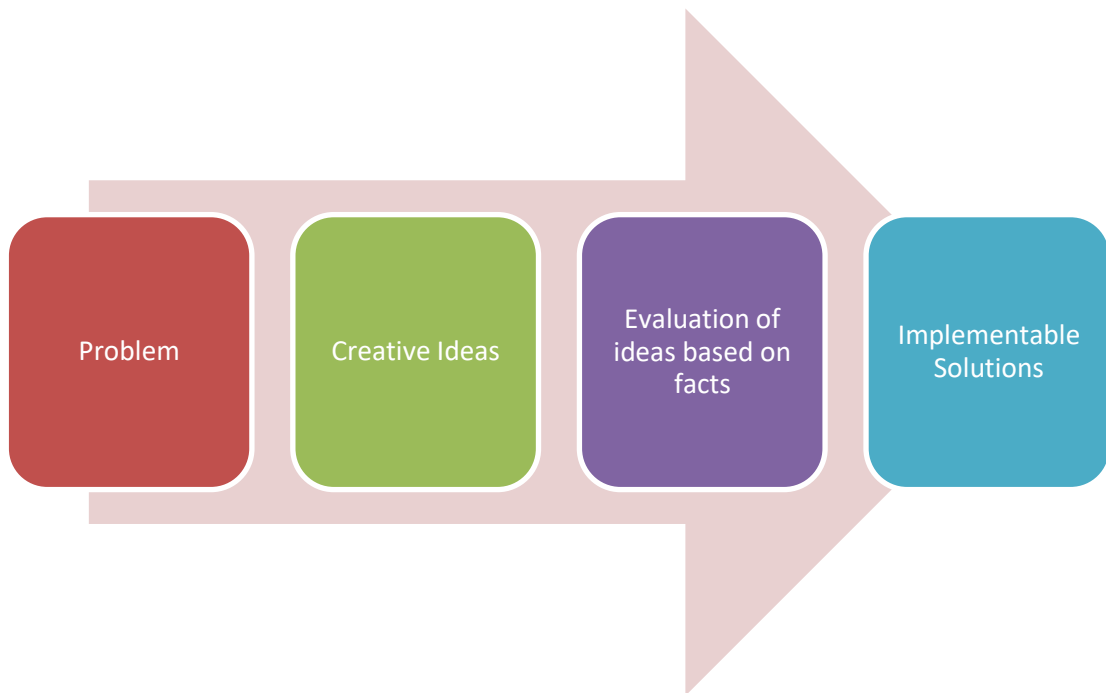
Figure 1.19 Lateral Thinking Process
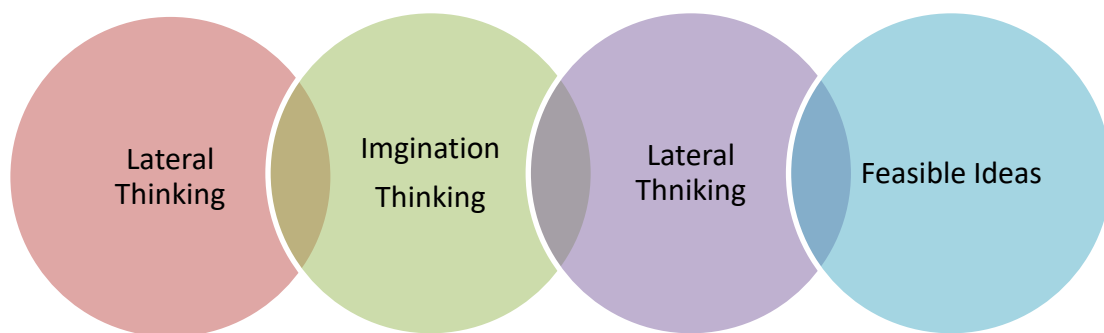
Figure 1.20 Lateral Thinking Characteristics

Lateral thinking is solving problems through an indirect and creative approach, using reasoning that is not immediately obvious and involving ideas that may not be obtainable by using only traditional step-by-step logic.

To understand lateral thinking, it is necessary to compare lateral thinking and critical thinking. Critical thinking is primarily concerned with judging the truth-value of statements and seeking errors. Lateral thinking is more concerned with the "movement value" of statements and ideas. A person uses lateral thinking to move from one known idea to creating new ideas.

1.5 Business and Creativity

Business and creativity are not mutually exclusive. It needs creative thinking mind and perspective to solve any business-related problems. In any business situation, creativity plays key role in terms of learning and generating ideas differently. The best mentors in business often find themselves learning as much as their mentees. Creatively inspired by someone else's style and ideas, and one can make the ideas implementable (innovation) by improving them, changing them, or personalizing them in some way, and sharing. Figure 1.21 explains creativity need in any organization.

Figure 1.21 Creativity Need for an Organization

There are eight principles that are proposed by removed researcher Lewis. Practicing or following these principles will facilitate the entrepreneurs or top managers to stay creative in the business solution (figure 1.22 and table 1.4).
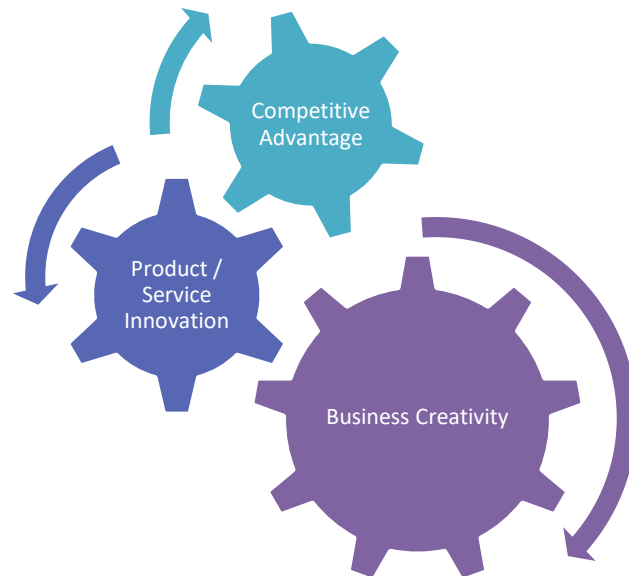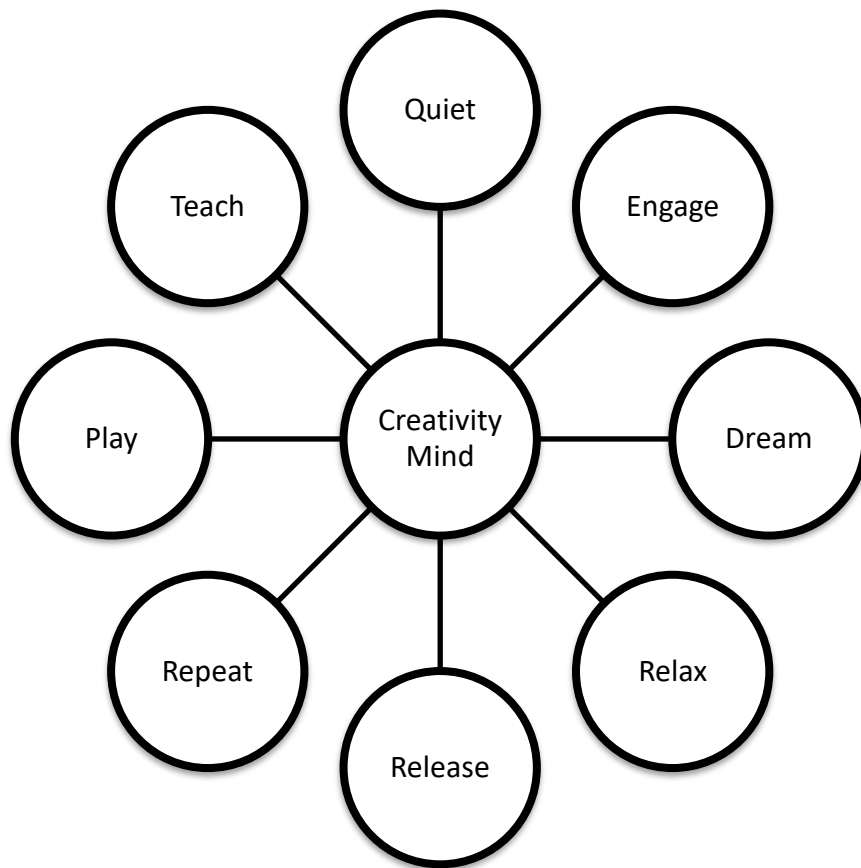
Figure 1.22 Creativity Attributes of Managers

Table 1.4 Creativity Mindset for Business Environment

Attributes	Definition
Quiet	Creativity speaks quietly and needs concentration
Engage	Creativity needs focus and commitment
Dream	Creativity needs imagination and free thinking
Relax	Creativity requires patience and will not be forced
Release	Let go and accept that can't do everything
Repeat	Experiments and repetition are the key
Play	Creativity comes from what enjoy and love
Teach	People learn more about creativity helping others

Few organizations churn creativity on their day-to-day activities. Apple is a company synonymous with creativity. It's a brand that's encourages to think different. The products of Apple Inc. reflect the creative environment. The Apple logo has proven to spark individuals' creativity and their actions mirroring how they perceive the brand. It tops 'th most innovative companies' for 11 years continuously. The products and brand is known for technology, design and innovation.

Creativity is essential in business because it's a differentiator, which facilitates to gain competitive advantage. Business leaders should focus on how they can foster creativity within their own organization. Among those benefits include increased revenue and greater market share.

Organizations today operate in a highly competitive, global environment, making creativity crucial. Creativity is what fuels big ideas, challenges employees' way of thinking, and opens the door to new business opportunities. Creativity and innovation are often used interchangeably for that reason, but are two separate concepts (Figure1.23).
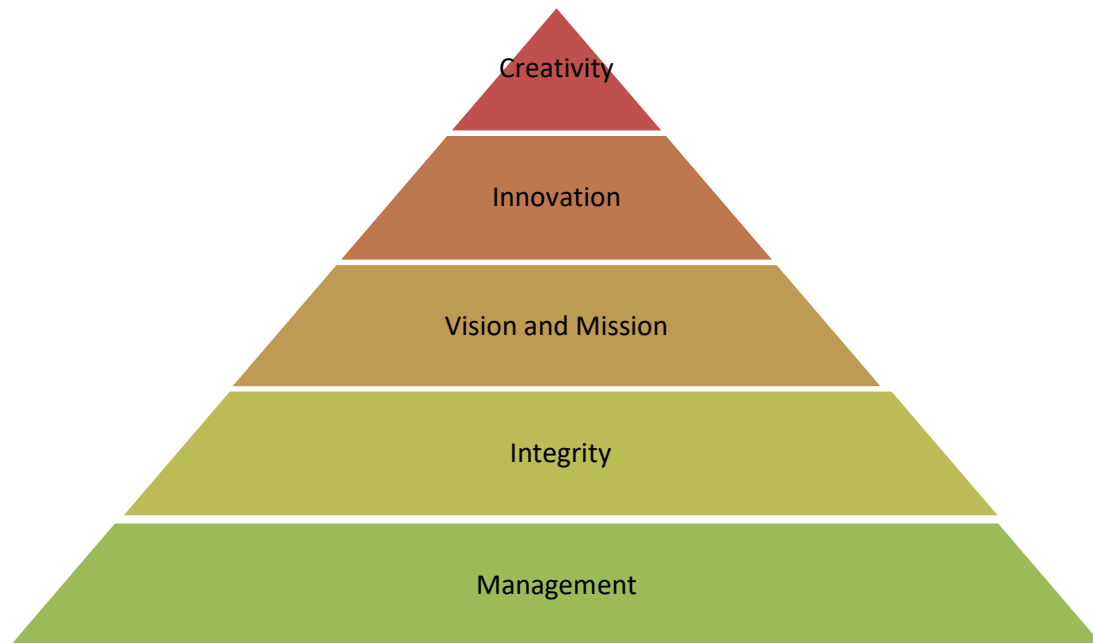
Figure 1.23 Business Success and Creativity

Innovation isn't just one thing. Creativity is different because creativity is a mechanism to being innovative. Can have great ideas, but not be innovative. There are a lot of competencies that go into realizing an innovation. Every industry is being challenged by dynamics globally and changes in technology. One reason for that is Creative leaders is more comfortable with ambiguity. And as industries continue to evolve, business goals and priorities will need to change.

Creativity in business is a crucial first step that needs to be prioritized by senior leadership. It is ranked as the number one factor for future business success—above management discipline, integrity, and even vision. There are several smaller steps leaders can take to make a big change on their organization. Here are five ways through which can foster creativity in an organization (figure 1.24).
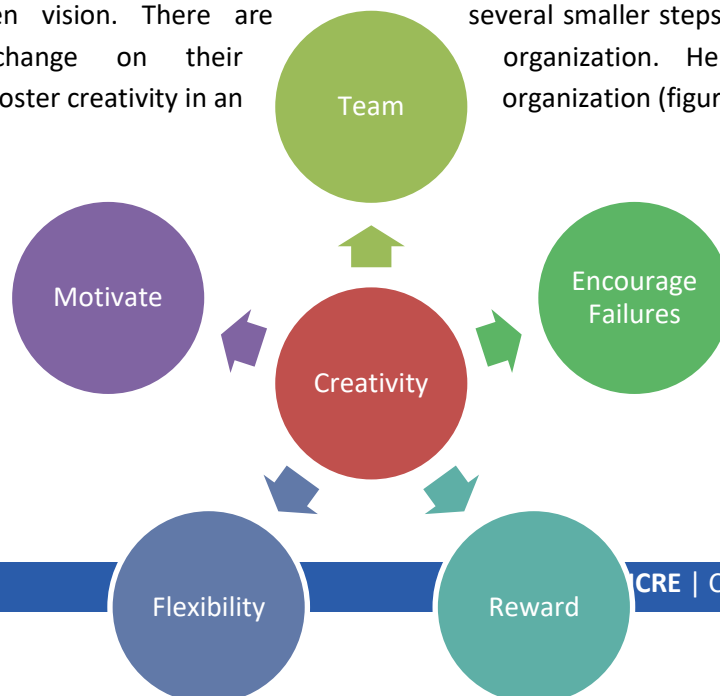
Figure 1.24 Nurturing Creativity in Business Environment

Not every idea will be a success, but big breakthroughs won't occur if the company plays it safe. Executives need to be comfortable with failure, and give employees the freedom and flexibility to experiment with and explore new opportunities. Companies that reward creativity show they value it, inspiring individuals within the organization to pursue untested theories and concepts.

Conclusion

This focuses on explaining basics of creativity and innovation in an organization. Importance of developing new product development to sustain competitive advantage is also discussed in detail. The convergent and divergent process of creativity and innovation is articulated that represents for any organization's creative thinking process. Importance of creativity in a business set up is briefed. The organization can gain competitive advantage and sustain market share in term of providing creative solutions to the customer need.

Review Questions

- What is creativity? Provide an example.
- What is innovation? How does it different from creativity?
- What is the key process step of creativity and innovation?
- What is convergent and divergent thinking process? What are the key outcomes of convergent and divergent thinking?
- Why creativity is important for an organization?
- How does an organization nurture creative thinking process?

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Chapter 2 Managing Creativity

Introduction

This chapter introduces the management of creativity. Perspectives of creativity and path to achieve creativity are elaborated. Key components of creativity are explained that will facilitate the organization to implement team and individual level of creative thinking process. The components of creativity can be implemented in the organization to nurture creative solutions. Creativity and its features are discussed for the business set up. Finally, creative skill development in the organization is explained. The key objectives of this Chapter are listed.

Objectives

- To explain the creative perspective of a problem and solution
- To establish the key direction for any problem/need to achieve creative solutions
- To explore the key components of creativity for a business need
- To understand the key features of creativity
- To deploy and develop basic skill development for individual/team and organizational level

Figure 2.1 explains the Chapter flow
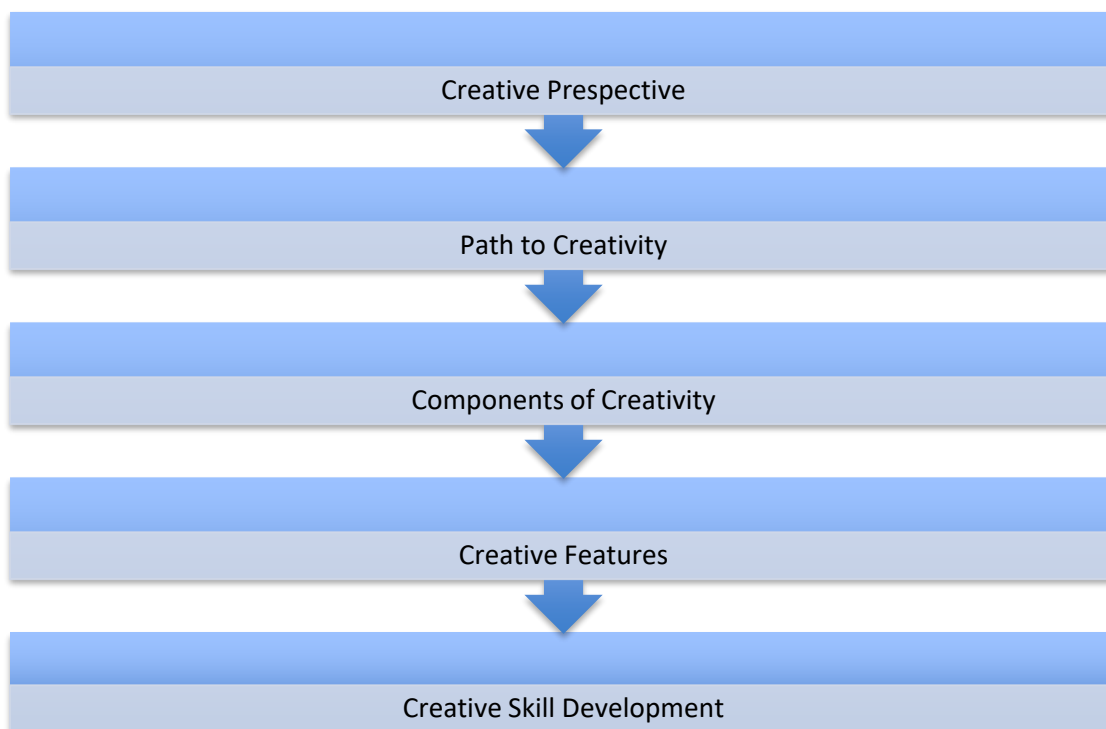
Figure 1.2 Chapter Flow - Managing Creativity

2.1Creative Perspective

Creative perspective of working in office is based on knowledge-intensive. These processes are considered complexion nature and results are unpredictable. The creative thinkers provide solution based on creative perspective while attending the problem. Moreover, creativity in business processes also leads to particular (creative) risks, requires particular incentive systems, and demands good knowledge of the involved creative tasks and their consequences to allow the process owner to successfully allocate resources without compromising.

Creative people and their processes play an importance role in business processes. The organizations seek to deploy the merits of business process management to more than just the set of transactional processes. Product development and marketing activities are few examples of such creativity-intensive processes.

Creative processes often occur continuously. It is not like providing creative solutions only once. Creative thinking, new product introduction always calls for continuous improvement. This brief about historical perspective, its thinking and the process of thinking is presumed differently. Freud's concept of creative thinking explains how people think differently by observation and understanding of the problem (Figure 2.2).
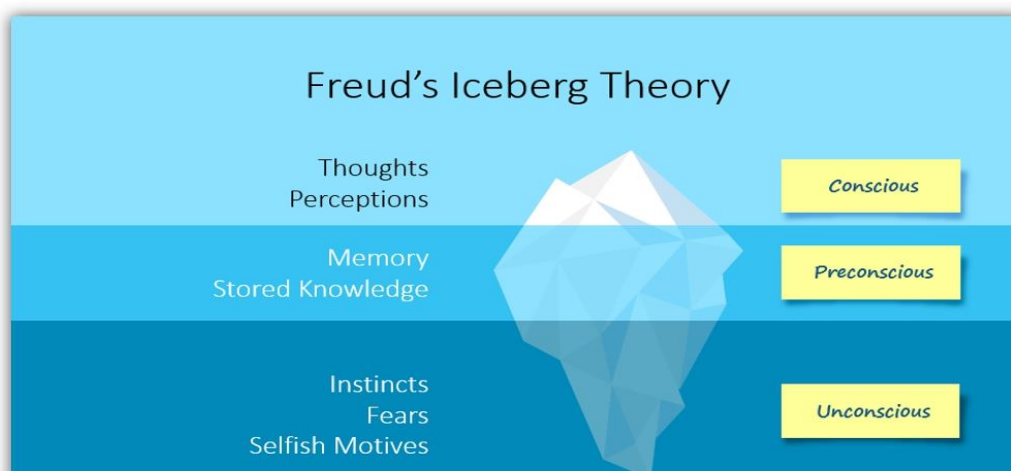
Figure 2.2 Freud Iceberg Model for Creative Thinking

Freud (1900, 1905) developed a topographical model of the mind, whereby he described the features of the mind's structure and function. Freud used the analogy of an iceberg to describe the mind (Figure 2.3).
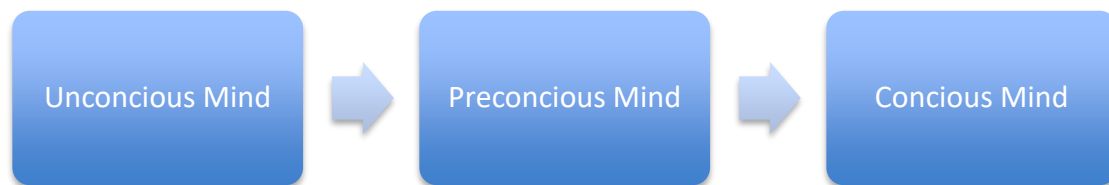
Figure 2.3 Three Levels of Creative Mind Set

Freud described conscious mind, which consists of all the mental processes of which we are aware, and this is seen as the tip of the iceberg. For example, may be feeling thirsty at this moment and decide to get a drink.   It is a conscious decision. Creative mind to operate or think it should be aware of what is happening around, observation and acknowledgement.

The preconscious contains thoughts and feelings that a person is not currently aware of, but which can easily be brought to consciousness.   It exists just below the level of consciousness, before the unconscious mind. Finally, the unconscious mind comprises mental processes that are inaccessible to consciousness but that influence judgments, feelings, or behavior. According to Freud, the unconscious mind is the primary source of human behavior. Like an iceberg, the most important part of the mind is the part that cannot see.

Different people think differently. Creative mind has options of imagination, evaluation, thinking and experiencing the solution for any given problem. The styles of the creative thinking differ based on the inclination towards solution (Figure 2.4).
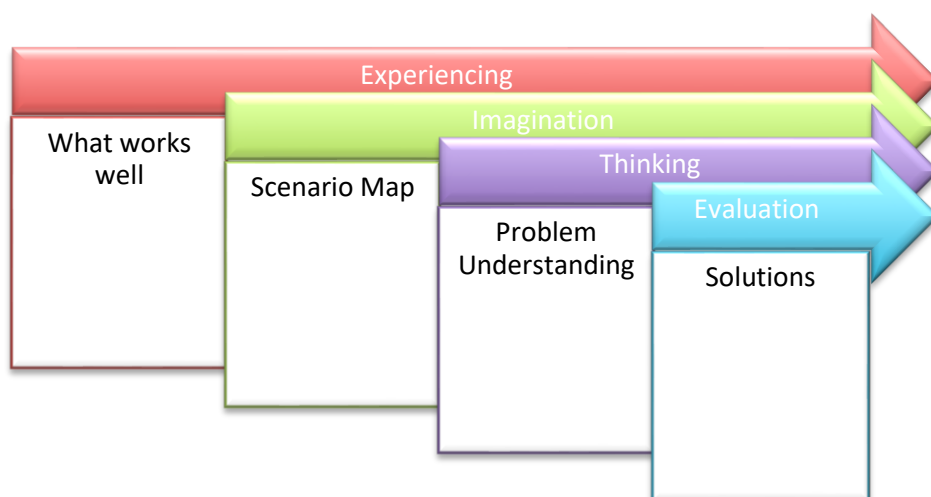
Figure 2.4 Creative Thinking in Business

Based on the different types of creative thinking, the creative styles can be identified in terms of information gathering, processing and arriving solutions. These four creative styles (figure 2.5) are part of any organization where the solutions are provided accordingly.
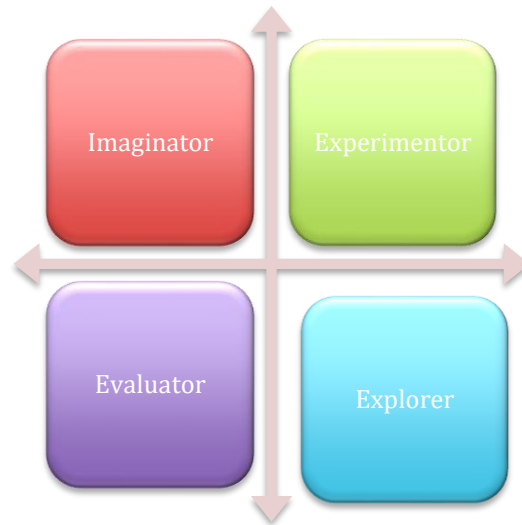
Figure 2.5 Four Creative Styles of Operation

The explorer characteristic works on the divergent aspect of the problem. Every attributes of the problem is further opened with many options. The imaginator understands and solves the problem through visual methods of representing them. However the evaluator and experiment or works on the convergence thinking process to arrive the solution. Evaluator works on the conscious facts and figures to conclude where in the experiment or does possible combination by re-arranging and re-inventing. The table 2.1 provides brief of these styles of creativity.

Table 2.1 Creative Styles of Operation - Comparison

Explorer	Imaginator	Evaluator	Experimentor
Divergent Process of thinking for a solution	Visual methods of representing the problem and solution	Facts and figures for decision-making	Re-arranging or re-organizing the combination of attributes and solution options
Creates ideas without any validation	Looks problem and solution from different perspective	Gets thinks done from others	Willing to try many combinations even that we not working earlier
Focus on attributes of problem	Focus on problem definition	Evaluate ideas and information	Focuses on successful and practical solutions

The creative thinking process has no specific line of action. It is the type that one has acquired over the period or naturally has the ability to think in a particular way. However the ability of the creativity lies in providing solutions that enrich the business environment and sustainability.

2.2 Path to Creativity

Creativity as a process can be educated or nurtured. The process of creative process doesn't follow any strict steps. However researchers have established the key possible process steps for creativity process. It is depends on the problem, required solution and environment that decide the process steps (figure 2.6). This will introduce the creative process steps that can be adopted to solve any problem creatively.

Understanding the Problem /Need

Preparation

Incubation

Intimation

Insight
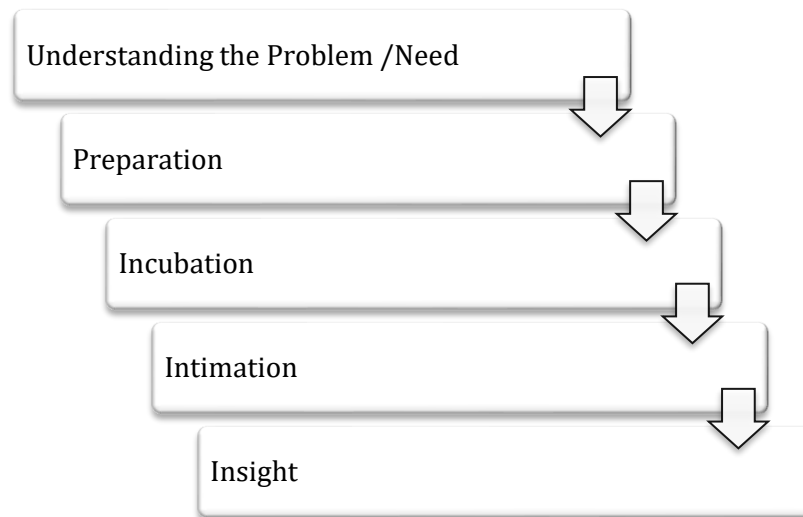
Figure 2.6 Creative Process Steps

Preparatory work to understand the problem in a holistic way and explores the problem's different dimensions. This facilitates the creative mind to explore at system level Incubation-During the preparatory work; the problem is internalized into the unconscious mind. Incubation provides the key systems and attributes associated with the problem. Once the problem is internalized the intimation of feeing within the problem and solutions are explored. The ideas are explored by considering the attributes. The ideas are consciously verified and right choice of solutions is applied. There are multiple skills associated with every stage of creative problem solving steps. Again it is not mandatory to follow to bring out the creativity however, these are considered as guidelines of creative process generation (Figure 2.7).

Expertise

Creativity

Motivation

Creative Thinking Skills
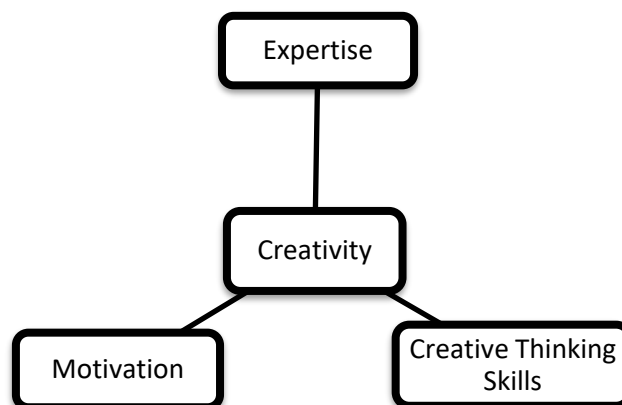
Figure 2.7 Creative Processes and Associated Skill Set

Problem Understanding

Skills:Observation, System Level Understanding

Analyze

Skills: Root cause, information gathering and analysis

Exploring Options

Skills: Brainstorming, creative thinking, prediction

Evaluating

Skills: Teamwork, testing and development

Implementation

Project Management, Prioritize
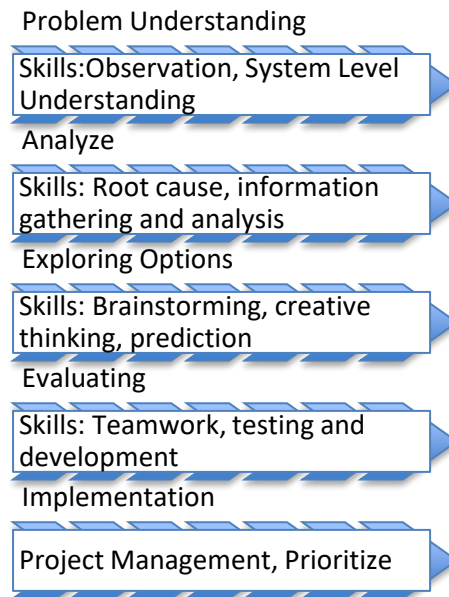
Figure 2.8 Conditions of Creative Thinking

There are many dimensions and conditions that affect the creative thinking process. These can be nurtured in an organization and managers play a key role too. Expertise refers to knowledge, acquired skill and intellectual capability of the creative person (figure 2.8). Creative thinking skills determine how imaginatively people approach the problems. How the problems are internalized and how the solutions are obtained. However these two are pretty tough for an individual to work on. With the help of motivating environment, the creative mind can be energized.

Many organizations have set up the environment to motivate the employees to feel positive and relaxed so that creative process and thinking can be motivated. For a creative person to think and work the environment should be motivating, energizing and relaxing. The new generation office spaces are carefully designed to accommodate creative and relaxing workspace. There are many factors that considered providing creative office space in terms of technology, space, seating arrangement etc., (Figure 2.9).
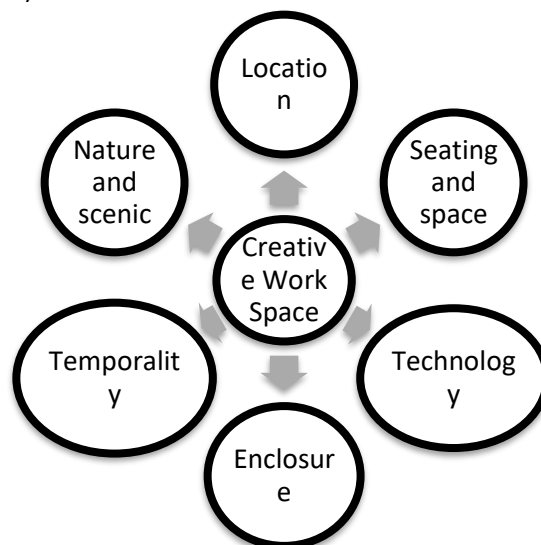
Figure 2.9 Creative Attributes for Work Space

However apart from the space, the individual should feel comfortable and enjoy the freedom to work and explore. Few images are provided for creative working space.

Figure 2.10 Creative Office Space

Creativity will not happen out of compulsion. It is key responsibility of the organization to provide the space to nurture the creative thinking process. The following s will cover further aspects of creativity.

2.3 Components of Creativity

Creativity is discussed in terms of individual and organizational level. There are three levels of component namely, cognitive, social/emotional and physical level. They are further divided into seven components. These are defined to explain the components for the creative personal especially in an organization set up (Figure 2.11, 2.12 and 2.13).
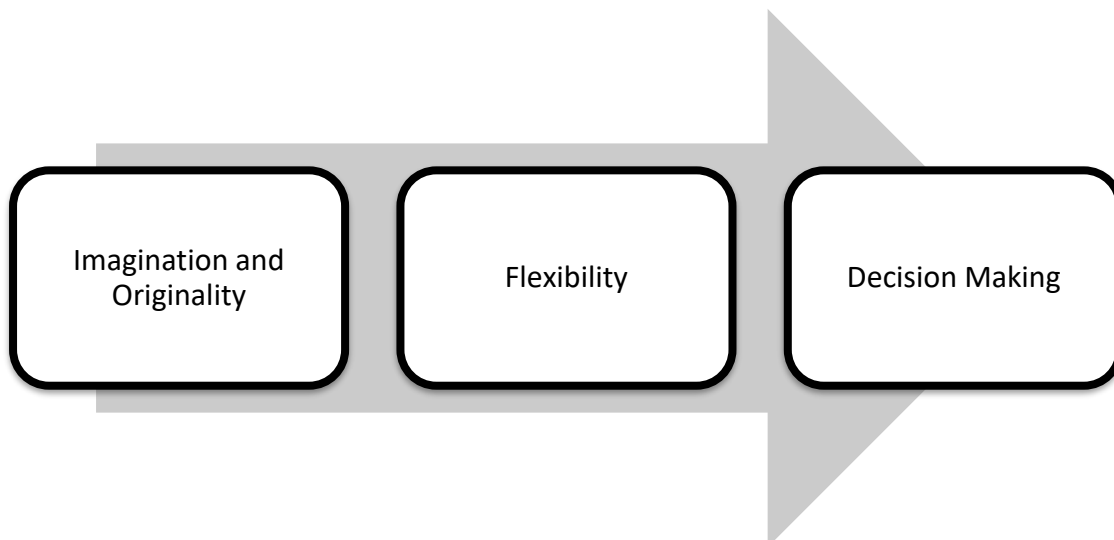
Figure 2.11 Cognitive Components of Creativity
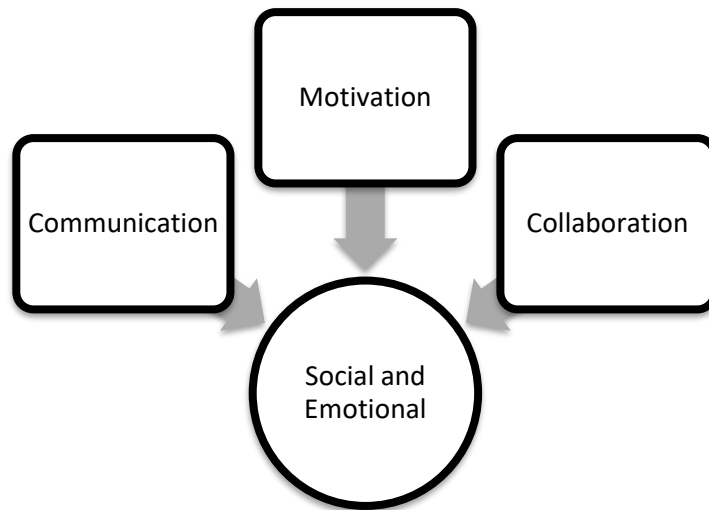
Figure 2.12 Social Emotional Components of Creativity

Figure 2.13 Physical Components of Creativity

Table 2.2 provides brief description about the creativity components

Table 2.2 Creative Components and Descriptions

Creativity Component	Brief Description
Imagination	Involves producing original ideas. Unusual or novel in nature. Imagine and explore newer avenues.
Flexibility	Flexible in terms of combination and modification of prior ideas, strategies or product characteristics. Enable to see from multiple perspectives.
Decision Making	One of the key skill set to converge from the divergent ideas to reach the desirable goals.
Communication and Self Expression	Express the creativity in terms of verbal or art forms. Able to connect to different inspirations behind the creative solutions.
Motivation	Facilitate the creator to be motivated for better outcomes.
Collaboration	Exchange of ideas from other sources or teams to enable newer and practical perspective of ideas and validation of ideas.
Action and motivation	Different types of movements and physical actions that energize the mental thinking ability of the individual.

However there are factors that directly reduces the creativity thinking capability of the individuals. The researchers have identified that stress, deferring of ideas, urgency etc., are few factors that

dimishes the creative perespective. Organizations carefully design their policy to ensure that the negative aspects of behaviour is minimized in day to day activities (Figure 2.14).

Motivation

Freedom

Responsbility

Knowledge Management

Stress

Time Targets

Strict Working Hours

Defeering of ideas

Figure 2.14 Factors that Affect Creatitivy

For any business to set up and sustain it is necessary to focus on the components that nurtures the creative mind set and reduces the factors that affects the creative thinking of the employees.

2.4 Creative Features

This Chapter covers the important aspects of creativity, its characteristics and traits of individual/organizational creativity. However there are other dimensions / features of creativity. This will cover the features of creativity from individual and organizational perspective. The creativity has basic and fundamental feature in the form of originality. This has been discussed while the characteristics are discussed. Any creativity or idea can be transformed into innovation provided it meets the financial investment and appropriate revenue generation (Figure 2.15).

Originality and Nativity

Poential possibility of Innovation

Intellectual ability to understand / solve problems

Knowledge and system understanding

Imaginative in nature

Tangible outcomes

Figure 2.15 Features of Creativity

It is said that creativity has the power of imagination and checking the correctness of imagination. It is not a production but a process or ability. The ability of creation depends on the acquisition of recognized knowledge. The process of Creativity is goal-directed. It is beneficial for either the individual or the group or society. Creativity is way of thinking and articulating the problems and solutions to the next level.

In the organizational set up the creative features look for group dynamics and performances to enhance the output. Business functions work towards gaining synergy with team creativity. The purpose of team and functional level creativity is explained in Figure 2.16.
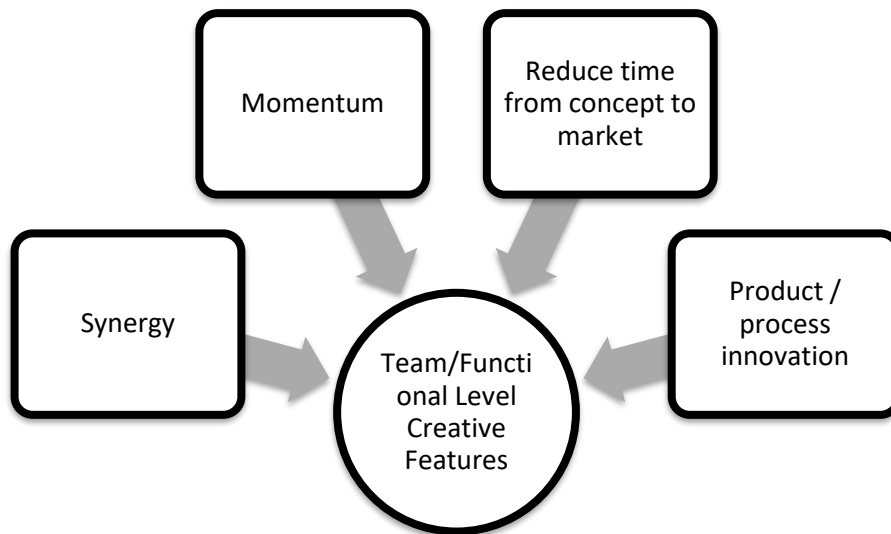
Figure 2.16 Team and Functional Creativity

In 1962, renowned researcher on creativity, Torrance undertook a study of creative individuals at a large scale. The researcher identified list of characteristics of an individual level creative features. The creative individuals have 84 different traits that describe the creativity in them. His creativity tests identified the level of imagination of an individual (Figure 2.17).

Figure 2.17 Terrence Creative Test (Sample)

The Torrance test for creativity measures the creative people on four different traits. It is measured in terms of fluency, flexibility, originality and elaboration. The simple shapes are provided to the individuals and level of creativity is measured based on the level of abstraction and detailed associated with the drawing (Figure 2.18 and Table 2.3).
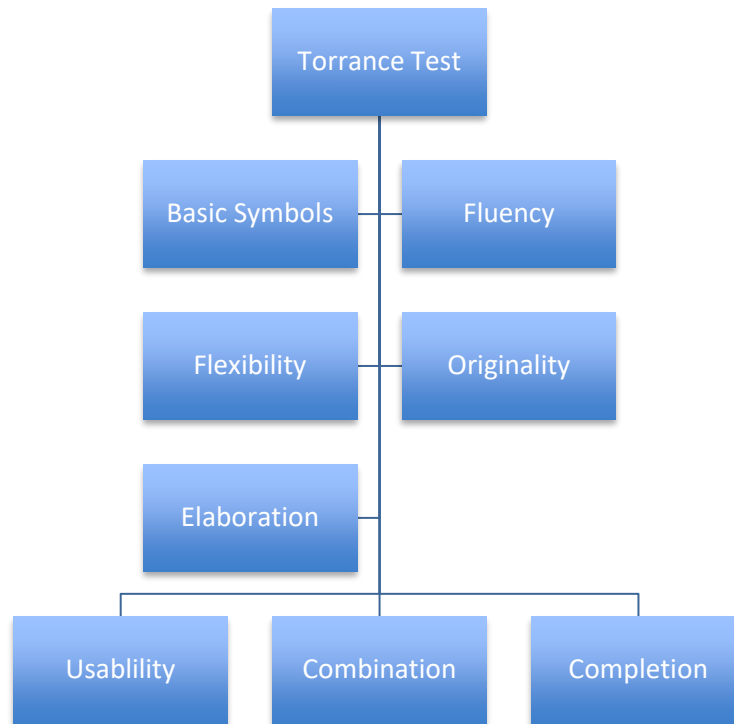
Figure 2.18 Torrance Measurement of Creativity

Table 2.3 Torrance Measurement of Individual Creativity

Creativity Measurement	Description
Fluency	Total number of interpretable, meaningful, and relevant ideas generated in response to the stimulus
Flexibility	Number of different categories of relevant responses.
Originality	Statistical rarity of the responses
Elaboration	Amount of detail in the responses

The 84 traits can be explored through the following link:

https://www.researchgate.net/publication/271619516_Psychometric_properties_of_Torrance_test_Persian_version_of_creative_thinking_A_form

Table 2.4 provides brief of the creative traits of the individuals.

Table 2.4 Torrance Traits of Creative Individual

Process	Motivation	Personality
Identifying Problems	Problem –Solving Hope	Critical Attitude Optimism
Perceiving Learning Remembering	Curiosity Willingness to explore	Knowledge Willingness to Judge
Relationships Consequences	Constraints Tolerance for accommodating uncertainty	Relax Imagination
Solutions	Intuition Reduction of Uncertainty	Open Sensitive
Evaluating Alternatives	Quality Conscious	Practical Conscious Decision-Making

The traits and evaluation of individual and team creativity can me measure and motivated in an organization to gain market share through innovation and creativity.

2.5 Creative Skill Development

All the human beings are having different types of creative abilities. However, assessing skills of an individual and developing creative skill facilitates the organization to nurture the creativity. The skill set can be defined in terms of mental or physical action the responses (solutions) are arrived. These skills can be experimental, dynamic, physical etc. (figure 2.19), The sensory organs provide necessary emotions for the skills. Freeman defines about the skills that- It is an ability to perform a given task with convenience and subtlety.
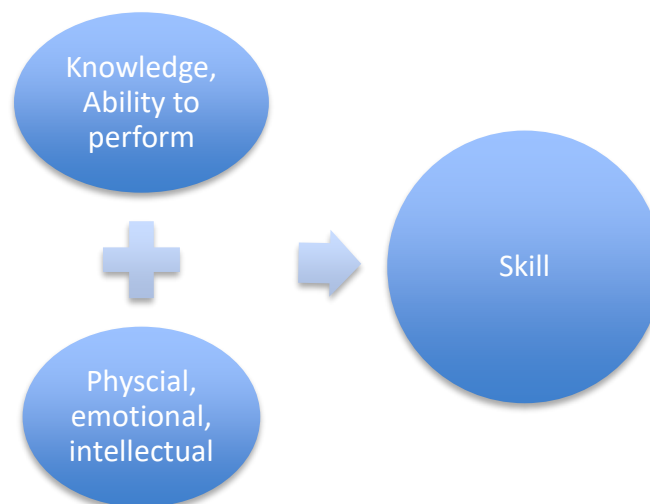
Figure 2.19 Skill Development

Creative skill is ability to linking the objects/subjects. Creative person visualize the finer linkages that connects two distinct products. Linking and creation can be sustained only by practice. Different skill set associated with creativity is discussed in this. There are predominantly four skill set that associates with creativity (figure 2.20). This will explore each skill in detail.
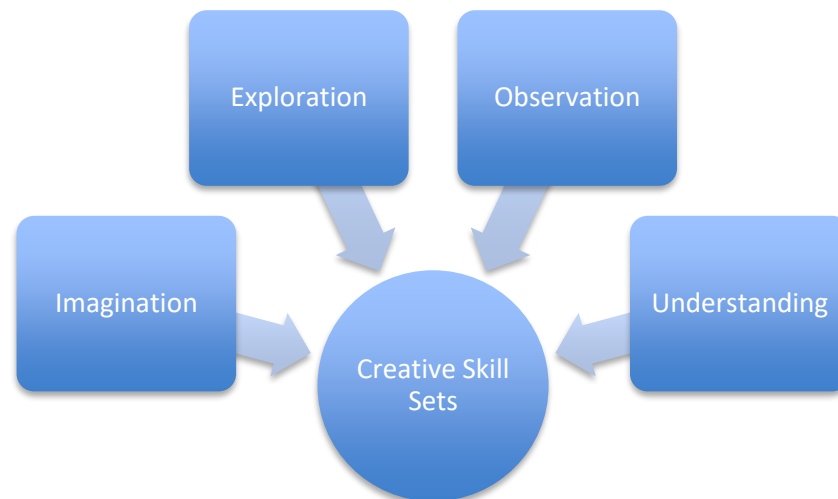
Figure 2.20 Creativity and Skill Sets

The most important step of creativity is imagination. It acts as a base for the creative person since others cannot see or visualize. However, the creative person can communicate in terms of visual or verbal to others. It facilitates the creativity to solve the problem by integrating the experience and the learning process. The imagination is narrated in the form of storytelling. The creator puts across the characteristics of the story in terms of products and services. The exercise of image formation and 'evoke worlds' will facilitate the creator to link the totally different aspects of life or things. For example: linking between a donkey and the sun.

It is whole cycle of images or words that expresses the creator's imagination. The creator can imagine according to his/her perception without judging the (good or bad). It is accepted as the innate ability to invent personal creative realms.

> The term 'imagination' is technically used in psychology for the process of reviving in the mind, percepts of objects formerly given in sense perception. It represents the eyes of the 'mind'.

Most of the things, which are created in the world so far, are based on imagination. The right brothers imagined to fly and invented airplane. Therefore, the creative skills are based on imaginations. Ways to nurture imagination is mentioned in the figure 2.21.
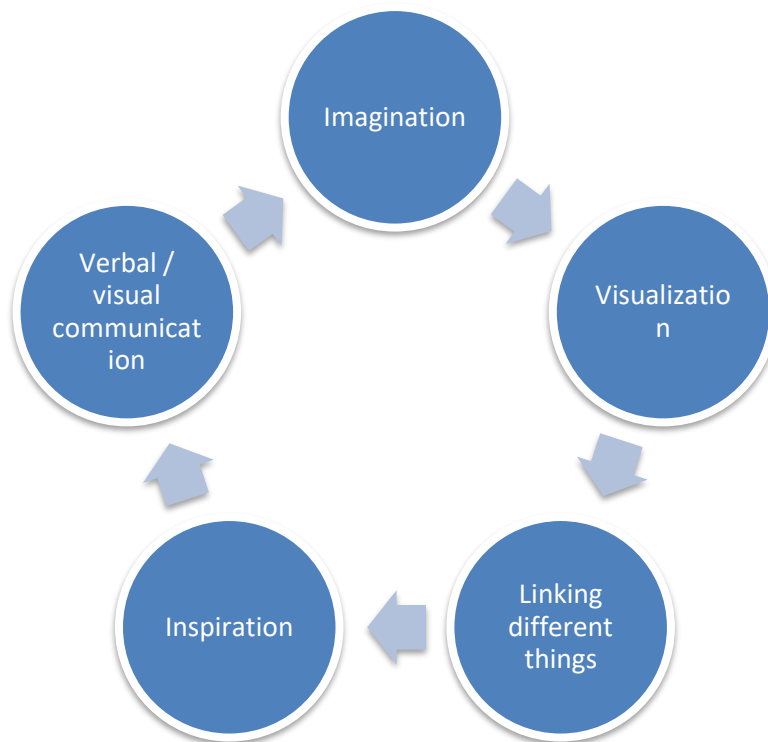
Figure 2.21 Nurturing Imagination

Thus it can be said imagination inspires human beings in multiple ways. Human development can be achieved by imagination and creative thinking process. The other skill for creativity is known as 'Observation'. It is the active acquisition of information either verbal or non-verbal. The observation generally performed from a primary source by actively employing the sense. It plays a significant role in creative skills. Figure 2.22 represents the observation as skill. Subtlety of observation is very helpful in increasing the curiosity. In Indian culture the creation of art, sculptors and other craftsmen happens through the process of observation. Observation said to increase the efficiency and effectiveness of anyone especially the creative person.
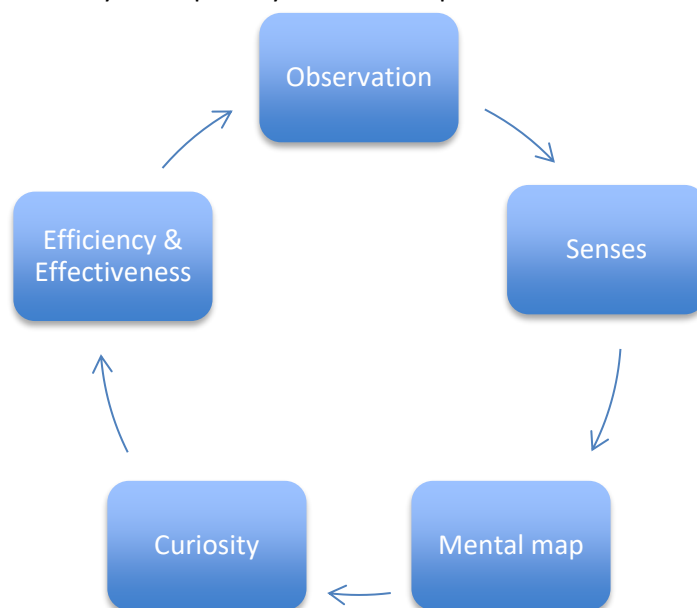
Figure 2.22 Observation Skill

The result of observation skill is understanding of the system where the problem and solution lies. It is considered as a unique quality of mankind. The learning phase or the observation phased is said to be complete once the understanding is justified. The creation or the creative solution lies in the basis of understanding. The process of understanding has different dimensions. Figure 2.23 explains the different aspect of understanding.
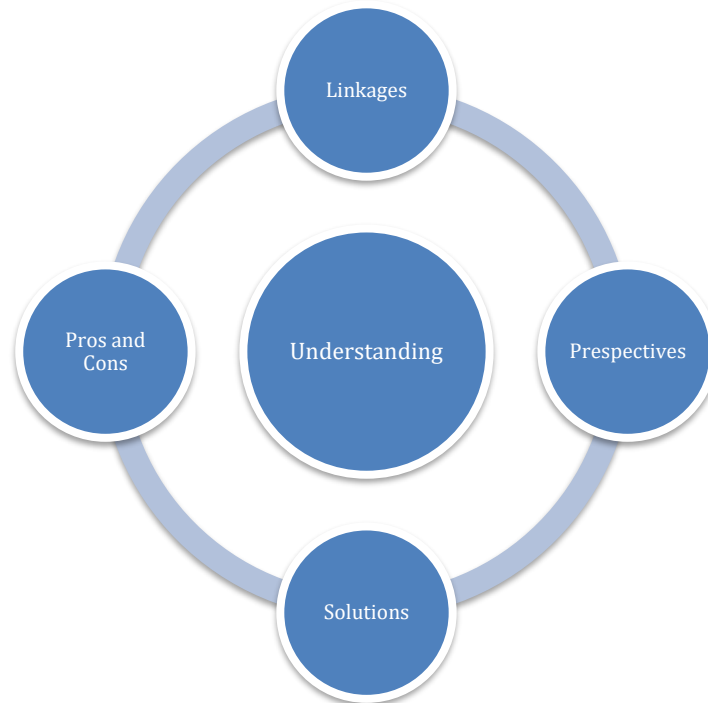
Figure 2.23 Dimensions of Understanding

To Do Activity
For teachers to evaluate the students understanding of the particular problem, it is better to initiate a group discussion in the classroom. The presentation and discussion will result in higher level of understanding of the problem or solution.

Once the understanding of the system level problem and solutions are done, the options can be explored in terms of drawing inspiration and linking the characteristics. There is no end to the process of exploration. It is purely a divergent process. The convergent process can happen either in terms of time or investment restrictions. The process of exploration is briefed in the figure 2.24.
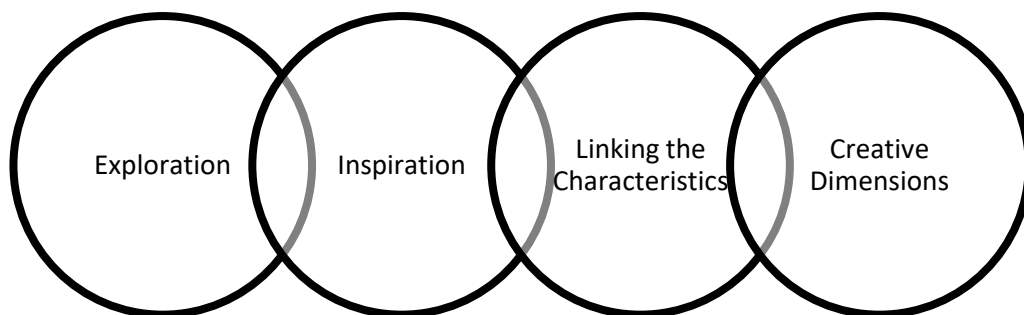
Figure 2.24 Exploration and Creativity

Once the exploration is completed sufficiently the process of innovation starts. The convergence process is purely based on the business requirements and constraints if any. The process of innovation and organizational success will be discussed in the following Chapters.

Conclusion

This Chapter brings out the process of creativity in a business setup. Nurturing creativity in a team and individual levels are discussed in detail. There are multiple avenues of motivating creativity of an individual. It is said that by birth every human being is designed to think creatively and explore the unlimited possibilities to benefit the society. However the environment and other characteristics challenges the process of creation. As the researcher Torrance rightly pointed out, the dimensions of the creativity can be viewed in 84 dimensions (characteristics) of an individual. Organization that motivates such dimensions will benefit to bring out new products / services in the market.

Review Questions

- What is creative management?
- What is called creative perspective of a solution? What is the path taken to arrive at a creative solution?
- Visit a water body in r area and observe how to preserve the water bodies at district/state and national level? Form groups and discuss the possible solutions.
- What are the creative features? Explain in detail.
- Perform a case by exploring the components of creativity. How does it affects/modify the thinking process?
- How to develop skill at individual or team level in the institution? What are the challenges faced while implementing the solutions?
- Identify a place in an institution and set up or modify the environment that motivates creativity.

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Chapter 3 Innovation Management

Introduction

Chapter 1 focused on introduction to creativity and innovation where as Chapter 2 explores the creativity as a process in an organization. The possibility of nurturing the creative mind at individual and team level is explored. This Chapter explains the innovation and managing innovation in an organization set up. This Chapter has 5 s focusing on, business innovation, innovation process steps, skill for innovation. The key objectives of this Chapter are listed as follows

Objectives

- To link the business and innovation. To explore the importance of innovation in any business domains.
- To introduce innovation process steps.
- To understand the innovation as a skill and development of the skill at an organization.
- To establish the innovation and business plan.
- The key challenges of innovation from the perspective of waste management business

Figure 3.1 explains the Chapter flow.

3.1	•Innovation and Business
3.2	•Innovation Process Steps
3.3	•Innovation SKill
3.4	•Innovation and Business Development
3.5	•Challenges of Innovation in Waste Management Business

Figure 3.1 Chapter Flow – Innovation Management

3.1 Innovation and Business

Business innovation is said to create new avenues of wealth for any business. It increases stakeholders' benefit in multiple value generation (Figure 3.2). Innovation explores the possible and multiple ways of generating revenues for an organization. In an business environment it provide p There are multiple ways business innovations have been defined by the researchers. Innovation researcher Sawhney (2006) briefs the business innovation as follows

"Business innovation is the creation of substantial new value for customers and the company by creatively changing one or more dimensions of the business system In other words, business innovation is the creation and adoption of something new that generates business value. This includes new products, services, or processes, such as integrated supply chain solutions"
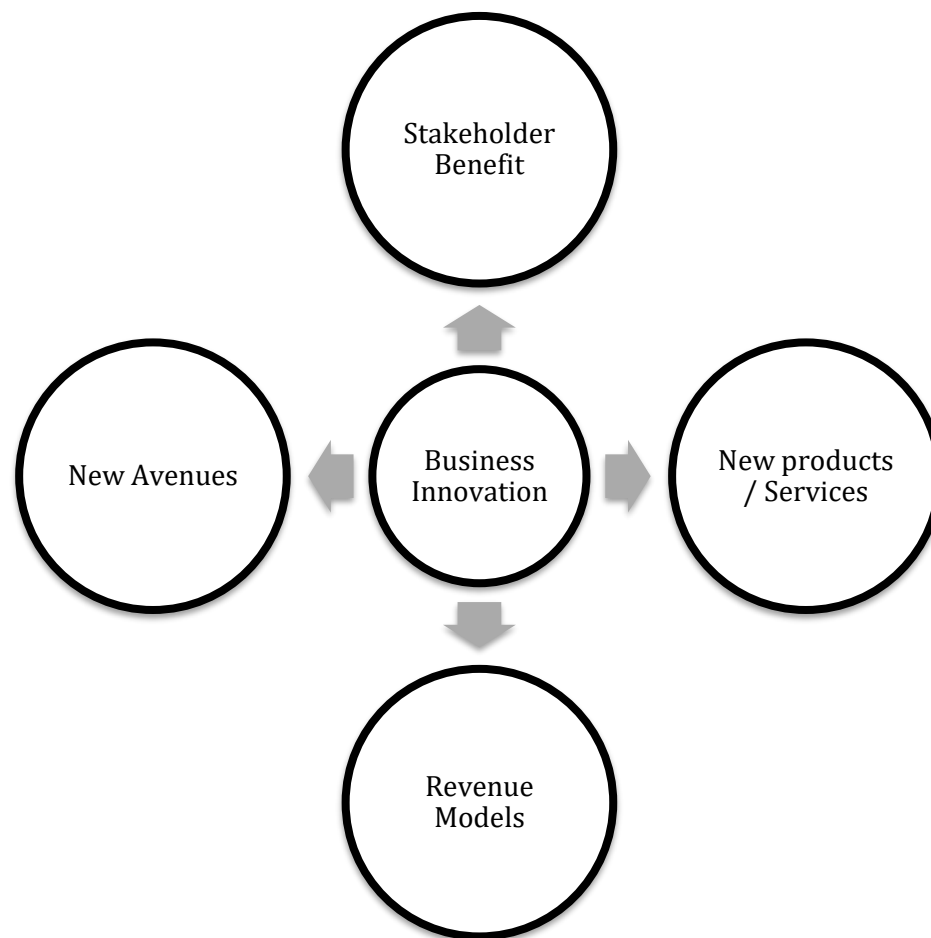
Figure 3.2 Benefits of Business Innovation

Business innovation can happen in multiple streams of business functions. It also benefits the society, consumers and business owners. Organizations establish innovation strategies to provide avenues for innovation. Not all companies are successful innovators. There are many organizations in the world still struggling to establish innovation as a practise in the organization. This Chapter will provide key insights about the innovation and its relationship with business. Many researchers have identified that innovation does not provide only tangible outcomes. It also produces non-tangible outcomes such as knowledge, people motivation and generates synergy in any organization.
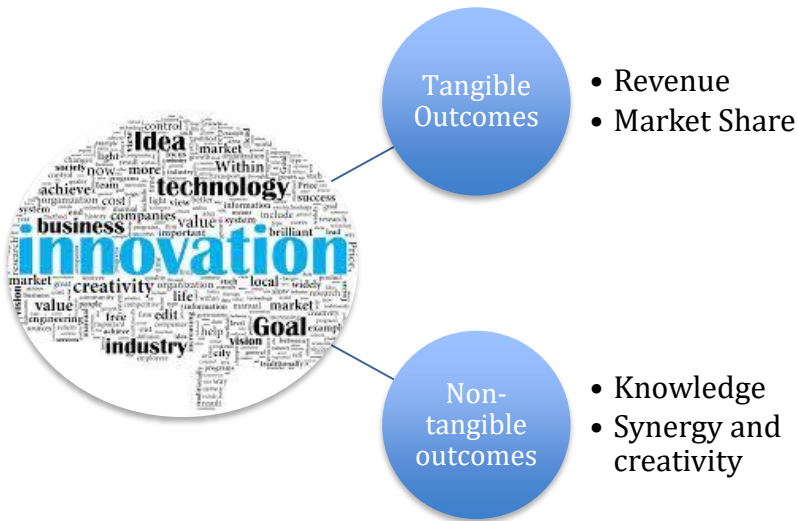
Figure 3.3 Innovation and Organizational Outcomes

Many companies have evolved by integrating innovation as their part of the system. Innovation can be employed in multiple business functionalities. In management the innovation can be employed in terms of strategy, system, technology and information system. The organization excels the innovation in every streams of operation. Figure 3.4 maps the innovation system representation in an organization.

Figure 3.4 Innovation System at Organizational Level

The prominent innovation streams in an organization are product innovation, process innovation, business model innovation etc. As discussed earlier product and service innovation are directly linked to tangible outcomes of the organization (first level). However process and business model innovation are indirectly related to the tangible outcomes (Figure 3.5).
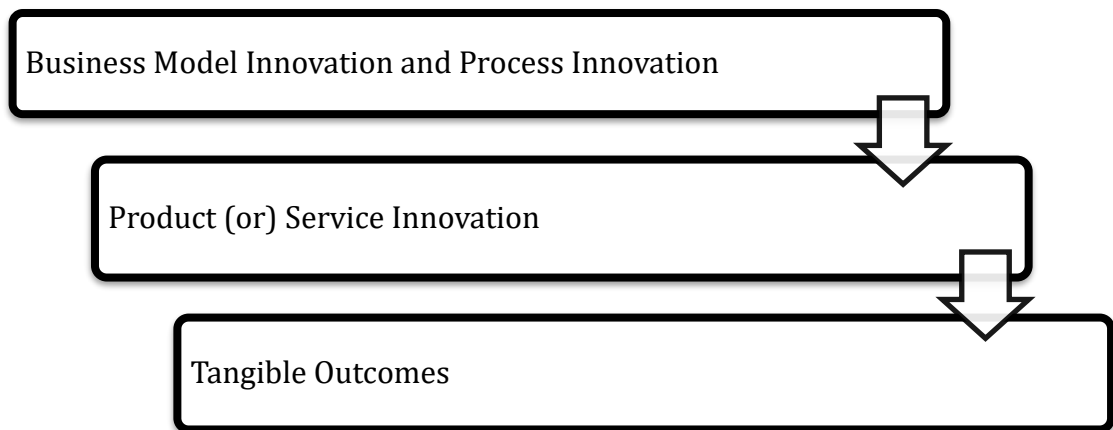
Figure 3.5 Innovation Map for Tangible Outcomes

Few examples of the innovation types are Provided in the table 3.1.

Table 3.1 Innovation Types and Organization

Innovation Type	Organization	Description
Product Innovation	Apple Inc	Breakthrough technology products that are not comparable with current available products range
Service Innovation	Amazon	The processes are streamlined that the organization could build the platform to integrate sellers and buyers
Process Innovation	Walmart, Coca-cola	Walmart pricing strategy is unbeatable by any other retailers because of its process. Coca-cola's marketing initiations fetch market share than its competitors
Business Model Innovation	Google	Google business model in terms of search engine and cloud computing provides value added services to the customers.

Startups tend to lead the way for innovation. The following are three startups that have led the way in terms of innovation.

Uber

In just a few years, Uber has completely revolutionized the traditional taxi industry. The company leveraged technology to create a business approach that allows almost anyone to become a taxi driver while making more profit than a traditional taxi driver. Uber's gross booking for the first half of 2015 was $3.63 billion. As of 2016, the company has a market valuation of $62.5 billion.

Airbnb

The company revolutionized the hotel and rental housing market and influenced how people travel. Airbnb made it possible for the average person to rent out their home, rooms and apartments. In the year 2013, the company earned a total of $250 million. In mid 2015, the company's total earnings for the year was projected to be $900 million, and projected to rise to $10 billion by 2020. Airbnb currently has a market valuation of $24 billion.

Slack

Slack developed an innovative platform that edged out Apple's iMessenger, Facebook's Messenger and traditional email to become the prime digital communication tool for companies and organizations across the world. As of May 2016, Slack had a total of 3 million active daily users, up from 750,000 in April 2015. At the same time, Slack is generating over $25 million in annual recurrent revenue.

The main reason why startups lead the way for innovation is because they usually take an 'outsider's approach' to business. They have a raw outlook and a desire to infiltrate the current system. All the companies mentioned above analyzed their respective markets, identified gaps and sought to create a product that could fill those gaps and improve on the current infrastructure. On the other hand, well-established firms have difficulty innovating because they are too scared to take risks.

3.2 Innovation Process Step

Business leaders recognize the value of innovation at every organization. Most business leaders recognize the value of innovation.

> Innovation distinguishes between a leader and a follower – Steve Jobs, Founder, Apple Inc.

In a survey of fortune 500 companies, 87 percent of leaders believed that their organization's return on investment is high because of innovation. Innovative environment helps to retain the employees since it motivates them to work differently. However, many organization's innovation is just by serendipity (by chance) since it does not have the system of innovation. The structured or systematic process enables the organization to capture, validate and implement the innovation system (figure 3.6). There is a fine difference between creativity and innovation management. Creativity focuses on only ideas generation for the state problem (or) need. It follows a divergent process whereas; innovation process focuses on converting the idea(s) into potential business revenues. It generally works on divergent process (figure 3.7).
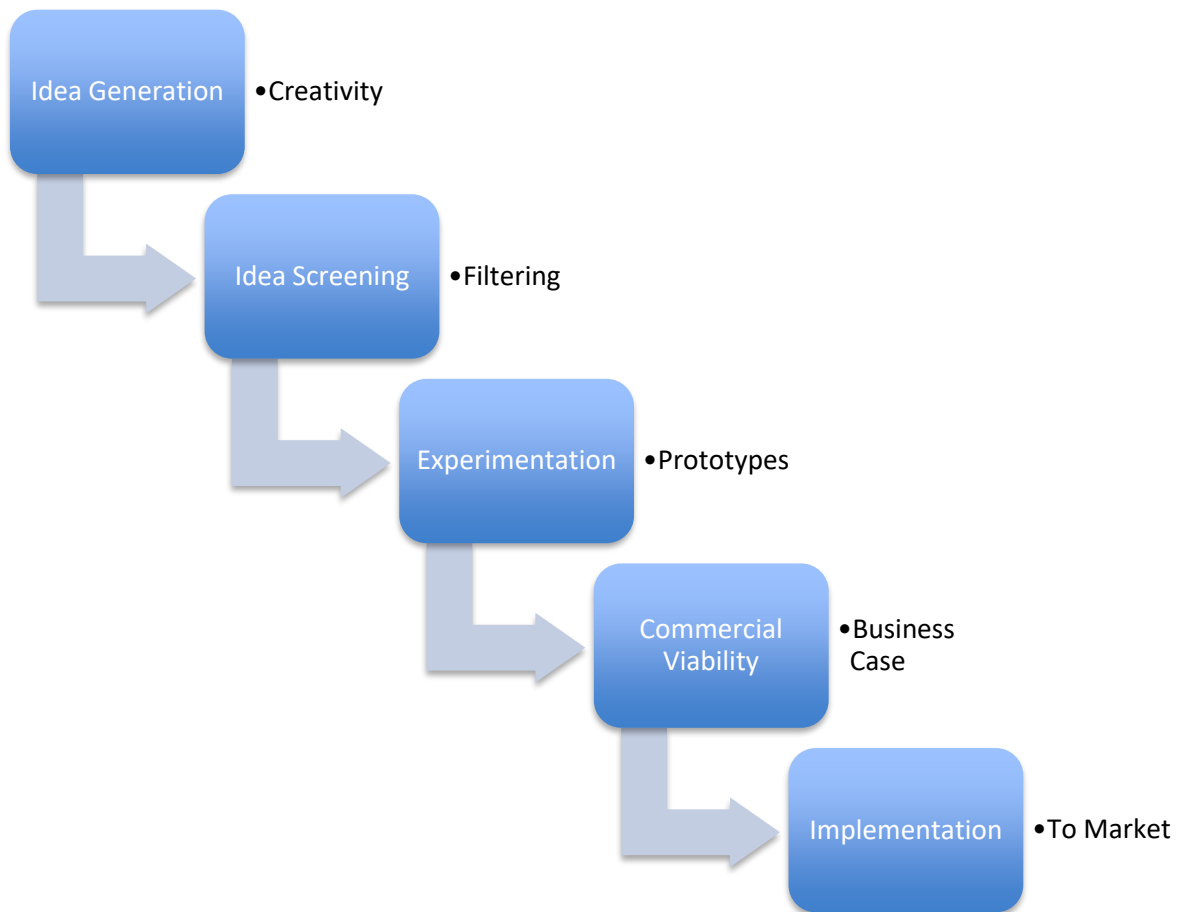
Figure 3.6 Innovation Process Steps
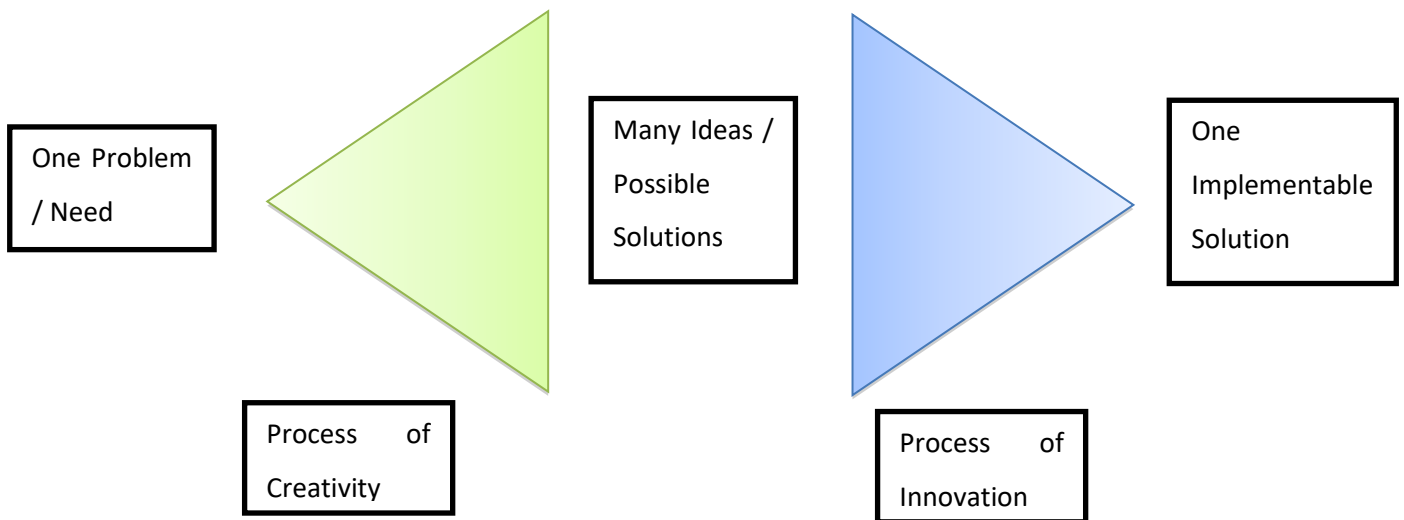
Figure 3.7 Creativity and Innovation Process Methods

Details of the process steps of innovation are discussed in detail.

Idea Generation

New ideas are created during idea generation. Inspiration for a new idea can originate from an improvement of an existing idea, or something from scratch. Not all ideas are worth implementing.

Advocacy and screening help evaluate an idea and measure its potential benefits and problems. From there, a decision can be made about an idea's future.

> 3M provides employees with time (15 percent of their workday) to explore ideas outside of their work assignments. Other organizations also have followed this model, and robust organizations in general provide employees with the time and resources to innovate.

Idea generation for innovative solutions is based on the environment, motivation, time etc., Companies looking to build a robust culture can establish a few best practices for this step (Figure 3.8). First, employees should have plenty of avenues to receive advocacy and feedback. Second, organizations must understand the difficulties involved with evaluating truly innovative ideas. Third, organizations need to build transparent evaluation and screening protocols.

Avenues to Explore Innovation Need

Evaluating Mechanism

Transprant System to Choose Right Solution

Figure 3.8 Facilitating Innovation - Idea Generation

Idea Screening

Idea screening requires knowledge of function, vision and market sense. It is important that ideas screening is transparent enough that right choice of idea has been taken forward for innovation. Innovation process needs resources and capital funding. There are many methods that can be used for idea screening. For example, Pugh Matrix provides simple evaluation method based on the key attributes of the problem / solution.

Experimentation

The experimentation stage tests an idea, such as with a prototype or pilot test. Experimentation can remain continuous or exist in spurts, as advocates and screeners reevaluate an idea. Sometimes, experimentation leads to new ideas due to information that is gathered on the results and the overall feasibility of the original idea. Time is crucial in this process; individuals must be given adequate time to run the experiments. As refinements and evaluations occur, they must be given enough time to reflect on the experiments.

Many businesses experiment with new products and services, such as grocery stores. One innovation came in 2007, when Amazon tested its grocery delivery service in certain Seattle suburbs, which opens up new avenues for the business.

Commercialization

Commercialization aims to create market value for an idea by focusing on its potential impact. This step makes the idea appealing to the audience, such as by packaging an idea with other ideas, clarifying how and when the idea can be used, and using data or prototypes from experiments to demonstrate benefits. An important part of commercialization is establishing the specifications of any given idea. Commercialization is the stage of the innovation process when the focus shifts from development to persuasion. After the idea is clarified and a business plan is created, it will be ready for diffusion and implementation.

Implementation

The use or application of the innovation should be demonstrated by the end of this stage, along with acceptance of the innovation. For the innovation to succeed, it will need the proper resources, a marketing plan for customers and an open culture with strong advocacy. Also important to diffusion and implementation is the opportunity for future ideas; this final stage allows the organization to determine the next set of needs for customers. Receiving feedback, in addition to indicators for success metrics and other benchmarks, enables the organization to stimulate the innovation process once again. The following s will bring up innovation skills and transforming to business.

3.3 Innovation Skill

The National Skill Development Agency of India, invites innovative ideas, concepts and practices on skill development. A committee has been set up to review all such innovations and to facilitate their application on a wider scale. This initiation is performed at national level to develop the skill of every citizens of India. The National Skill Development Corporation has initiated the Innovations for Skills Marketplace to host information on innovative solutions, practices, models and other relevant research in the skill development space. Practitioners, Government agencies, policy makers, corporates and other stakeholders that contribute to this growing and vibrant ecosystem can use these. The site is free to use for everybody and all submissions are voluntary.

National Skill Development Agency also runs the Innovations for Skills Challenge to look for proposals, which will positively impact and create a multiplier effect in the skill development space. The proposals can be from enterprises, which have solutions to reduce cost, enable new processes and create a higher impact than the existing practices in the current skill development space.
For more details, visit http//innovation.nsdcindia.org/

> Now that innovation and creativity is a course for every management and engineering curriculum that will facilitate students to develop and appreciate the skill.

Innovation is a skill that can be developed by providing training to think from the regular solution. The skill is purely based on application in a specific context by combining skills, knowledge and attributes. As the nature of the challenges or the problems are constantly changing, it is necessary to cope up with the changes (figure 3.9).

There are believes about teaching innovation. Some believe that innovation cannot be taught and

> Innovation is consciously exploiting new ideas, or new uses for old ideas, to add social or economic value.

others feel it can be taught. However innovation is something it need not be created; it exists in everybody but to tap it, there needs certain thinking process and atmosphere. This includes the movement of training methods away from being teacher centered to being learner centered. The workforce needs new, or newly emphasized, skills and capabilities to support an innovation economy.
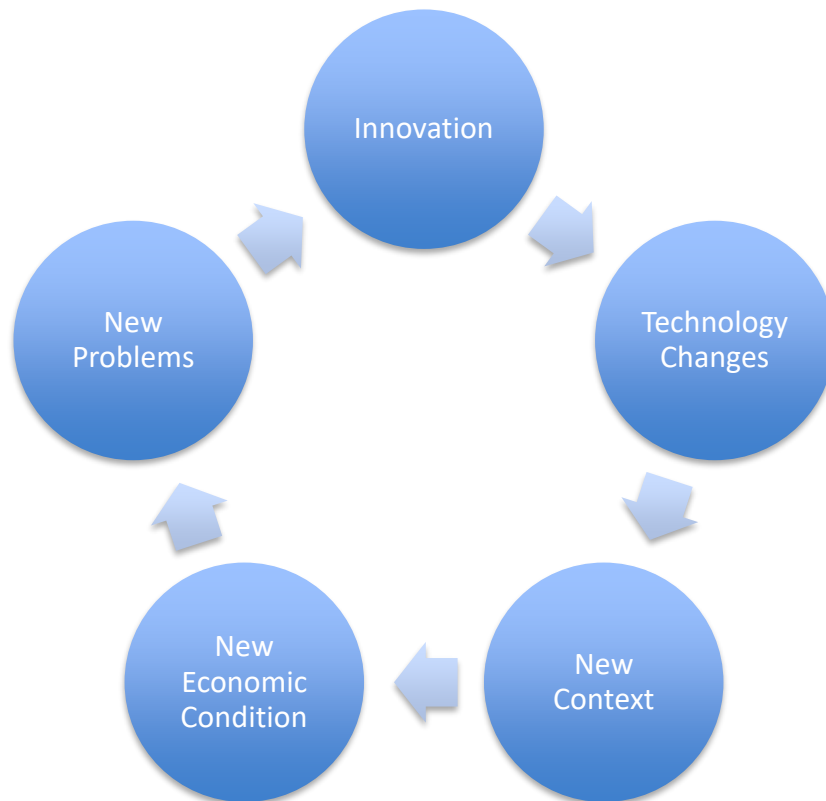
Figure 3.9 Innovation to Cope Up with the Change

However, there are set of processes that can facilitate innovation. Though there is no specific formula for creativity and innovation, the set of process will systematically explore the new avenues for solution. Figure 3.10 briefs the process of innovation.

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┌─────────────────────────────────────────────────────────┐
│                  The need / Opportunity                 │
└─────────────────────────────────────────────────────────┘
                            ↓
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│               Ideas generation and Screening            │
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│               Collaborate to develop the idea           │
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│                        Prototype                        │
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│                  Testing and Evaluation                 │
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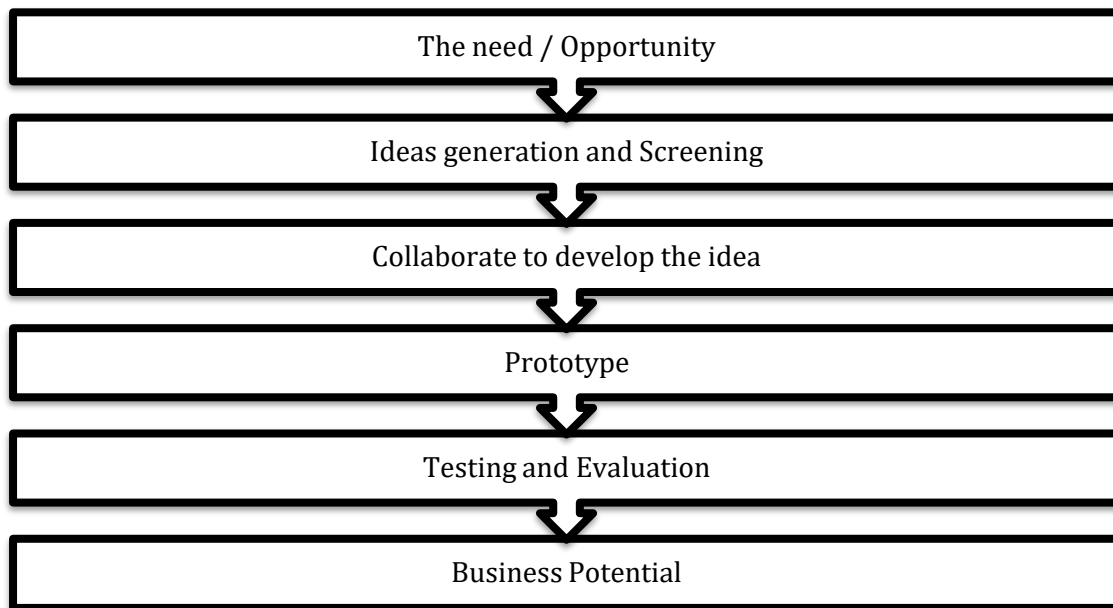
Figure 3.10 Innovation Skill Development – Key Process Steps

can embed the development of learners' skills for innovation into the delivery and assessment of a or group of s of competency. The divergent thinking process is key for gathering ideas. Divergent thinking can be articulated by means of seeking clarity and understanding problems. Few of the in-line questions for divergent thinking is listed as follows

- What worked before?
- What could work in the future?
- How could we use something in a completely new way?
- Could something new be used?
- Is there a better way to do this?
- What could come from looking at other people's ideas?
- If I thought about it from a different perspective, what would I come up with?
- What can I see the end user doing with it?
- What's new in this area? How can I apply new concepts to this issue?

The process of innovation has convergent thinking process. Seeking clarity on the context and situation can stimulate that. Few questions for convergent thinking are listed

- Would this work?
- What is the Context?
- Who is the beneficiary?
- What can go wrong?
- What can go well?
- Could it be achieved?
- Is it technically possible?
- What are all the challenges?

There are few teaching and training methods that are exists to facilitate the learner. The innovation training will facilitate the innovator to think in multiple ways (Figure 3.11).
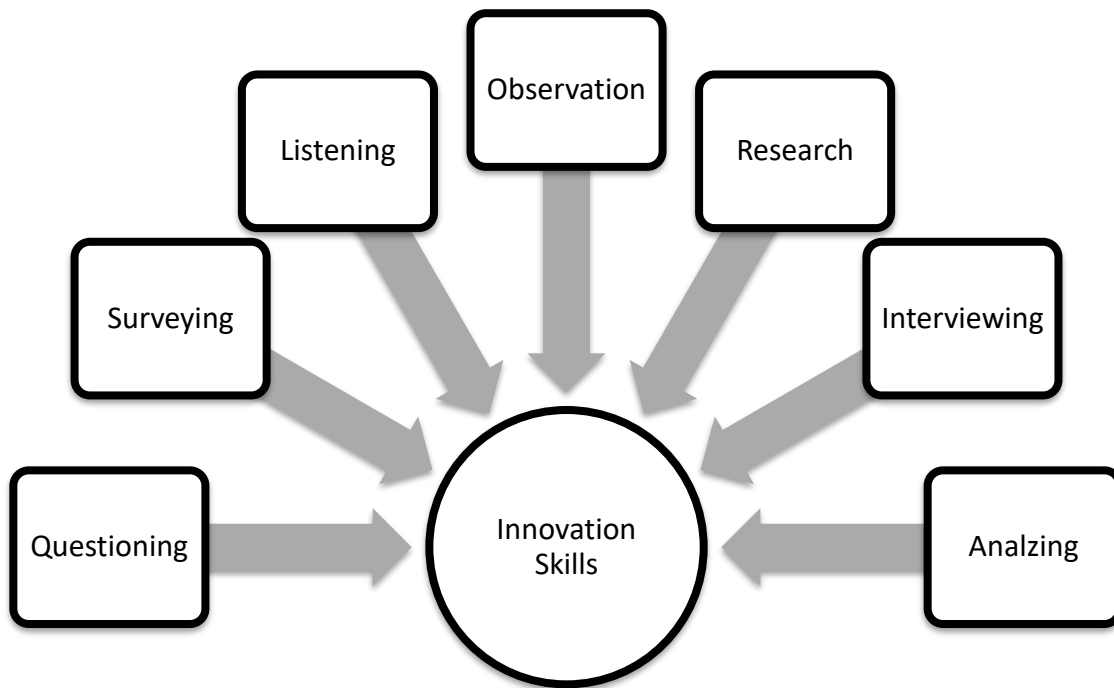
Figure 3.11 Innovation Skills

The innovation training can be focused to develop skills that can facilitate to think. The linking of the innovation to business potential is discussed in the following below link. https//www.oecd.org/cfe/leed/TSME%20Highlights%20FINAL%20formatted.pdf

3.4 Innovation and Business Plan

So far, innovation and creativity is discussed in terms of developing potential solution. The skill development is for both innovation and creativity is also established. A novel idea is the starting point of every innovative business. Business plan helps the organization to be evaluated the idea that justifies the business need. Figure 3.12 explains the need for the business plan.
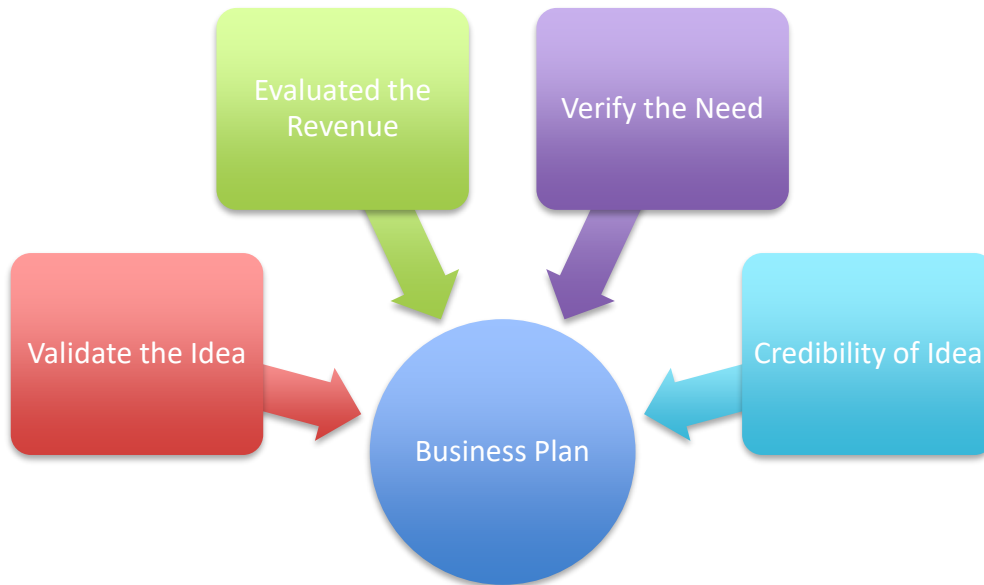
Figure 3.12 Need for Business Plan for Innovation

What is unique about the innovation?

How it can be protected?

What is the target market?

What are the costs involved in developing and delivering the innovation?

What is the size of the competition?

When will the business start receiveing the income?
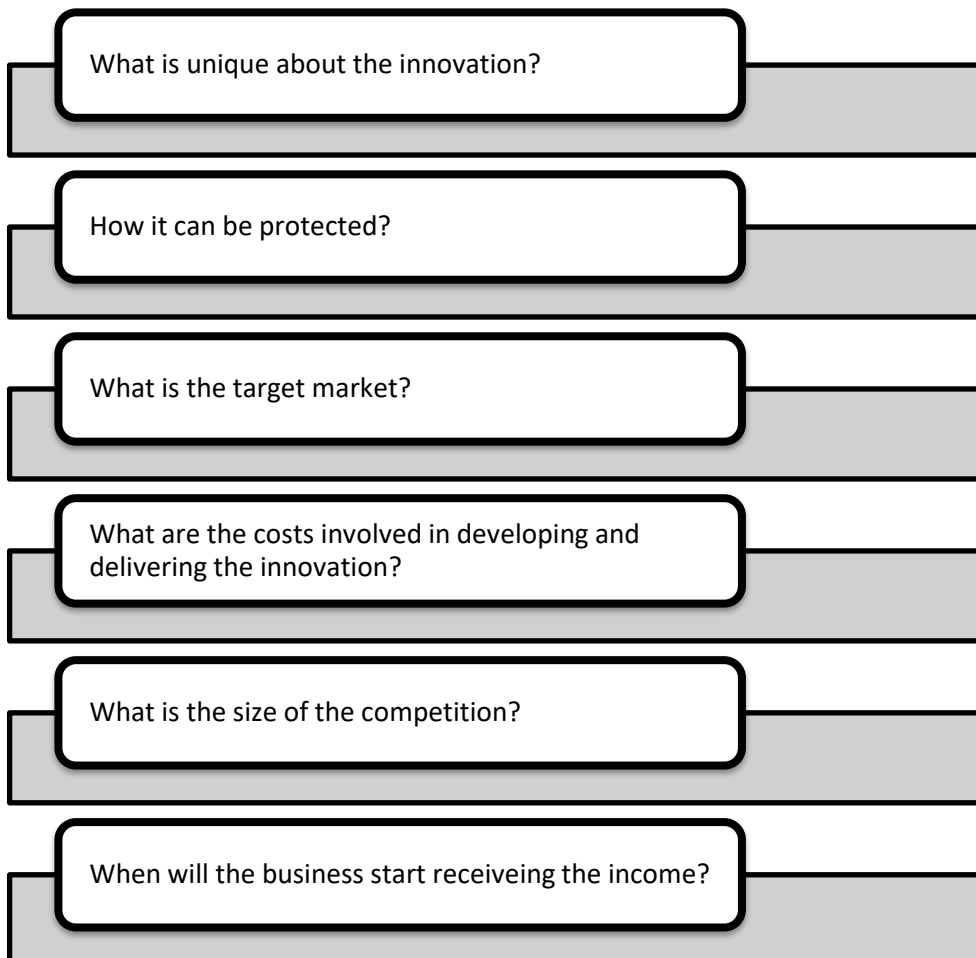
Figure 3.13 Fundamental Need for the Business Plan

The structure of the business plan will include many components. However there are specific yet important components that a business plan should consists of. The structure of the business plan is provided in the figure 3.14.

Figure 3.14 Components of Business Plan

Including brief description of the overall risks and risk mitigation plan will facilitate the investor or the organization to decide faster.

3.5 Challenges of Innovation in Waste Management

This will link innovation to the study context of waste management. Few waste management practices that are carried across the world is provided for the benefit of understanding. However, they are all contextual and specific to the countries that are implemented.

Scheme to Deposit Cans and Drinking Bottles
Deposit-refund scheme for cans and drinking bottles in EU and UK is a commendable scheme for waste management, as it incentivizes the consumer to return the bottle or can for which he/she is compensated, and it reduces pressure on landfills, increasing the life cycle of the product. The deposit refund scheme if applied to all products will greatly increase the rate of recycling, and it is easily replicable across different localities and regions, as the mechanism remains the same.

Zero-Waste Region
Kamikatsu in Japan is one of the role models when it comes to waste management, as they proclaim themselves to be a 'zero-waste' region by 2020. With recycling being the core of most of their operations, the residents segregate their waste into 34 categories. 80% of the waste is recycled in the region, while only 20% goes to landfills. There are no garbage trucks, so each resident has to wash, sort, and bring their trash to the recycling centre—which residents admit took some time getting used to. A worker oversees the sorting process at the centre, making sure trash goes into the right bins. Some used items are taken to businesses to be resold or repurposed into clothing, toys, and accessories.

Re-cycling the Waste

Sweden has set a benchmark when it comes to waste management and recycling. About 99% of the waste in Sweden is recycled and only 1% goes to landfills. In fact, their landfills are so empty that apparently, Sweden has to import waste from other countries. Of the 4.4 million tons of household waste produced by the nation every year, 2.2 million are converted into energy by a process called waste-to-energy (WTE). Before this process starts, home and business owners filter and separate the waste into hazardous wastes and recyclable material, which are then sent to different waste-management systems, like incinerators and recycling, and a small amount to landfills. The furnaces in WTE plants are loaded with garbage, and then burnt to generate steam which is further used to spin turbines in order to produce electricity. The waste that is recycled is essentially used as a resource, converted into district heating, electricity, biogas, and bio-fertilizer.

Decentralized Waste

The coastal town of Alappuzha, famous for its backwaters and intricate network of canals and lagoons, has found a spot in a ed Nations (UN) report of five global cities that have successfully tackled solid waste management. Alappuzha, which has a population of 0.174 million and produces 58 tonnes of solid waste a day, has been implementing a project called Nirmala Bhavanam Nirmala Nagaram (Clean Homes Clean City) since November 2012. The city has adopted decentralised waste management and is pushing for 100 per cent segregation in all the 23 wards of the city. Moreover, as many as 80 per cent households now have biogas plants and decentralised composting system.

Sustainable Waste Management

Specific innovations in USA, Germany, Australia, Brazil and Columbia are gearing towards sustainable waste management. USA has an eco-friendly robotic machine in the Baltimore River, which is powered by the sun and river currents, and it cleans debris and waste from the river and deposits it in a dumpster barrage built into the machine. Germany has a company which produces biodegradable leaf plates to curb plastic pollution. There are SmartBelly bins in Australia are 'smart bins' which segregate waste at the collection point and then compost and treat the waste as well, and connect individual bins to garbage collectors, streamlining the waste management process efficiently. Rosenbaum, a design studio in Brazil is encouraging people to use plastic waste to decorate and beautify their houses. Columbia has ECOBOT-vending machines, which give rewards such as movie tickets and vouchers and monetary compensation for every time someone deposits a plastic bottle or bottle caps. There is a need for diffusion of such technology to all places, given that these can be easily adaptable to localized scenarios.

Waste Management Innovation System in India

Waste management rules in India are based on the principles of "sustainable development", "precaution" and "polluter pays". These principles mandate municipalities and commercial establishments to act in an environmentally accountable and responsible manner—restoring balance, if their actions disrupt it. The increase in waste generation as a by-product of economic development has led to various subordinate legislations for regulating the manner of disposal and dealing with generated waste are made under the umbrella law of Environment Protection Act, 1986 (EPA**)**. Specific forms of waste are the subject matter of separate rules and require separate compliances, mostly in the nature of authorisations, maintenance of records and adequate disposal mechanisms.

With rapid urbanisation, the country is facing massive waste management challenge. Over 377 million urban people live in 7,935 towns and cities and generate 62 million tonnes of municipal solid waste per annum. Only 43 million tonnes (MT) of the waste is collected, 11.9 MT is treated and 31 MT is dumped in landfill sites. Solid Waste Management (SWM) is one among the basic essential services provided by municipal authorities in the country to keep urban centres clean. However, almost all municipal authorities deposit solid waste at a dumpyard within or outside the city haphazardly. Experts believe that India is following a flawed system of waste disposal and management.

The key to efficient waste management is to ensure proper segregation of waste at source and to ensure that the waste goes through different streams of recycling and resource recovery. Then reduced final residue is then deposited scientifically in sanitary landfills. Sanitary landfills are the ultimate means of disposal for unutilised municipal solid waste from waste processing facilities and other types of inorganic waste that cannot be reused or recycled. Major limitation of this method is the costly transportation of MSW to far away landfill sites.

A report by IIT Kanpur (2006) found the potential of recovering at least 15 per cent or 15,000 MT of waste generated every day in the country. This, the report said, could also provide employment opportunities to about 500,000 rag-pickers. The report added that despite immense potential in big cities in this area, participation from non-profits or community is limited.

In some urban centres, people working in the informal sector collect solid waste for each doorstep to get a collection fee and derive additional income from sale of recyclables. The informal recycling industry plays a major role in waste management. It also ensures that less waste reaches landfills. More than three-fourth of solid waste management budget is allotted to collection and transportation, leaving leaves very little for processing or resource recovery and disposal.

There has been technological advancement for processing, treatment and disposal of solid waste. Energy-from-waste is a crucial element of SWM because it reduces the volume of waste from disposal also helps in converting the waste into renewable energy and organic manure. Ideally, it falls in the flow chart after segregation, collection, recycling and before getting to the land fill. But many waste to energy plants in India are not operating to their full potential.

Installation of waste-to-compost and bio-methanation plants would reduce the load of landfill sites. The biodegradable component of India's solid waste is currently estimated at a little over 50 per cent. Bio-methanation is a solution for processing biodegradable waste which is also remains underexploited. It is believed that if we segregate biodegradable waste from the rest, it could reduce the challenges by half. E-waste components contain toxic materials and are non-biodegradable which present both occupational and environmental health threats including toxic smoke from recycling processes and leaching from e-waste in landfill into local water tables.

The concept of common waste treatment facility (ENVIS Newsletter, December 2010) is being widely promoted and accepted as it uses waste as a resource by either using it as a co-fuel or co-raw material in manufacturing processes. This has led to rise of Public Private Partnership (PPP) models in waste management which has open doors for doing business in waste management.

Bio-medical waste (management and handling) rules, 1998 prescribe that there should be a Common Biomedical Waste Treatment Facility (CBWTF) at every 150 kms in the country. CBWTFs

have been set up and are functioning in cities and towns. However, establishment of functional CBWTF throughout the country must be ensured. Integrated common hazardous waste management facilities combine secured landfill facility, solidification/stabilisation and incineration to treat hazardous wastes generated by various industrial s. They contribute about 97.8 per cent of total landfill waste and 88 per cent of total incinerable hazardous waste generated in the country, as per an environment ministry report.

The Way Forward for Indian Cities

Around 100 cities are set to be developed as smart cities. Civic bodies have to redraw long term vision in solid waste management and rework their strategies as per changing lifestyles. They should reinvent garbage management in cities so that we can process waste and not landfill it (with adequate provisioning in processing and recycling).To do this, households and institutions must segregate their waste at source so that it could be managed as a resource. The Centre aims to do away with landfill sites in 20 major cities. There is no spare land for dumping garbage; the existing ones are in a critical state. It is reported that almost 80 per cent of the waste at Delhi landfill sites could be recycled provided civic bodies start allowing ragpickers to segregate waste at source and recycle it. Compost pits should be constructed in every locality to process organic waste. Community participation has a direct bearing on efficient waste management. Recovery of e-waste is abysmally low, we need to encourage recycling of e-waste on a very large scale level so that problem of e-waste disposal is contained. Innovation in solid waste management can happen in every aspect of waste management process. Figure 3.15 explains the possible innovation in waste management.
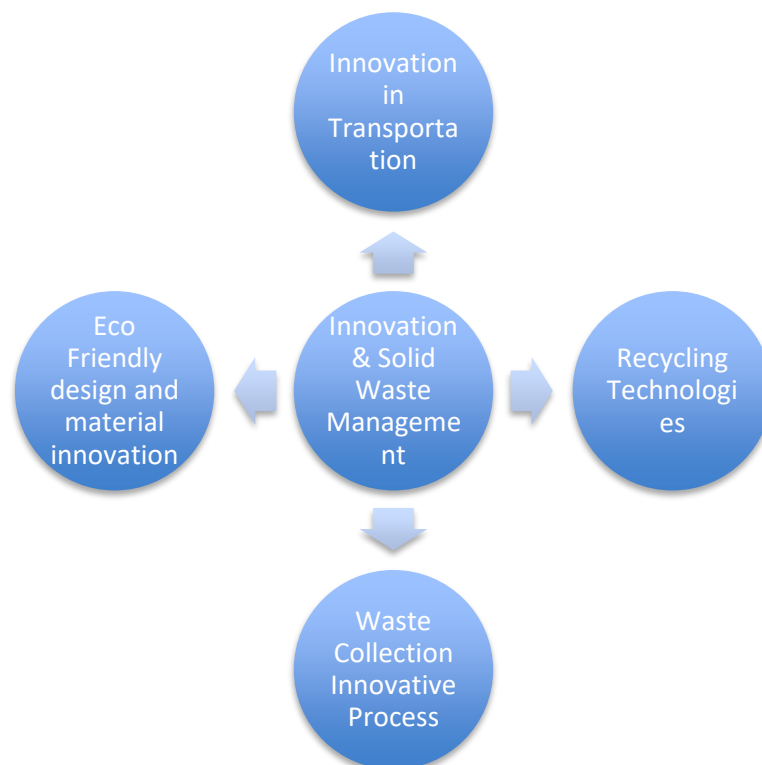

Figure 3.15 Innovation in Solid Waste Management

Solid waste management (SWM) may be defined as the discipline associated with the control of the generation, storage, collection, transfer, transport, processing and disposal of solid waste in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes. In its scope, solid waste management includes all the administrative, financial, legal and engineering functions involved in finding a solution to all the problems of solid waste. It is an essential service that is provided for the protection of the environment and public health, as well as to promote hygiene, recover materials, avoid waste, reduce waste quantities, emissions and residuals, and prevent the spread of diseases. Population growth and industrialization in most Asian countries has also caused serious problems of pollution. Implementation of SWM, many countries have now benefited from recycling and reusing waste, converting it to energy.

The high rate of urbanization and population growth in most African countries has made it difficult to develop and implement effective SWM systems. In the Zanzibar municipality, it is estimated that around 216 tons per day of waste is generated and only 25% of the Municipal waste in Zanzibar is collected and transported to the disposal site. The remaining 75% of the waste is left to be eaten by animals, burned, illegally dumped, or swept away by storm winds into the town where it accumulates in heaps.

The generated waste is growing at increasing rate and the municipal council is not able to provide service for solid waste collection due to the rapid increase in the population and urbanization. A large amount of the solid waste generated by the market areas during working hours produced different types of waste in Zanzibar municipality which is not being properly managed, and might have detrimental effects on the environment, health and ecosystem. Despite all of these problems, little is known about the challenges associated with SWM in the market area. Therefore this study was conducted to identify the challenges, problems and to recommend the appropriate methods that can be used to manage solid waste generated in the three main markets in Zanzibar municipality. Other objectives are to assess the types, quality, and quantity and identify the current method used to manage the solid waste generated.

Conclusion

This Chapter focused to explore innovation management in an organization. Unlike creativity, innovation should fit into specific requirements of business requirements. The innovative process should fulfill the investor (if any) by providing appropriate justification. It follow convergent process that facilitate the team to achieve specific goals and meet the requirement. Few examples and case studies are provided in 3.5 from the perspective of waste management. Government of India has initiated many innovation processes to facilitate and spread the innovation across industries.

Review Questions

- What is innovation management?
- Why innovation is important for any organization?
- Brief about the innovation project from Government of India?
- What are the innovation key process steps? Explain in detail.
- How does an organization / team can develop innovation as a skill?

- Visit a nearby market and map the innovation process in place. Observe and provide your innovative ideas. Discuss in class.

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Chapter 4 Tools and Techniques for Creativity and Innovation

Introduction

This Chapter will explain few tools and techniques that are available to facilitate the process of creativity and innovation in an organization. Organizational creativity is elaborated that captures the creativity / innovation of their employees. Innovation can be deployed in any product / service to provide continuous improvement. Other tools like brainstorming, Ishikawa diagram and mind maps are also discussed to facilitate the creativity and innovation thinking process. The objectives of this Chapter is listed as follows

Objectives

- To understand the organizational creativity and its limitations
- To explore the creativity / innovation in the context of continuous improvement
- To learn about brainstorming technique in the application of creativity and innovation
- To apply and execute Ishikawa diagram for any given problem
- To explore the mind map techniques that facilitates to identify the gap in any problem or need.

Following figure 4.1 provides the flow of this Chapter

4.1	• Divergent Tools
4.2	• Creativity and Continuous Improvement
4.3	• Brainstorming Technique
4.4	• Ishikawa Diagram - Soultion
4.5	• Mind Map - Finding Gap
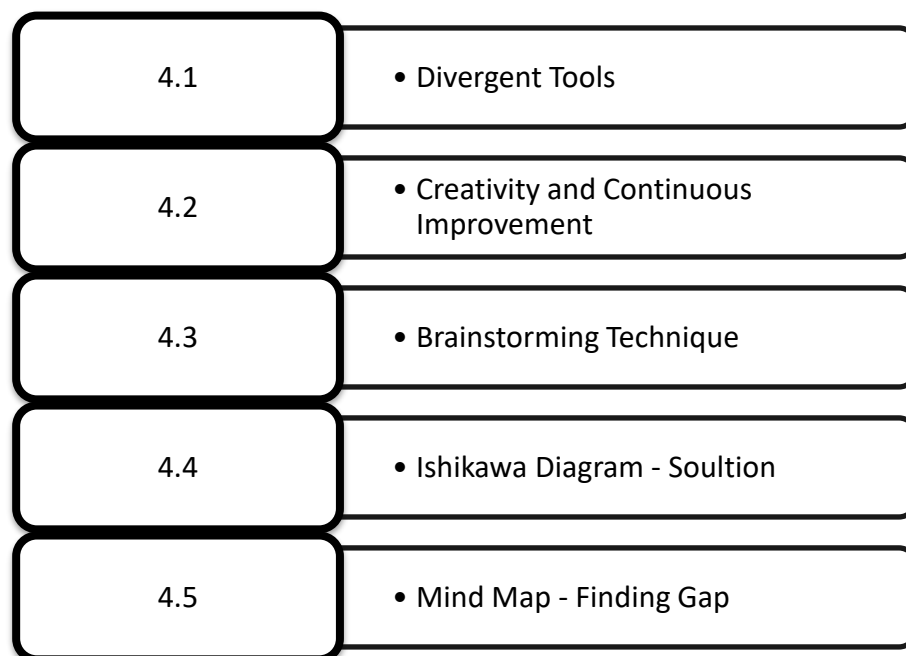
Figure 4.1 Chapter Flow – Tools and Techniques for Creativity and Innovation

4.1 Divergent Tools

All the creativity tools focused on generating ideas. The divergent process tries to explore ideas during a short time span. This also establishes the boundaries with respect to the problem. The fundamental rule for the divergent process is not to criticize any idea. It just focuses on generating ideas and not judging them since negativity is probably the best way to kill any ideation. Creators should let their brains run free to generate as many possibilities as they can; filtering and merging will come later, during the convergence process (figure 4.2).
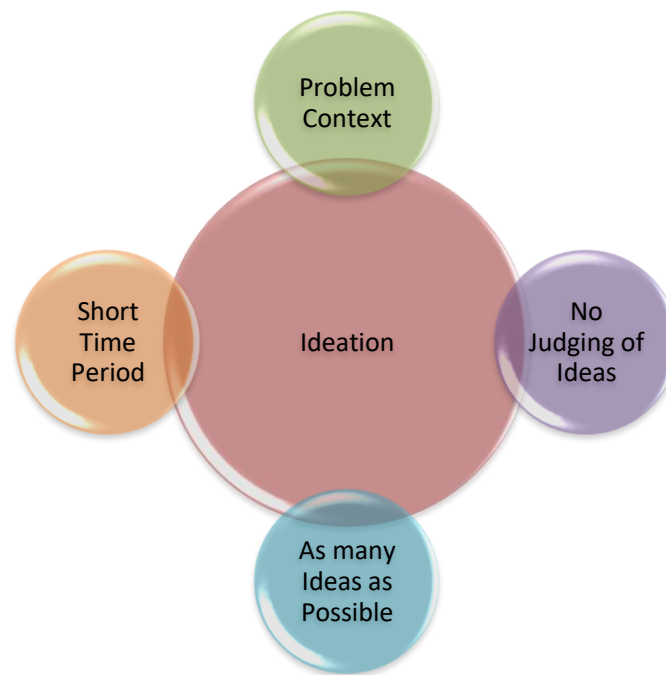
Figure 4.2 Ideation Process Characteristics

Referring Other Industries

This kind of thinking produces 80% of ideas during the ideation session. Basically, this means referring concepts from other similar industries. The concepts and methods can be directly used or modified to suit the current industry. For example, six sigma processes were primarily used in manufacturing industries to reduce the rejection and adhere to the standards. Later six sigmas has

been deployed in information technology (IT) industry and hospital industries to control the process variation. This is also called as 'analog thinking pattern' (figure 4.3).
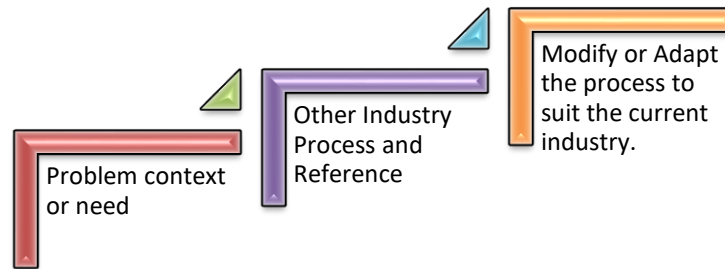
Figure 4.3 Other Industry Reference for Divergent Thinking

It is a great way to generate new business ideas is to check and review other business models and industries, even those not closely related to our own company. Try to analyze their business model, and figure out how we can apply it to own industry. During this process, new business possibilities will naturally arise.

Trend & Technology Benchmarking
Another alternative method for divergent thinking uses technology as 'benchmarking'. Benchmarking helps to fix the 'to be' status. Difference between the current status and to-be status will help to map the gap and establish action plan (figure 4.4).

Sometimes it is useful to select several trend technologies, and try to figure out how to implement them in our company. For instance, if we choose data analytics, internet of things and Chapterchain etc., through a reference process that could come up with new business ideas for the company based on current applications for these technologies. New ideas will emerge from interlinking between the experience, performance and new possibilities coming from new technologies.
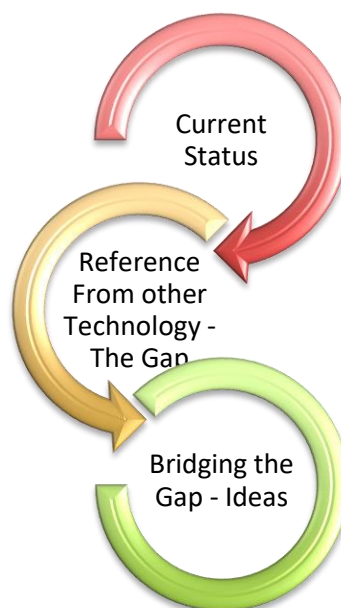
Figure 4.4 Technology Reference for Divergent Process

The "three ifs"

'Three ifs' tools are effective way to think laterally. It provides different dimensions that alter the perspective of thinking. It is another useful methodology set to run an ideation session. This way of thinking involves looking at the situation in a different way -- essentially stepping sideways from the current business strategy. It challenges the key assumptions and make to think differently. It preciously explores the different avenues if the situation(s) is/are different (figure 4.5).
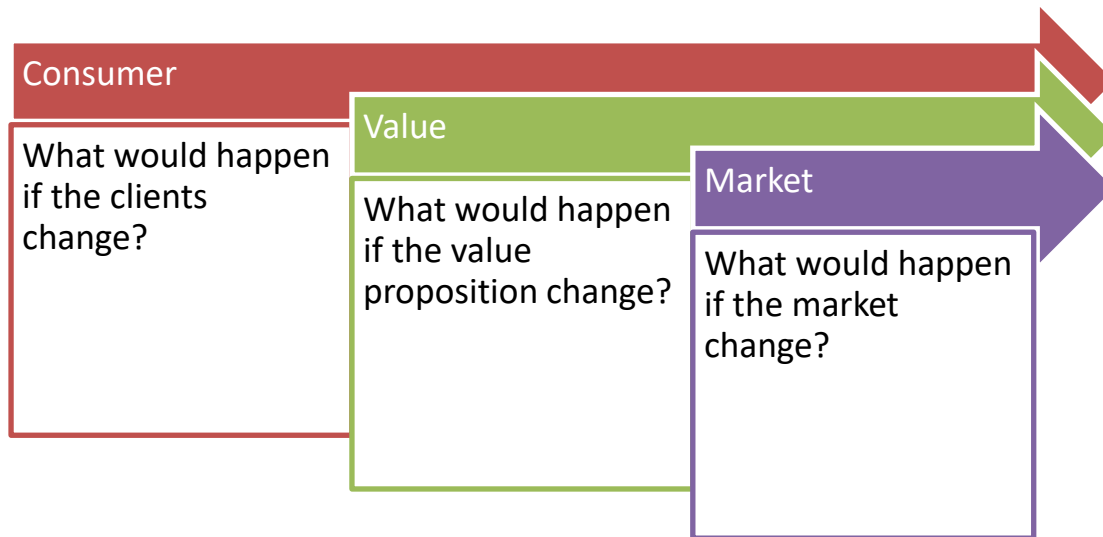
Figure 4.5 Three ifs for Ideation Process

While trying to answer these "if" questions, the creator discover new avenues to generate ideas. The possibilities for analogy and lateral thinking are huge, and that is fine, since these tools are designed to fire the spark for a fruitful ideation process, where the organization can widen the business scope.

4.2 Convergent Tools

The innovation process follows convergent of ideas by organizing and evaluating it preferably in a structured yet conscious decision-making process. Unlike the divergent tools, convergent tools are meant to analyse, filter, merge and choose the right ideas. It also helps the organization to systematically arrange and select appropriate decision based on the business needs. Though it is an outcome of divergent process, the convergent thinking required analytical and problem-solving approach. This will explore the possible tools and techniques that support convergent process. The convergent process generally starts from narrowing down to fewer concepts from the ideas that are generated from ideation (divergent process).
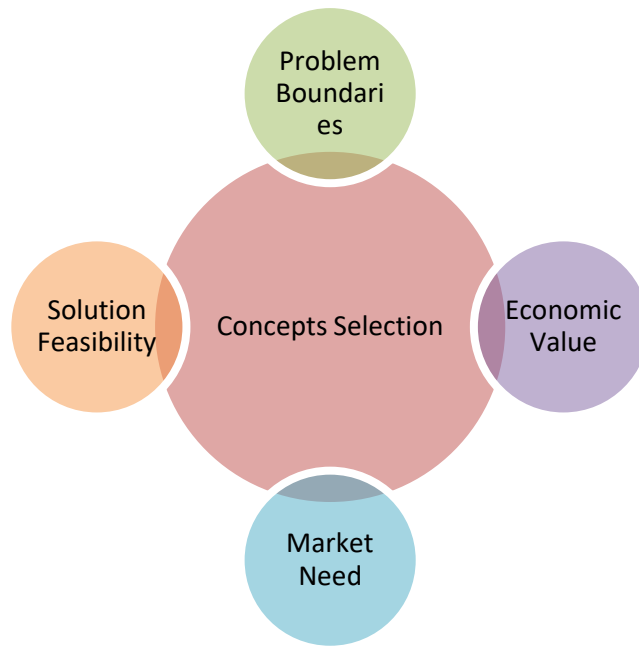
Figure 4.6 Convergent Process – Ideas to Concepts

There are many tools and techniques available.

Pugh Matrix

Pugh matrix method helps to evaluate potential solutions in comparison to each other. It is also employed in the market to capture the voice of the customer. It is a scoring matrix used for concept selection in which options are assigned scores relative to criteria. The selection is made based on the consolidated scores. Before starting a detailed design, there are many options – this tool helps with selecting the best option. It is also known as criteria-based matrix (figure 4.7).
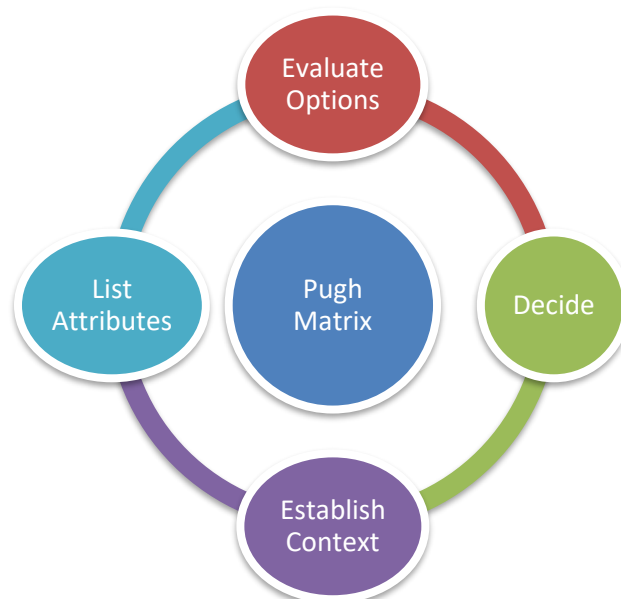
Figure 4.7 Pugh Matrix

The Pugh matrix is a tool used to facilitate a disciplined, team-based process for concept generation and selection. Several concepts are evaluated according to their strengths and weaknesses against a reference concept called the datum (base concept). The datum is the best current concept at every iteration of the matrix. It follows a process steps to arrive at desirable outcomes (Figure 4.8).

Step 1

Set the Context for the problem /need

Step 2

Tabulate the Ideas

Step 3

Establish Attributes for Evaluation

Step 4

Add Weitage to the Attributes if required

Step 5

Evaluate the options and Choose
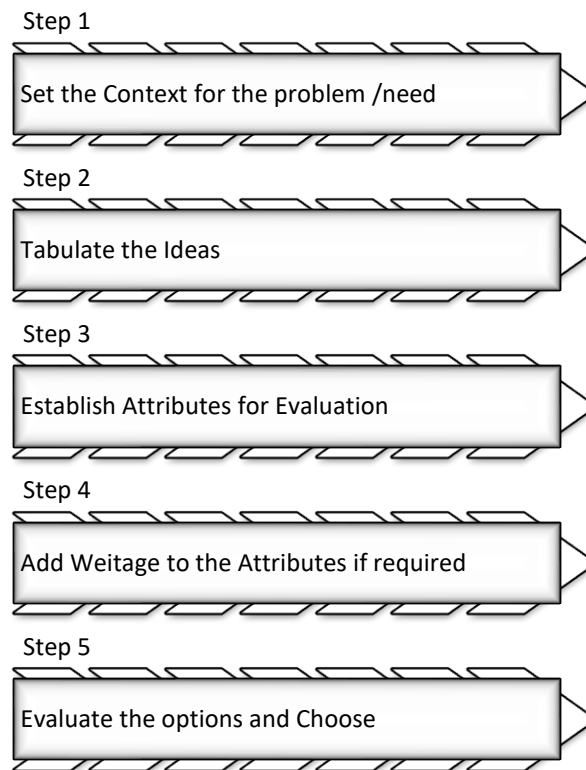
Figure 4.8 Process Steps for Pugh Matrix

Similar to Pugh Matrix there is another tool called 'mind maps' that helps to set the context of the innovation. It is discussed in detail in 4.5. Once the context is clear with boundaries it is easy to choose the options that fulfill the need. 'Thinking hat' and 'Morphologic Analysis' is yet another powerful tool that converge the solution options. It considers different perspective through the concept of 'hats' (figure 4.9).

PROCESS
Blue Hat - Process
Thinking about thinking.
What thinking is needed?
Organizing the thinking.
Planning for action.

CREATIVITY
Green Hat - Creativity
Ideas, alternatives, possibilities.
Solutions to black hat problems.

FACTS
White Hat - Facts
Information and data.
Neutral and objective.
What do I know?
What do I need to find out?
How will I get the information I need?

BENEFITS
Yellow Hat - Benefits
Positives, plus points.
Why an idea is useful.
Logical reasons are given.

FEELINGS
Red Hat - Feelings
Intuition, hunches, gut instinct.
My feelings right now.
Feelings can change.
No reasons are given.

CAUTIONS
Black Hat - Cautions
Difficulties, weaknesses, dangers.
Spotting the risks.
Logical reasons are given.

Figure 4.9 Thinking Hat Techniques

It can define several hats, each one representing a different mindset (for instance the customer, the advocate, the devil´s advocate, and the board of directors). After pitching the idea, some people should wear different hats, analyzing the pitch from a different perspective. It might be useful to have the same person wear several hats, forcing him or her to look at the same idea from different angles. The feedback this technique generates is really valuable and helps the team to bring new perspectives into the discussion, dismissing those ideas that do not make it through the test, and improving those passing it.

Morphological analysis is a method developed by Fritz Zwicky (1967) for exploring all the possible solutions to a multi-dimensional, non-quantified complex problem (Figure 4.10). The morphological analysis is actually a group of methods that share the same structure. This method breaks down a system, product or process into its essential sub- concepts, each concept representing a dimension in a multi- dimensional medium. Thus, every product is considered as a bundle of attributes. New ideas are found by searching the medium for new combination of attributes that do not yet exist. It doesn't provide any specific guidelines for combining the parameters. It tends to provide a large number of ideas.

Critical Function 1	Critical Function 2	Critical Function 3	Critical Function 3
Solution 11	Solution 12	Solution 13	Solution 14
Solution 21	Solution 22	Solution 23	Solution 24
Solution 31	Solution 32	Solution 33	Solution 34

Figure 4.10 Morphological Analysis

4.3 Brain Storming

The earlier s of this Chapter specifically explored the convergent and divergent tools. However, there are few powerful yet simple techniques like brainstorming, Ishikawa Diagram and mind maps provides in depth analysis of the problem by generating ideas to the context. By using a range of creative thinking techniques, organization will be able to generate innovative and creative ideas to address identified needs.   Brainstorming is a session that can initially diverge and quickly converge. It is called as 'organized ideation' established by Alex F. Osborn, in 1938.Brainstorming is a process for developing creative solutions to problems. Brainstorming works by focusing on a problem, and then deliberately coming up with as many solutions as possible and by pushing the ideas as far as possible. There are few rules that are followed in a brainstorming session (Figure 4.11).
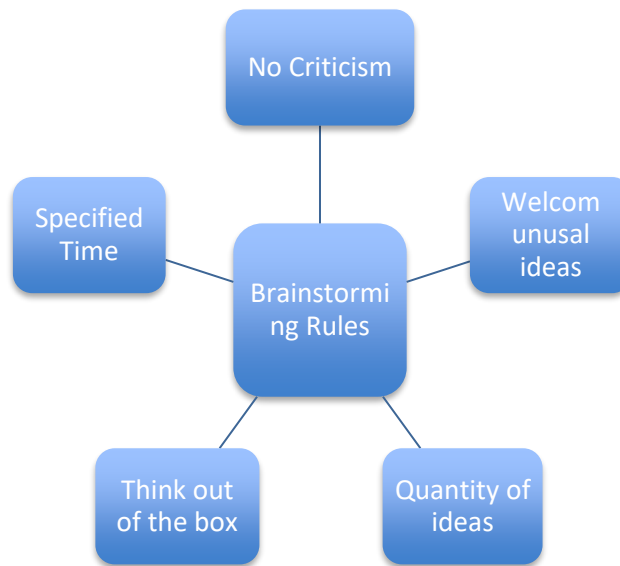
Figure 4.11 Brainstorming Rules

Criticism of ideas is withheld during the brainstorming session as the purpose is on generating varied and unusual ideas and extending or adding to these ideas. Criticism is reserved for the evaluation stage of the process. This allows the members to feel comfortable with the idea of generating unusual ideas. Unusual ideas are welcomed, as it is normally easier to "tame down" than to "tame up" as new ways of thinking and looking at the world may provide better solutions. The greater the number of ideas generated, the greater the chance of producing a radical and effective solution.

Not only are a variety of ideals wanted, but also ways to combine ideas in order to make them better. Any brainstorming session should have 10 to 20 participants and maximum time limit of one hour thirty minutes. Beyond which the members will lose the focus. The characteristics of the brainstorming session are mapped in figure 4.12.
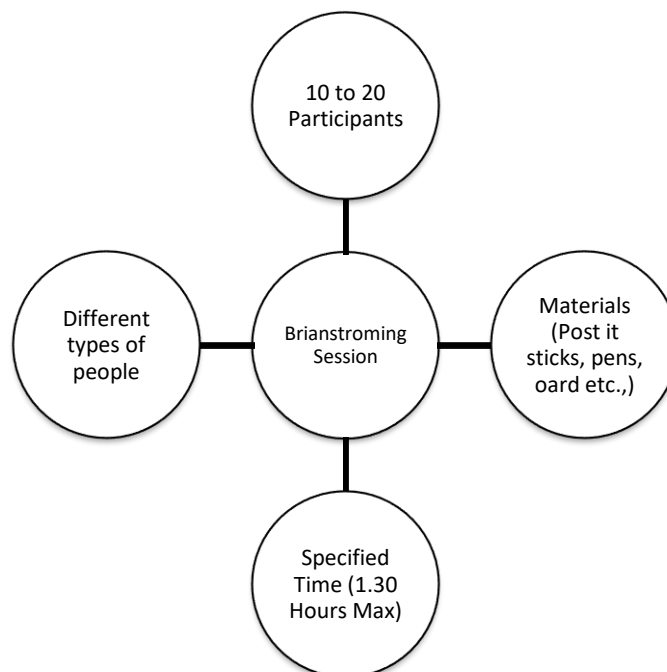
Figure 4.12 Characteristics of Brainstorming Session

However, it follows a specific set of processes. The process starts from defining and explaining the problem/need to the participants and ends with fewer concepts (Figure 4.13).

Step 1
Define the Problem statement

Step 2
Choose participants with broad range of experience

Step 3
Set the context and rules to the participants

Step 4
Encourage as many as ideas as possible

Step 5
Group the ideas based on the characteristics
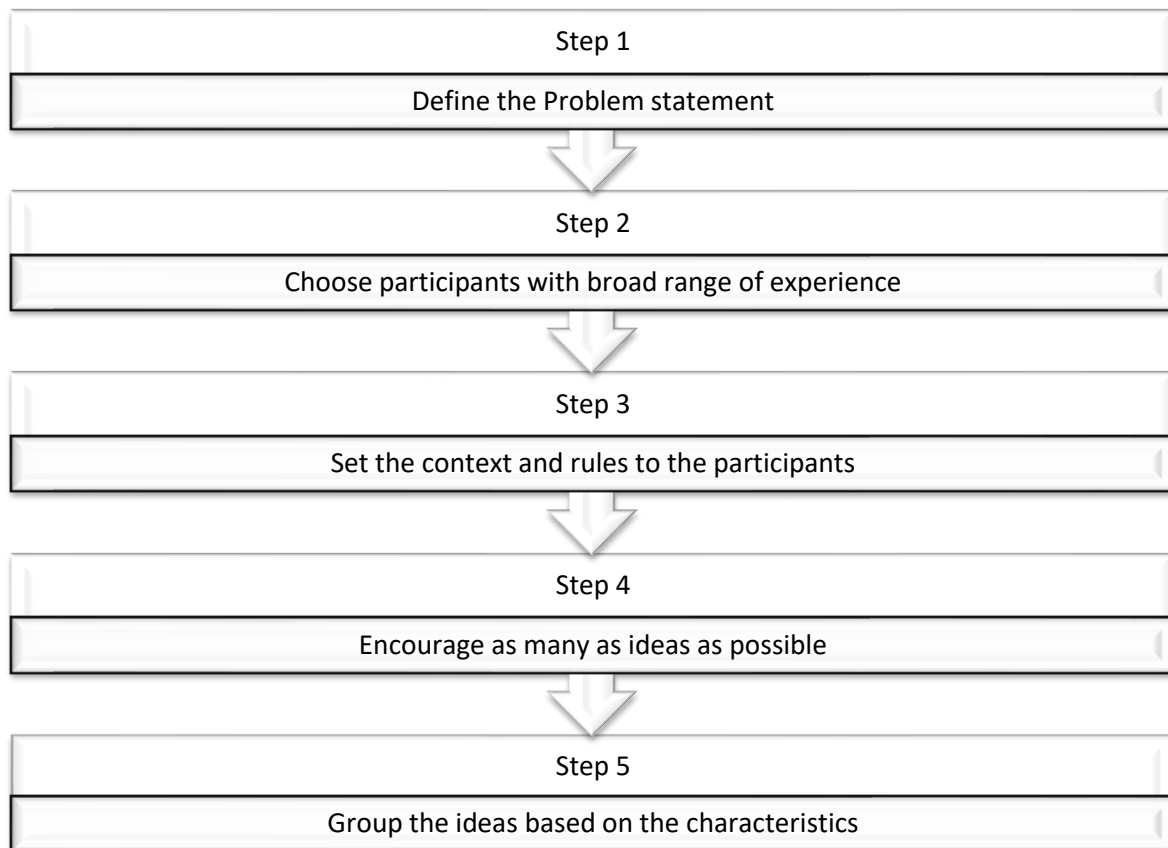
Figure 4.13 Brainstorming Process Steps

If participants are having trouble coming up with ideas, ask these questions to encourage them to look at things from different perspectives.

- What would different people (e.g. client/end user) think about this?
- What if did the opposite of what think of?
- If this were an animal/bird/flower/food/colour, what would it be?
- How would a negative person see this?
- How would a positive person see this?

Ishikawa diagram and mind mapping techniques are explored in the following paragraphs.

4.4 Ishikawa Diagram

Ishikawa Diagrams, also known as 'fishbone diagram' was developed by Dr. Kaoru Ishikawa. It helps to understand the root cause of the problem. The diagram looks like a fish bone with deep reasons for the problem. It has central spine and several branches representing the different attributes to the problem.   This diagram is used in process improvement methods to identify all of the contributing root causes likely to be causing a problem. The Fishbone chart is an initial step in the

screening process. After identifying potential root cause(s), further testing will be necessary to confirm the true root cause(s). This methodology can be used on any type of problem, and can be tailored by the user to fit the circumstances. Figure 4.14 represents the benefits of Ishikawa Diagram.
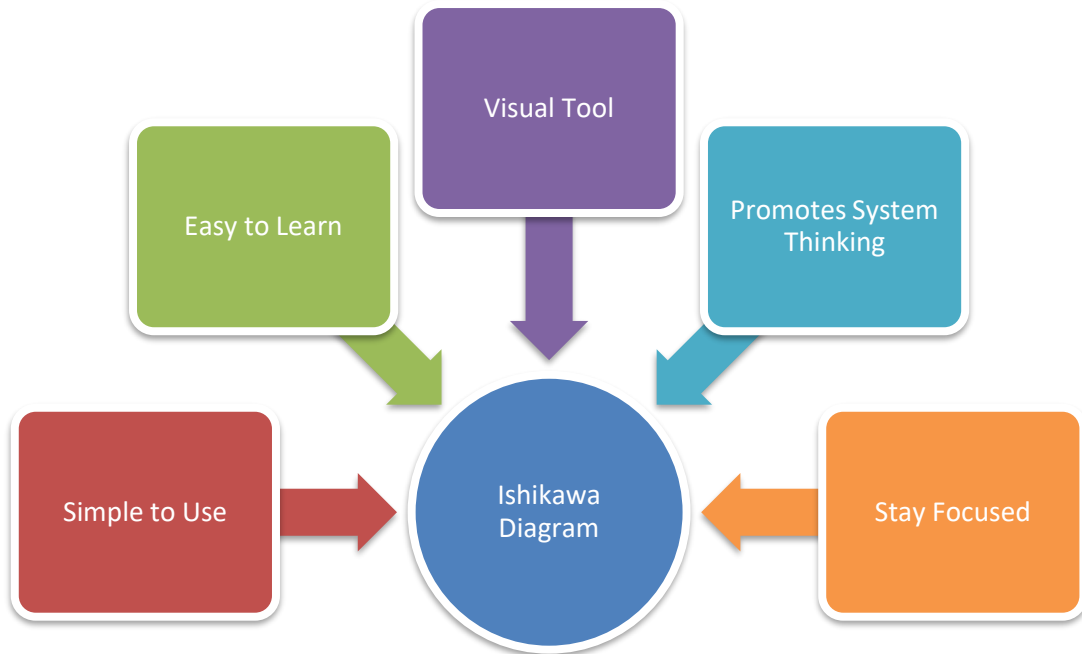
Figure 4.14 Benefits of Ishikawa Diagram

The root cause analysis considered as contemporary problem solving techniques as it reduces the chance of problem reoccurring. It can address the key attributes of the problem in terms of seeking answers to 'why' and other abilities (Figure 4.15). As illustrated below, a completed Fishbone diagram includes a central "spine" and several branches reminiscent of a fish skeleton (Figure 4.16).
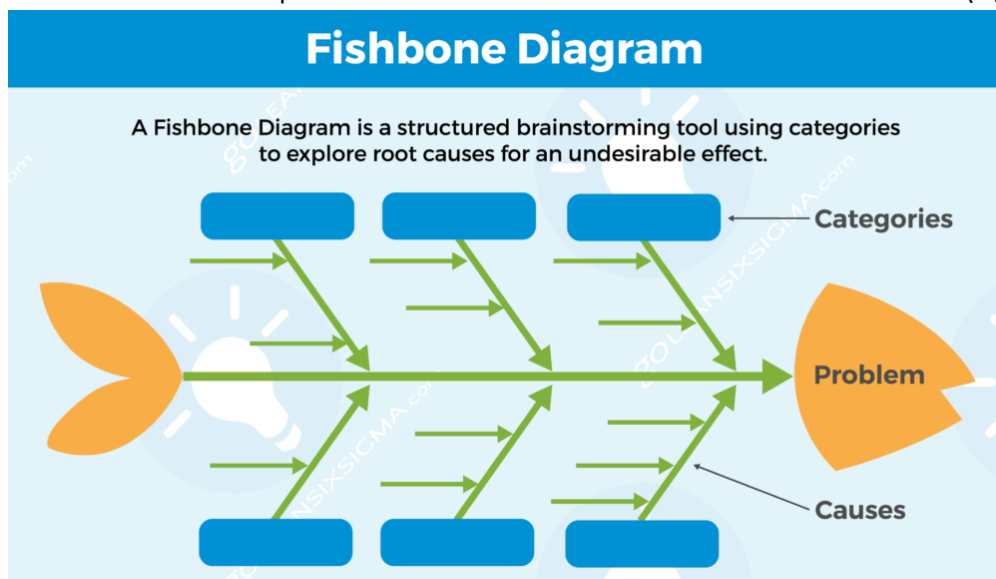
Figure 4.15 Fish Bone Diagram Representation
(Source https//goleansixsigma.com/cause-and-effect-diagram/)
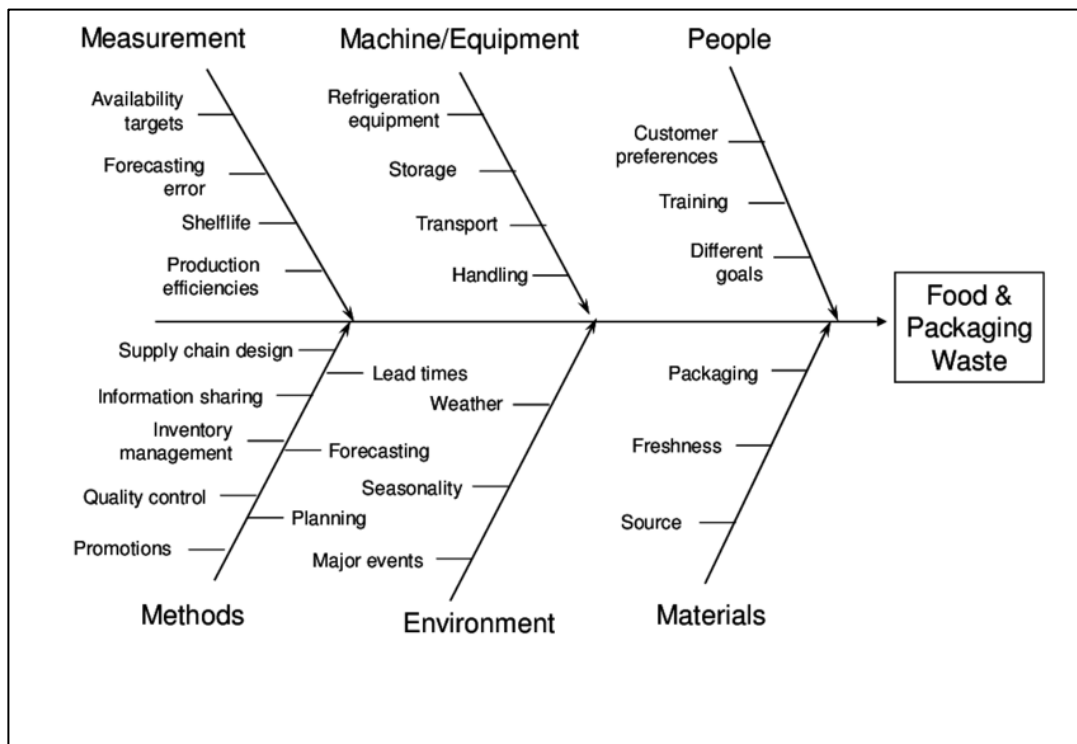
Figure 4.15 Ishikawa Diagram for Food and Packaging Waste
Reference https//www.researchgate.net/figure/Cause-and-Effect-Fishbone-Food-
Waste_fig2_285832431

Ishikawa diagram is most effective when it is performed as a group of experts. The participants can be experts on different attributes of the problem. The cross-functional mode helps to arrive at feasible solution. The process steps of Ishikawa Diagrams are mentioned below 4.16

Step 1	•Problem Statement
Step 2	•Draw the fishbone that represents roots and possible solutions to the problem
Step 3	•Categorize the causes and name it appropriately
Step 4	•Collect ideas for causes
Step 5	•Share ideas for possible solution
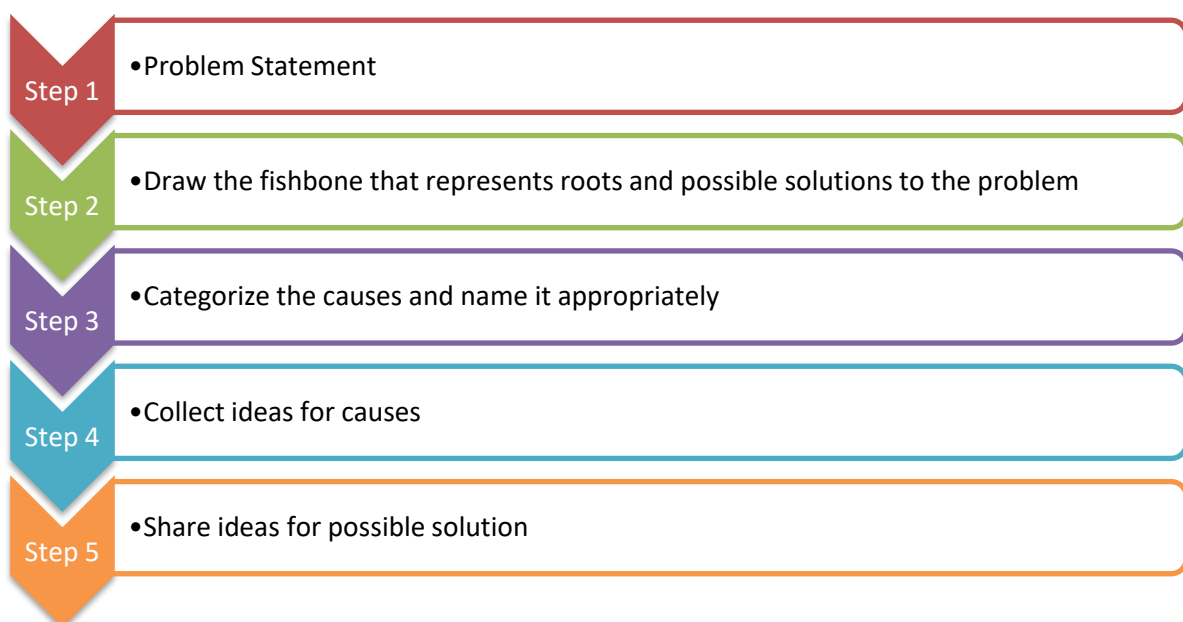
Figure 4.16 Process Steps for Ishikawa Diagram

A closely related approach to this tool is to seek answers for '5-why'?This analytical approach to the appropriate answer. The "5-Why" approach, which states "Discovery of the true root cause requires answering the question 'Why?' at least 5 times" (Figure 4.17).
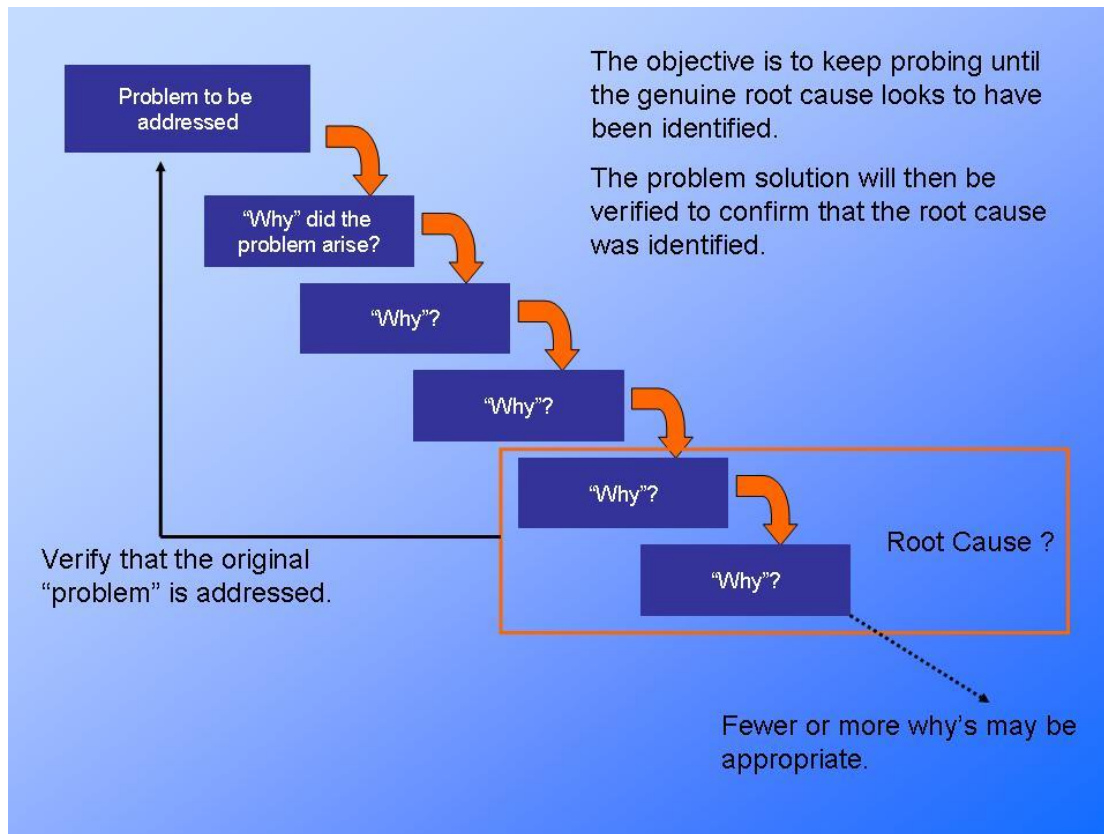
Figure 4.17 5 Why Analysis

(Source http//www.presentationeze.com/blog/5-whys-analysis-training-presentation/)

The benefit of the fishbone diagram is the depth of focus and understanding of the problem and root cause. The quality of outcome is completely depending on the problem statement, knowledge and involvement of the participants. The tool yields better results if it is performed as a group. The following will explore another technique called mind map.

4.5 Mind Map Technique

Mind mapping is a technique that is particularly effective when looking for new solutions to a problem or new idea. Mind mapping is the process of capturing ideas on a page and linking them. It is the opposite of linking ideas in sequential order, and it often creates new links between ideas as well as generating new ones. It is a visual method of capturing ideas (Figure 4.18).

Who • The primary customers /Key Stakeholders

What • Service / Products

How • The business offers the product/service

Why • Why is the business profitable

Where • Market - e-commerse
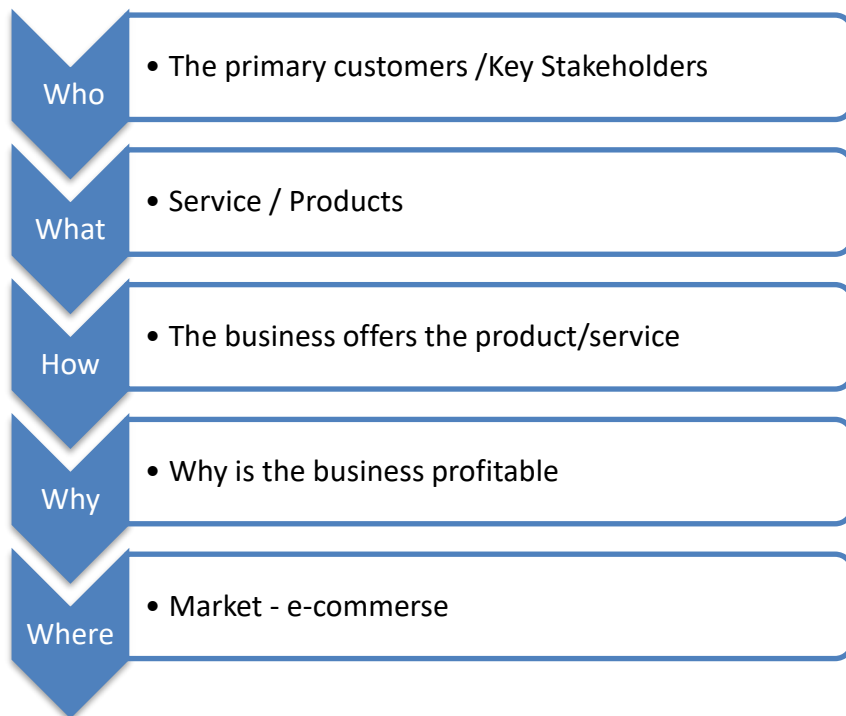
Figure 4.18 Mind Maps – Fundamental Questions

Mind map is a technique, which organize the thinking process through visual representation. It helps to bring out the clarity of understanding and establish the links. Mind maps are usually a great way to organize ideas. We can use them to explore associations and divergences between ideas, clustering all those concepts coming from ideation. Mind maps will help to identify underlying trends, cleaning redundancies and narrowing our scope to fewer concepts to work with (figure 4.19).
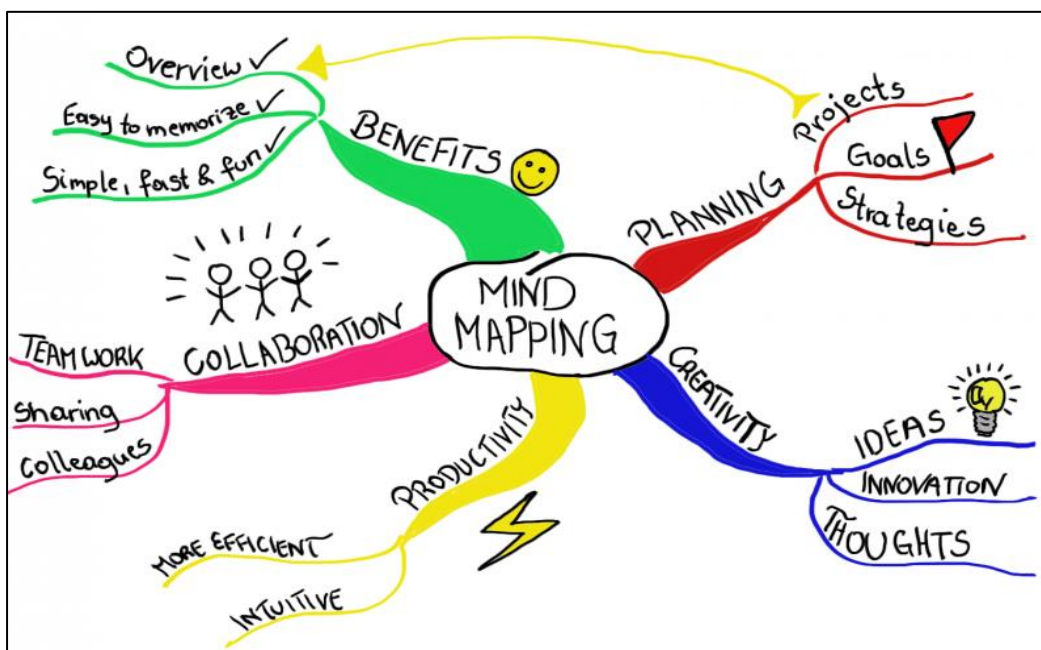
Figure 4.19 Sample Mind Map

Mind map helps to organize the thought, ideas and solutions through a visual exploration. It has many key benefits. Figure 4.20 explains the key benefits of mind map

To explore unlimited attributes / soultions

Relationship among attributes

Easy to communicate

Identify the missing link if any

Visual organizer
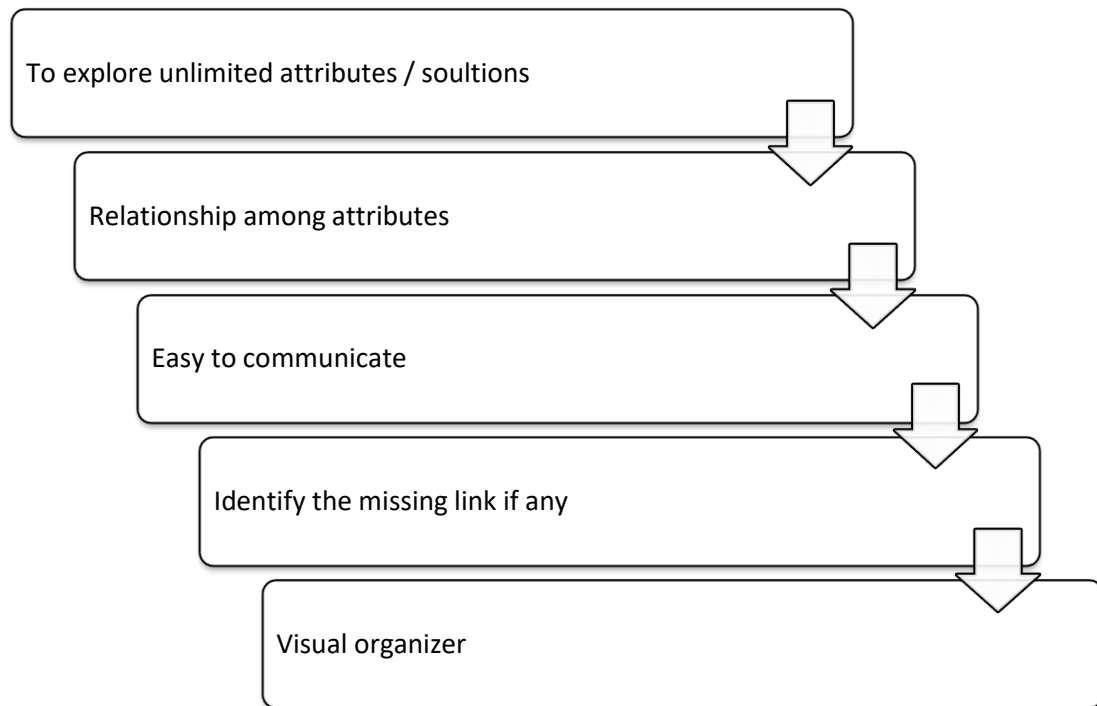
Figure 4.20 Benefit of Mind Map Techniques

The process of mind maps begins with problem/need or solution. This is considered as the centre point. The rest of the map revolves around, so choosing that idea or topic is the first step. Begin by creating an image or writing a word that represents that first main idea. This can be done either in-group or individually.

From that main idea, create branches (as many as needed), that each represent a single word that relates to the main topic. It's helpful to use different colors and images to differentiate the branches and sub-topics.

Then, create sub-branches that stem from the main branches to further expand on ideas and concepts. These sub-branches will also contain words that elaborate on the topic of the branch it stems from. This helps develop and elaborate on the overall theme of the mind map. Including images and sketches can also be helpful in brainstorming and creating the sub-branch topics (Figure 4.21).
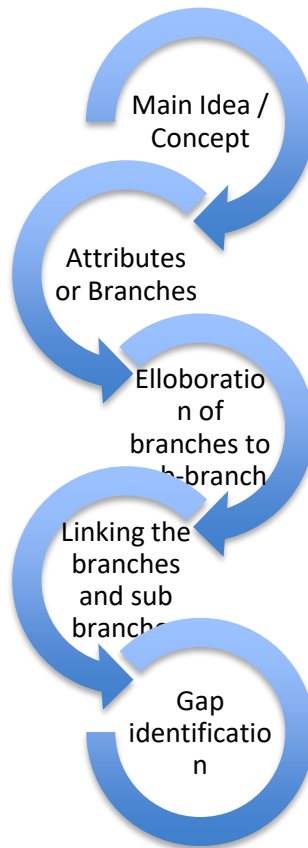
Figure 4.21 Process Steps for Mind Map

These techniques unwind the creative thinking process with respect to a specific context. The tools and techniques are beneficial especially if the knowledge towards the problem / solution is not much known or explored. The tools and techniques will bring out essential element in a systematic way.

Conclusion

This Chapter explores the tools and techniques associated with creativity and innovation process. The tools are segregated based on its application either to converge or diverge. Tools in terms of ideation, benchmarking products and techniques, support the divergence process. Divergent processes are explored in terms of Pugh evaluation matrix and morphological analysis. The convergent and divergent process can be explored together through brainstorming techniques, mind map and Ishikawa diagram. The next Chapter will focus on creativity and innovation with respect to waste management business.

Review Questions

- Explain the convergent and divergent tools that are deployed to unfold the creativity and innovation.
- Perform brainstorming technique for a problem or a need at class room and institute level.
- What are the key benefits of Ishikawa diagram?

- How does mind map is performed for any problem? Explain the process steps.
- Apply Ishikawa technique for solid waste management problem in your city or district.

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Chapter 5 Creativity and Innovation Challenges in Business

Introduction

This brings out the key challenges of creativity and innovation with respect to business environment. It includes business decision-making process, nurturing creativity and innovation and team dynamics. Creativity and innovation has key implications on the business process/products and service outcomes. Hence it is essential to address these challenges at the earliest. Fear of failure is another key concern of innovation. Many potential innovations were killed just because of 'fear of failure'. Calculated risks and risk mitigation will help to increase the success rates. This Chapter objective are listed as follows

Objectives

- To understand the importance of business decision-making process
- To explore the underlined relationship between innovation success and decision-making process
- To estimate the team dynamics and associated challenges with respect to creativity and innovation
- To implement the creativity and innovation at individual, team and organizational level
- To elaborate the impact of sustaining creativity and innovation in overall organizational development

5.1	•Business Decision-Making
5.2	•Nurturing and Sustaining Creativity and Innovation
5.3	•Implementing the Innovation
5.4	•Team Dynamics for Innovation
5.5	•Open Innovation and Case Study

5.1 Business Decision-Making

The major outcome of creativity and innovation (i.e.) divergent and convergent process is to decide on go /no-go for the benefit of the organization. It is also important for the innovator to understand the decision making process in business setup. They generally examine the alternatives and decide the best route to take. The informed decision is made possible by systematic step-by-step approach. The decision will have impact on short and long term goals of the organization.

The business decision-making process is commonly divided into seven steps. Managers may utilize many of these steps without realizing it, but gaining a clearer understanding of best practices can improve the effectiveness of the decisions. 7 Steps of the Decision Making Process is briefed in figure 5.2.

Figure 5.2 Decision-Making Process Steps

Brief description of the decision-making process steps are briefed
- The first step in making the right decision is recognizing the problem or opportunity and deciding to address it. Determine why this decision will make a difference to customers or fellow employees.
- Next, it's time to gather information so that one can make a decision based on facts and data. This requires making a value judgment, determining what information is relevant to the decision at hand, along with how one can get it.

- Once the team members have a clear understanding of the issue, it's time to identify the various solutions. The range of options help to determine which course of action is the best way to achieve the objectives.
- By evaluating the feasibility, acceptability and desirability the team can decide on which alternative is best. According to management experts Phil Higson and Anthony Sturgess, the innovation team members need to be able to weigh pros and cons to select the option that has the highest chances of success. It may be helpful to seek out a trusted second opinion to gain a new perspective on the issue at hand.
- When it's time to make the decision, be sure to understand the risks involved with the chosen route. By choosing combination of alternatives now that fully grasps all relevant information and potential risks.
- Next step is to create a plan for implementation. This involves identifying what resources are required and gaining support from employees and stakeholders.
- An often-overlooked but important step in the decision making process is evaluating the decision for effectiveness. If the team finds decision didn't work out the way planned, may want to revisit some of the previous steps to identify a better choice.

However, there are few challenges of decision-making is identified and researched out well especially for the business environment. Figure 5.3 explains the challenges faced during decision-making process.

Figure 5.3 Challenges in Innovation Decision Making

Although following the steps outlined above will help to make more effective decisions, there are some pitfalls to look out for.

- Gathering relevant information is key when approaching the decision-making process, but it's important to identify how much background information is truly required.
- In addition, relying on one single source of information can lead to bias and misinformation, which can have disastrous effects down the line.
- In many cases, the issues surrounding r decision will be obvious. However, there will be times when the decision is complex and aren't sure where the main issue lies.
- Even by following the steps of the decision making process, there is still a chance that the outcome won't be exactly what had in mind. That's why it's so important to identify a valid option that is plausible and achievable. Being overconfident in an unlikely outcome can lead to adverse results.
- Decision-making is a vital skill in the business workplace, particularly for managers and those in leadership positions. Following a logical procedure like the one outlined here, along with being aware of common challenges, can help ensure both thoughtful decision-making and positive results.

In creativity and innovation set up it is essential to decide appropriate solution based on which the organization can gain market-share, competitive advantage and customer satisfaction. The upcoming s will discuss the decision with respect to team and motivating the team spirit.

5.2 Nurturing and Sustaining Creativity and Innovation

Yet another key challenge of creativity and innovation in an organization is nurture the thinking process continuously. Since lack of creativity and innovation at any point of time will damage the outcomes of the organization. Meaning of creativity makes the nature of creativity clear, but many scholars have attempted to clarify its nature. Creativity is the intellectual ability to make creation, invention and discoveries that bring novel relations, entities and unexpected solutions into existence. Creativity is the gifted ability of human beings in thinking, inference, and problem solving and product development. Figure 5.4 explains the nature of creativity at an organizational level to solve any problem.
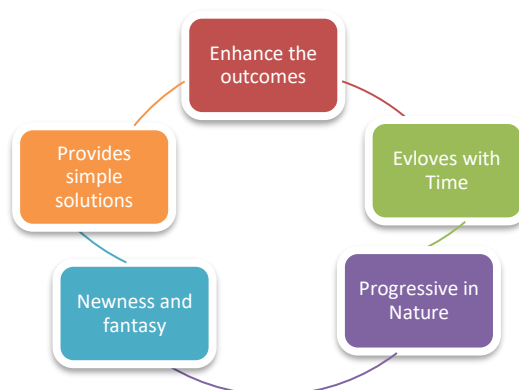
Figure 5.4 Nature of Creativity in an Organization

In an organization, nurturing and sustaining creativity should happen at three levels namely, individual, team and organizational level (Figure 5.5). The effort to nurture these levels is different in nature and it is essential to manage creativity and innovation at each level. The nature of creativity is always growing towards development; however the level of development at individual, team and organizational levels exponentially increases. This is applicable to all attributes of creativity and innovation (Figure 5.6).
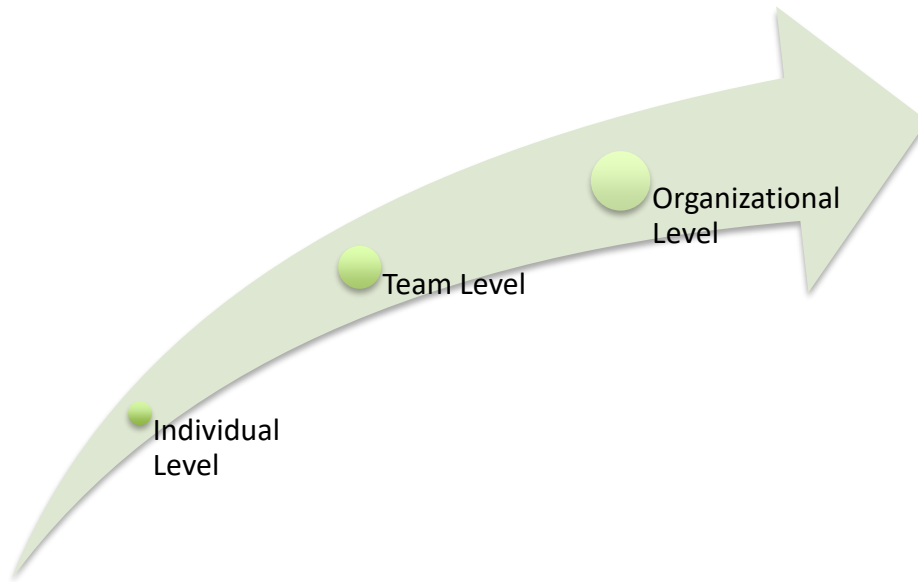
Figure 5.5 Levels of Creativity and Innovation in an Organization
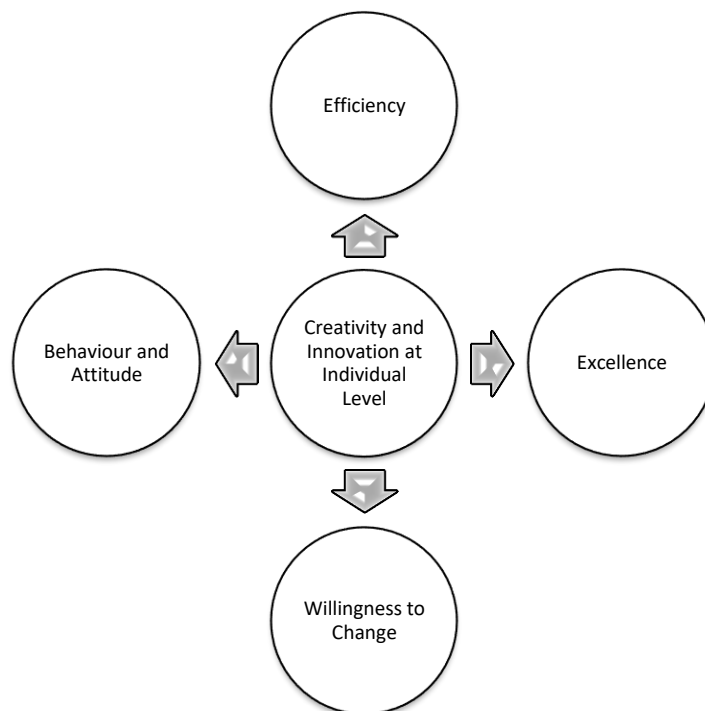
Figure 5.6 Creativity and Innovation at Individual Level

Individual level of efficiency and effectiveness results in appropriate solutions within the specified time targets. It is also greatly associated with their behavior and attitude. However willingness to change determines their ability to cope up with time and newer challenges.   Similarly, the team and organizational attributes are nurtured and sustained in terms of synergy and strategic outcomes (Figure 5.7 and 5.8).
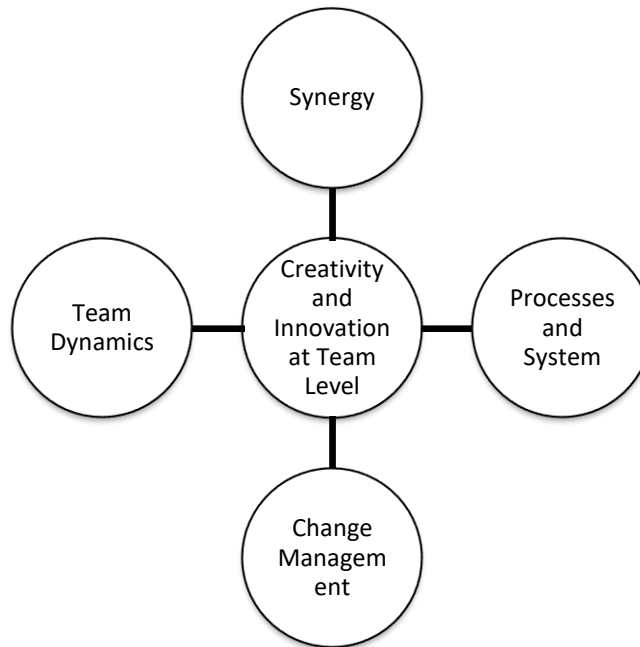
Figure 5.7 Creativity and Innovation at Team Level
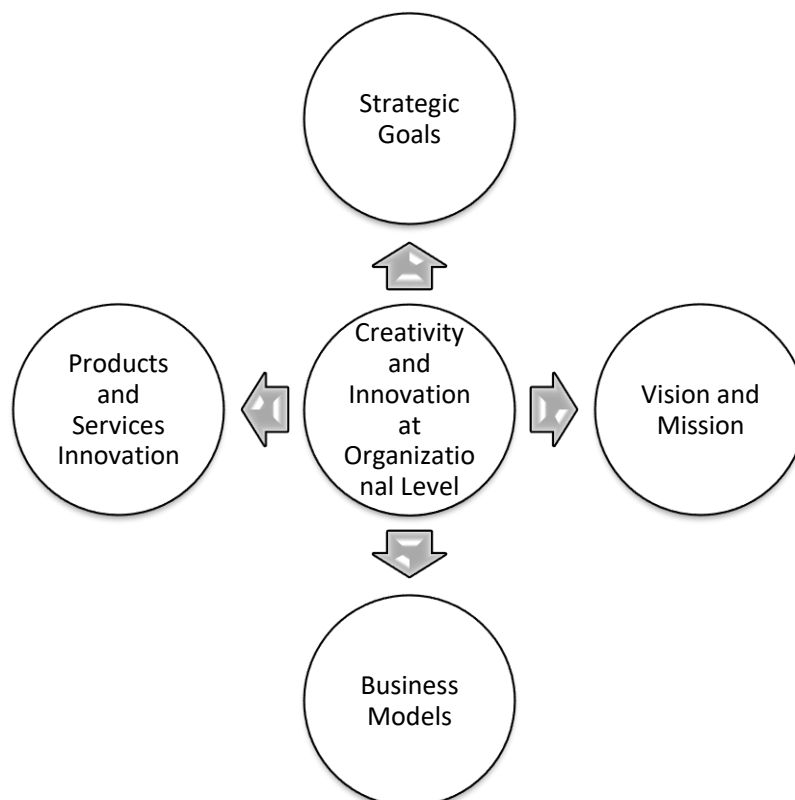
Figure 5.8 Creativity and Innovation at Organizational Level

Ability to nurture and sustainable innovation has resulted in these attributes and vise versa. Hence organizations are careful in establishing vision and mission statements, encouraging team dynamics and encouraging individual capabilities.

> The best mantras inform a company's everyday decisions and are actionable statements of intent, such as: "Create one new Innovation a year"; "Be relentless"; or "Inspire Innovation".

It is able to give any work in new and basic form. Creativity enhances the quality of a material or matter. Creativity is mainly present. It Varies according to the intellectual ability. Creativity is related to intelligence. The thought of Creative man is constantly changing according to new situations. Creativity gives happiness to the thinker of new imagination. Flexibility of thought and behavior is found in creativity

The nature of creativity is that it is always moving towards progressive ideas. It varies continuously according to the new conditions of human thinking. Creativity always brings important consequences. So any new imagination gives joy to thinker. Therefore creativity attracts all. By their nature, creative people, are always ready to adopt new behavior, new fantasy. So they succeed in finding new solutions to problems.

> One of Pixar's mantras has been to "be wrong as fast as we can". Google's phrase is "fail well." Risk often translates into failure, so make sure failure is seen and experienced as a "Learning Experience".

It is the nature of creativity to re-explain any problem or to see a problem with new attitude. Ability of fundamental ideas, freedom of judgment, awareness, sensitivity and entertainment are the nature of creativity. The following s will cover implementing creativity and innovation along with management of team in an organization.

5.3 Implementing the innovation

Innovation is more than generating the next big idea—it involves how to implement the ideas that make it out of the gate, and how to build the culture to sustain the creation of those ideas. Thus, innovation's ability to modify strategy is critical. With that said, the *implementation* of innovation must exist separately and distinctly from corporate strategy. There are generally moments within the history of an organization when the need for innovation becomes crystal clear. It may be a long draught of revenue growth, a succession of lost bids, or a competitor's new product.

Whatever the tipping-point, the first step toward creating a sustained culture of innovation is to lay the groundwork toward building the organizational capability for innovation. The climate for innovation can only thrive when every aspect of the organization promotes creativity, engagement and acceptance of the change required.

Implementing innovation has 3 big parts. The following figure 5.9 explains the implementing innovation in an organization.
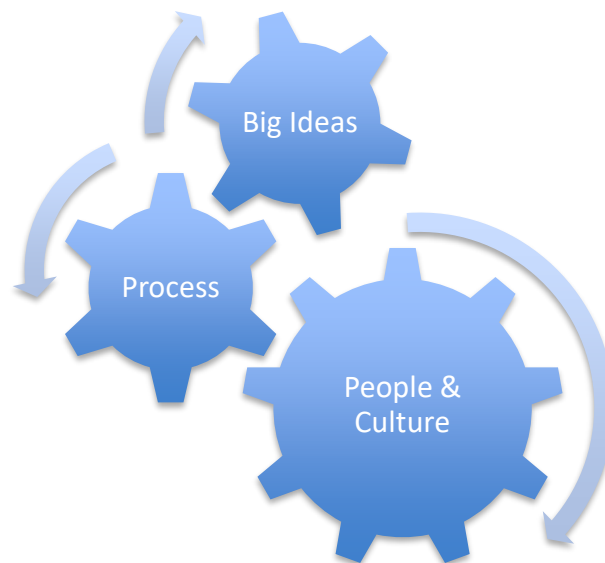
Figure 5.9 Implementing Innovation at Organizational Level

Build the culture of innovation step-by-step, stone by stone. It is organizational responsibility to build consensus, reinforce ideas, and underscore the need for accountability. Resistance to change can take many forms, from open dissent to covert subterfuge; but in any form, it is threat to innovation implementation (Figure 5.10).
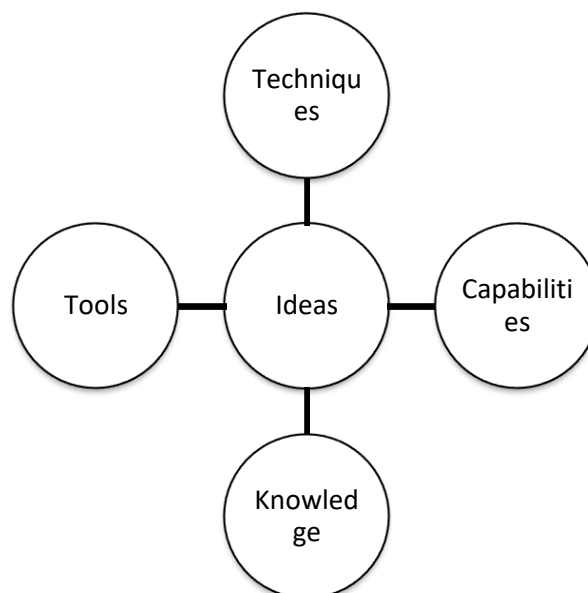
Figure 5.10 Implementing Innovative Ideas – Key Attributes

A key element is to implementing innovation is finding and keeping the right people. In the past, an organization's culture would shape the individual employees. However, today it is the value system of the individuals that, collectively, define the organization's style (5.11).

> The most innovative companies today realize that competitive differentiation comes as much from how they innovate as it does from what they're innovating.
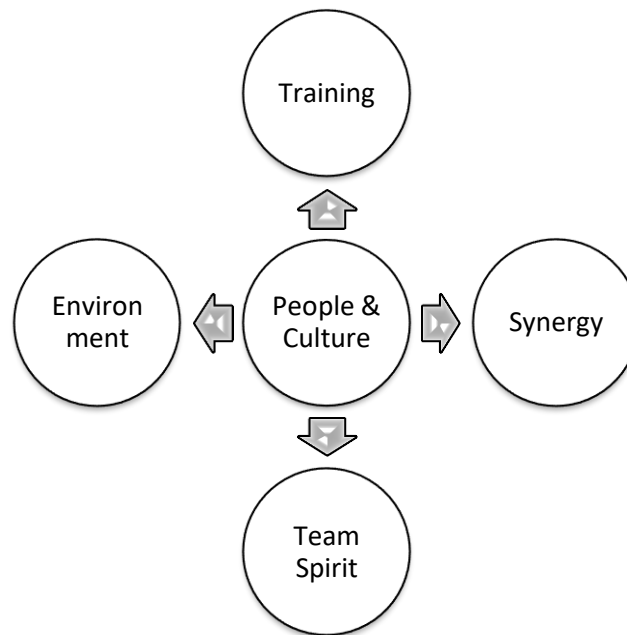
Figure 5.11 Implementing Innovation through People and Culture

The workplace of today is complex. Generations of workers are not always defined by age. Also, technology is changing the way we do things, and it is changing us. It is changing the very DNA of the work environment we have come to know and understand from years of experience. Organizations will have to be nimble in the treatment and care of workers to create a culture of innovation. Organizational structure should be reviewed and modified as appropriate (Figure 5.12).
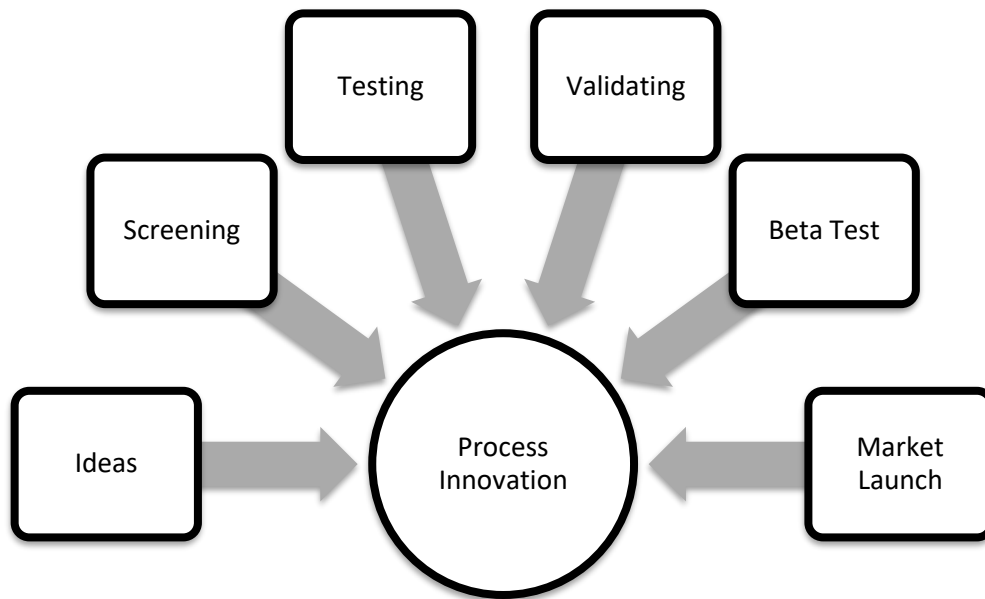
Figure 5.12 Key Areas to Implement Process Innovation

The implementation of innovation can be successful through people, process, culture and especially based on creativity. Development of team and team dynamics are discussed in the next chapter.

5.4 Team Dynamics for Innovation

In earlier building team for organizational creativity and innovation is discussed. This will cover the team dynamics aspect of creativity and innovation. However, researchers have identified the team dynamics and challenges to overcome difficulties in an organization (Figure 5.13).
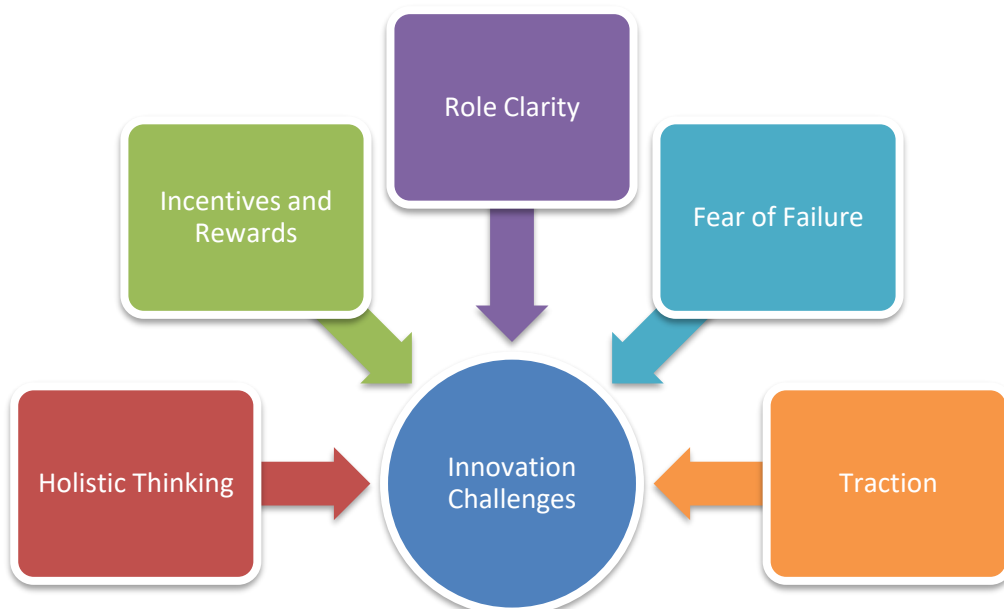
Figure 5.13 Innovation Challenges

Individuals and teams often work better if they are assigned special tasks or roles. Managers can leverage these roles by making each team member understand that they will provide a unique outlook on a given topic or problem.

Well-established firms often feel like they have more to lose, in terms of reputation, brand and finances, so they fail to innovate for fear of failure. To overcome this challenge, businesses should set aside a portion of their income for testing innovative ideas.

Employees should be constantly motivated towards creativity and innovation. To prevent this from happening, there should be powerful motivational quotes around the workplace. Furthermore, employees should exercise and take breaks on a regular basis. Organizing different training, workshops and conferences will sustain the learning process. Figure 5.14 lists the activities that encourage creativity and innovation within the organization.

```
                        ┌──────────┐
                        │ Creative │
                        │  Cornor  │
                        └────┬─────┘
                             │
┌──────────┐           ┌─────┴─────┐           ┌──────────┐
│ Humorous │           │           │           │ Creative │
│Environme ├───────────┤ Creative  ├───────────┤ Activity │
│   nt     │           │   Team    │           │  Boards  │
└──────────┘           │  Spirit   │           └──────────┘
                       └──┬─────┬──┘
              ┌───────────┘     └───────────┐
         ┌────┴─────┐              ┌─────────┴──┐
         │ Creative │              │  Seminars  │
         │ Writing  │              │    and     │
         └──────────┘              │ Discussion │
                                   │     s      │
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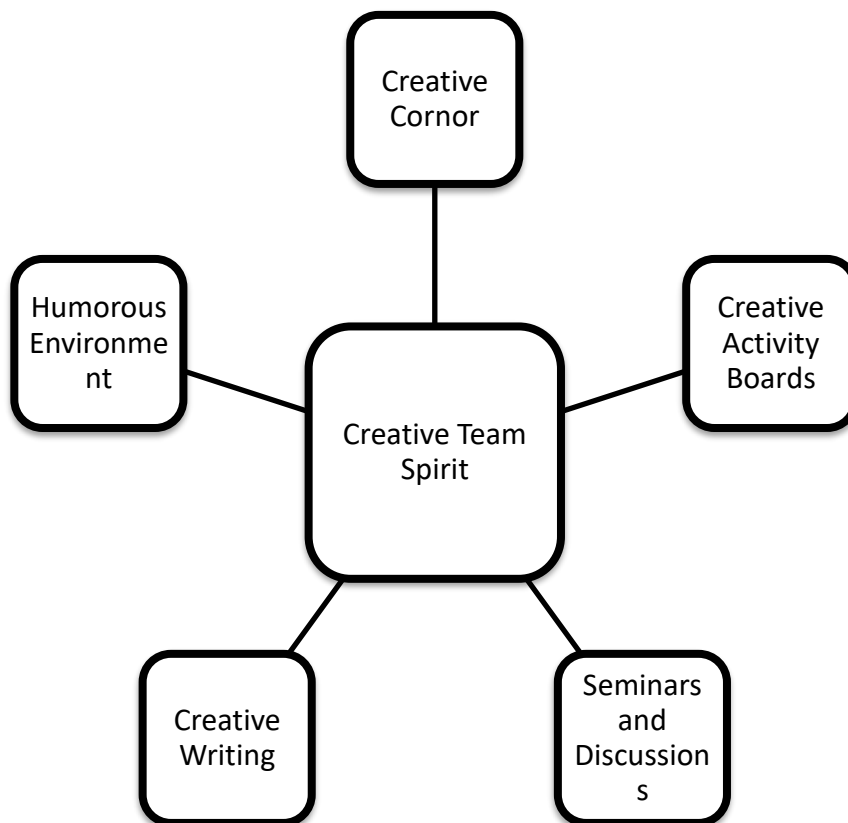
Figure 5.14 Nurturing Creative Team

Attention is the process of bringing clear ideas in mind

So far we have discussed creativity and innovation within an organization. However, recent times, organizations have created wide boundaries to generate (or) utilize the ideas from its consumers, stakeholders and other partners. The following discusses about open innovation.

5.5 Open Innovation and Case Studies

This will bring out the concept of 'open innovation' and discuss three cases of GE, Samsung and LEGO written by Stefan Lindegaard. Open innovation seeks the ideas and thoughts without any boundaries, (i.e.,) the organization look for any potential idea from its suppliers, customers and stakeholders. This mechanism will enable them to reach out creative minds and gather ideas. However, it is also equally challenging to gather and organize the appropriate information, evaluation and installation (Figure 5.15).
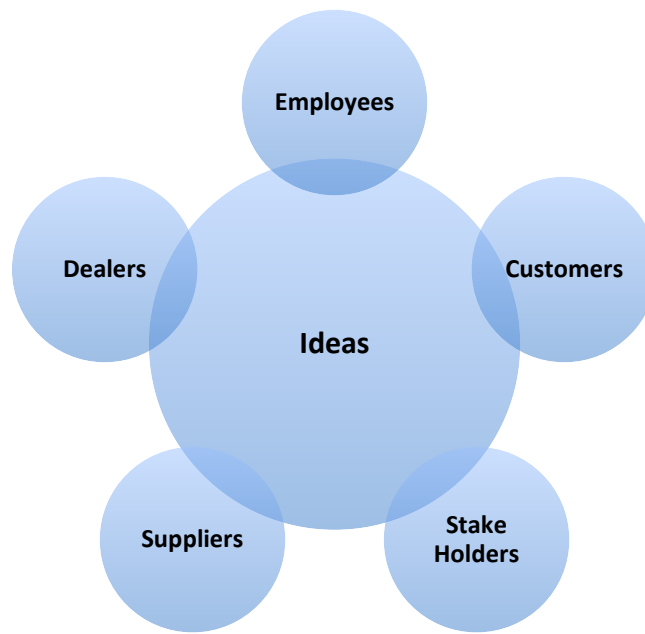
Figure 5.15 Open Innovation –Sources of Idea

> Open innovation refers that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology.

This converts three cases on open innovation from GE, Samsung and LEGO. These companies are known for its creativity and innovation. Contemporary innovators and thinkers form group or post the challenge on the web. The ideas that are gathered will be evaluated and implemented along with rewards to the creative thinker.

Case Studies
(Adapted from https//www.linkedin.com/pulse/20141115202453-46249-3-successful-open-innovation-cases-ge-samsung-and-lego/)

The idea of open innovation is still fairly new, but we are starting to see a range of companies that are getting value out of their efforts with this new paradigm shift.

GE, LEGO and Samsung are three companies worth looking into not only because of their apparent success with their open innovation initiatives, but also because they seem to be willing to experiment with the innovation processes themselves.

This is a key requisite for innovation success in the future. Experimentation needs to go further than just products, services or technologies; you also need to innovate on how you innovate.

GE

This leader on open innovation first caught my attention with their Eco-imagination challenges in which they brought an ecosystem of partners (mostly VC's) together in order to not only bring out great ideas on big issues such as the smart grid and healthcare, but also to make sure that the ideas were actually implemented with the help of GE and its network.

It is interesting to observe how GE tries out new things with regards to their innovation processes. After the Eco-imagination challenges had their run, they went on to partner with Local Motors to launch a new initiative aimed at co-creating for a new world of home appliances.

The initiative, First Build is an online and physical community dedicated to designing, engineering, building, and selling the next generation of major home appliances.

"This is global co-creation paired with a micro-factory on site," said Chip Blankenship, CEO of GE Appliances. "We will innovate and bring products to market faster than ever before."

Companies need to know why they are pursuing open innovation and they need to be strong communicators on their efforts. Those are two key steps in my framework for open innovation, which I call the 7 Steps for Open Innovation. Talking about this, it is worth checking out the open innovation website at GE, which starts out with this manifesto

"We believe openness leads to inventiveness and usefulness. We also believe that it's impossible for any organization to have all the best ideas, and we strive to collaborate with experts and entrepreneurs everywhere who share our passion to solve some of the world's most pressing issues. We're initiating a fundamental shift in the way we do business – this is what we'll stand for in our open collaboration efforts and how we will operate.

- Customer focus, imagination, courage, expertise, inclusiveness, and clear thinking will always guide our collaborative effort.
- We will openly celebrate the efforts of lead solvers who have submitted winning solutions within our public collaborations.
- We'll collaborate with transparency – publishing evaluation criteria, rules, compensation and IP rights at the launch of our engagements.
- We believe ideas should be compensated – and compensation pools will always reflect level of impact, effort, commercialization risk and IP rights.
- We'll provide access to pools of IP to enable the Global Brain to create new and beneficial outcomes.
- We'll never stop experimenting, collaborating and learning – we'll get smarter as we go, and the Global Brain will evolve and grow with us."

It is no wonder that GE is an open innovation leader.

Samsung

In contrast to Apple, Samsung is more active and open about their efforts on building their external innovation capabilities. The below snippets are from an interview with Vice-President of Samsung's Open Innovation Center, Marc Shedroff, in which the journalist would like to find out more about the ways Samsung wants to innovate like a start-up.

"OIC has four legs to it, and it's sort of the continuum of how you would partner with talented entrepreneurs. The first is a partnerships team — think of commercial partnerships between us and a third party. The second is a ventures group, that is, R&D investments in start-ups. The third is an M&A team; we think there's an opportunity to acquire small teams, fit them into Samsung, and have them build products as part of the company. The fourth involves accelerators, which we have opened in Palo Alto and New York City."

"We can take a group of five or six people per team and give them the benefits of a small company, which is autonomy, nimbleness, and the freedom to build the product they want without going through the approval process. Then we give them the benefits of a big company, which provides financial support, extensive distribution, and other resources. After all, we sell 450 million phones a year and 50 million TVs. The end result, we hope, will be game-changing software products that can connect all of our devices."Companies can target different kind of "value pools" i.e. groups of external partners for their open innovation efforts. This includes suppliers, universities, consumers/users and start-ups.

The latter has become the hottest area of collaboration for many industries and this example of Samsung is just one of many in which companies work to develop better co-innovation capabilities with start-ups and SME's.

Lego

Erik Hansen is the Senior Director of Open Innovation at LEGO and he did lots of interesting research before he really got LEGO started with the open innovation and crowd sourcing efforts that seem to be working well for this very successful toy company. A few years ago, Erik Hansen shared some of his insights on how they got started with their efforts at a conference. Early on, LEGO established a taskforce with the aim of Erik Hansen shared some interesting quotes. "People don't have to work for us to work with us" internal LEGO quote

"Consumers of today are intelligent; they are creative and they have an opinion…and they expect you to listen" internal LEGO quote.

- Assessing the opportunities, needs, and benefits for introducing new practices of open innovation across The LEGO Group
- Defining what next practice would look like building on internal practice as well as insight from the best open innovation practitioners in the world
- Making a firm and evidence based recommendation on what and where the value could be, how this could be delivered and what would be needed to achieve this.
- Setting out a viable roadmap – based on how to move forward, balancing risk and rewards etc.
- As Erik Hansen set out to learn more about open innovation, he focused on 3 elements:
- Learning from others for which LEGO conducted 12 interviews with leading open innovation companies.
- Learning from the LEGO group which was based on input from over 30 practitioners including 10 interviews.
- Learning by doing by setting up 4 micro pilots to test capabilities, culture and appetite.
- When LEGO got started with their open innovation efforts, they ran pilots in the production area (solving hard, "unsolvable" problems), on improving the LEGO core experience, on how to improve core HR processes and on an open innovation platform

Conclusion

This Chapter focused on creativity and innovation challenges faced in any organization. Business decision-making especially in the context of innovation is key since it determines the market sustainability of the organization. Nurturing creativity and innovation is at individual, team and organization is considered as yet another key challenge for the organization. Implementing the innovation, managing the change and sustaining the innovations are considered as current challenges in any organization. Finally the contemporary innovation known as 'open innovation' is discussed with three major organization.

Review Questions

- What are the key challenges of creativity and innovation in any organization?
- How are decisions are made with respect to innovation?
- How do the organization nurture and sustain the creativity at all level. Explain the levels in detail.
- Visit a government school near to your area and understand how creativity is nurtured from childhood. What is the impact of nurturing the creativity?

- What is open innovation? Provide an example.

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Block 3
Consumer Behavior

Contents

Chapter 1 Introduction to Consumer Behavior

Introduction

In contemporary scenario, the arena of marketing remains incomplete without a full spectrum reflection of consumer behavior in it. Waste management is a practice that is closely merging with consumer behavior so that the entire marketing could be shifted in the direction of environment friendliness. Consumer behavior is a study that speaks about the attitudes, preferences and choices of a consumer with respect to its selection, use, purchase and final disposal. The marketers need to be aware of the various kinds of consumers so that he may treat them with a unique marketing mix. The various trends in consumer behavior need to be aligned with waste management so that sustainability could be attained. The approaches to the study of consumer behavior should be extrapolated so that it gives maximum mileage to both marketing and waste management in the long run. The marketer needs to strategize his interventions so that the problems in the way of achieving sustainable development may go a long way. This unit attempts at conceptual building in the above-mentioned directions and the model questions so framed permit ample opportunity to the learners to extrapolate consumer behavior in line with waste management.

Objectives

- To enable application-based learning of the basic concepts of consumer behavior and how it can be extended to cover up a new area of waste management.
- To impart knowledge of various approaches of consumer behavior and how marketing strategies can steer it to include waste management practices.

1.1 Meaning & Concept of Consumer Behavior

'Consumer Behavior' refers to the study of how customers, organizations or groups carry the process of selecting, buying, using, and disposing ideas / goods/ services to satiate their needs, wants and desires. It refers to the behavioral interventions of consumers in the marketplace and also the significant underlying motives for those interventions/ actions. Waste management is another area that is finding place in the minds of consumers who want to opt for greening strategies like recycle, reuse, reinvent, recondition, remanufacture and reinvent. The consumer behavior is witnessing a paradigm shift in this direction where every consumer has begun to show inclination towards a clean, healthy and green consumption pattern.

Understanding the underlying reasons justifying the purchase intentions furnish the marketers with some crucial information pertaining to

- Type of products / services which the consumer is looking for (including recycled products)
- Varieties of products that can enhance purchase (recycled or fresh)
- Obsolete products that need to be eliminated
- Best way of presenting goods to the consumers to enhance its sales (For example, biodegradable packaging)

Definitions of Consumer Behavior

Table 1.1 Significant definitions of Consumer Behavior

Researcher Name	Given Definition
Engel, Blackwell & Mansard	'Consumer Behavior is the set of actions and decision processes of people who purchase goods and services for personal consumption.'
Louden &Bitta	'Consumer Behavior is the decision process and physical activity, which individuals engage in when evaluating, acquiring, using or disposing of goods and services.'

Nature and Characteristics of Consumer Behavior

1. Non- Static Nature Consumer behavior is dynamic in nature and undergoes a constant change. The nature of the products dictates the frequency of change of consumer behavior and attitude towards a particular product. For instance, kids prefer fancy and colorful footwear, but when they mature up as teenagers or young adults then their preference shifts to trendy and fashionable footwear. A shift to more sober and comfortable footwear is observed when those consumers become middle- aged or senior citizens. It is not age alone that decides the change in consumer behavior but a number of other factors including increase in disposable income level, type of occupation,education level, and marketing factors and a sense of corporate environmental stewardship.

2. Varies from Consumer to Consumer Every individual is different from anotherand will not exhibit the same consumption pattern or choice of products. This inconsistency of behavior from consumer to consumer may be attributed to their lifestyle, individual nature and thought processes, family background, cultural differences, alternative genders, age differences, educational and occupational differences. For instance, some consumers may be technophilic and prefer shopping online only. Some may be spendthrifts and may spend illogically beyond their means. Some consumers have ardent preference for environment friendly products.

3. Consumer Behavior Varies both Regionally and Country Wise Every region is governed by their own set of beliefs and every country has its own set of norms and traditions too. This impacts the consumer behavior too because every consumer is observed as a unit of a country. Therefore, consumer behavior observes remarkable variation across regions, states, and countries. For instance, arural consumer would behave very differently from an urban consumer and may not show environmental citizenship. Rural consumers tend to be more conservative in approach and over cautious about pricing. Style, luxury and sophistication would never be a priority for them and they might never like to go to the extent of taking up loans for acquiring luxury goods. However, this mindset may again differ depending upon the individual's upbringing and lifestyle.

4. Leads to Purchase Decision A consumer is driven by lot of influences before he takes a purchase decision. Purchase decision may not just be a resultant of individual consumer needs but a sum total of other forces like peer pressure, environment stewardship, status and prestige or simply a search for variety. Therefore, it is imperative that marketer takes cognizance of all these forces and positively molds the consumer to take a purchase decision in his favor.

5. Behavior of Consumer also Varies from Product to Product The disposition of consumers is never the same for all set of products. Few set of consumers may spend more on certain products while spend nothing at all on the other. For instance, young consumers may like to invest more on clothing brands, cell phones, cosmetics, footwear etc. but may not spend on insurance schemes, mutual

funds, pension schemes etc. which a matured person may like to spend upon due to his different set of priority.

6. Improves Standard of Living The buying behavior decides on the standard of living as well. Consumers who spend more in purchase of quality and luxurious products are bound to exhibit a better standard of living in contrast to those who are miser in their buying habits.

7. Reflects Status The status of a consumer not only governs the buying behavior of the consumers but all reflects it in full spectrum. The purchase of eco- friendly, sophisticated and luxurious products instills a sense of pride in the ownership and reflects a higher living status.

Types of Consumers

Various kinds of consumers exist who are different in the choice and quantity of products they are looking for. A true marketer needs to first understand the extent up to which a new product will be accepted and how willing will the consumers be to purchase it. For instance, some people are simply unwilling to buy recycled products because of a pre-conceived notion that such products have poor functional performance. Also the marketer needs to be wary of the type of target market he wants to venture in. Various kinds of consumers exist and each type deserves to be treated with a different kind of marketing mix. The various types of consumers are

1. **Seasonal Consumers**

These are the consumers that purchase products on a seasonal basis only. Such consumers only make purchases when they actually need the product. Such sort of seasonal purchasing also implies that sales would occur only during a very short period of interval and therefore marketer has to be extra cautious that such type of targeted marketing hits the consumers effectively at the right time. Examples of products that rely on seasonal consumers are

*   Cold drinks like Pepsi, Coca- Cola during the hot seasons
*   Rain coatsand umbrellas during the rainy season
*   Christmas trees and related decorative items in the month of December

2. **Personal Consumers**

These include those set of consumers that buy products or services solely for personal use or family use or household use. Marketers dealing with such type of consumers should necessarily take care that there is immense value addition and constant up gradation so that the appeal of the goods is at its maximum. Examples

*   Buying a car intended for personal use
*   Purchasing apparel for personal use from a shopping mall

3. **Organizational Consumer**

It includes those set of consumers who do not buy for personal use rather they purchase for government, offices or other businesses. These consumers often end up doing a bulk purchase or may place long term recurring orders on behalf of the organization. It is for this reason that such products are expected to meet high specification standards and are usually priced on the higher side. Also, there is lot of negotiation of prices that is observed between the marketer and the organizational consumer. Products may sometimes be offered for resale at marginally compromised profit to the organizational purchaser. The marketer in this case usually adopts a negotiable role in pricing but portrays to be rigid in quality parameters. Example A furniture manufacturer selling specific hospital related furniture.

4. Impulse Buyers

Impulse buyers include those consumers who go for an unplanned shopping spree and who instantaneously getting attached to the product and buy it. Their swift purchase decision is due to an immediate connect they feel with the product or service. Such purchases usually do not require much persuasion. However, product placement is very crucial to attract such consumers at the very first place by featuring their product at a prominent place or by employing a sophisticated packaging (example, eco-based biodegradable packaging) in the store. For example

- Toys at eye level of children on the shop shelf
- Chocolates near the point of display (check-out counter)
- Biodegradable packaging
- Brightly colored eye-catching items where children can spot them.

5. Need Based Consumers

Need based consumers include those consumers who go for a product purchase only when they are in immediate need of it and not at any other time. The prime challenge for marketers is to instill a sense of 'need' of the product that can quench the immediate sale of that product. For example

- Oil Paint when a wooden house needs rain protection
- Heaters only when we need to be comfortable during winters

6. Discount Driven Consumers

These types of consumers often postpone their purchases until they come across heavy discounts or off season sales. Such consumers also tend to be extremely price sensitive and never engage in buying premium products. They prefer waiting for the prices to fall to an affordable range and then they go for a purchase. Promotion techniques used by marketers to grab such type of consumers are coupons and stock-take sales. A good number of retailers, service providers and manufacturers try to tap these consumers via heavy discounts during periods of recession or during harsh economic climates to gain consumer confidence.

7. Habitual Consumers

Habitual consumers are those who feel a strong urge to go for a particular product brand. Such consumers often become compulsive brand loyal to the extent that will move to some other shop if they don't find their preferred brand choice. Alcohol and cigarette smokers form classical instances of branded product ranges that target such compulsive habitual consumers.

Reasons for understanding various kinds of consumers

Understanding about the consumer type who purchases your goods/ products can help you take a diverse set of decisions including

- Product placement
- Product design (including cost)
- Production schedules

1.2 Current Trends in Consumer Behavior

Some of the significant generic trends that impact consumer behavior are

1. **Enhancing Business with the Strength of the Millennial Generation**

   The millennial or the young generation consumer group are heralding the trends and consumer shopping journeys. India harbors the world's largest millennial population. This generation is in age bracket of 18-35 years and currently having a population above 440 million. With this huge number the millennial constitute around 34% of the country's total

population and show a strong inclination towards environment friendly products & waste management practices. In today's scenario they form a very critical target group for plethora of brands operating across various consumer segments including apparel, food and beverages, footwear and accessories, consumer electronics, Fast Moving Consumer Goods (FMCG) and durables.

2. **Role of Social Media in Changing Consumer Preferences**

   With the advent of social commerce or 'S-commerce' in recent times, the consumers are more connected with each other and also with the brands. User-generated advertorial content portrayed through (i) reviews and recommendations posted online (ii) videos and pictures of products/brands on social networking sites and blogs (iii) stories and user experiences shared on the web (iv) ratings etc. speak volumes about the way consumers have been empowered. This sort of content has potential to either promote or demote a particular product/ brand/ service among those set of people who have access to the content.

Social commerce encompasses plethora of platforms that influence the consumers at large in the following manner

- User-curated shopping (where users create and share list of services/ products for other consumers to shop from).
- social network driving sales.
- participatory commerce (in which the consumers become decision makers across the entire product value chain via joint funding, voting and collaborative designing).
- peer-to-peer sales platforms (community-based marketplaces).
- group buying (this includes services and products offered at discounted rates if enough number of buyers are willing to make the purchase).

In contemporary times, online product reviews and social media platforms constitute an integral part of the millennial consumers' shopping by influencing their buying judgments and purchase decisions.

3. **Demand for a Healthy Lifestyle by the 'Conscious Customer' of Today**

   The consumption pattern and choice of products are a direct function of hygiene, health and quality of products. A paradigm shift is observed in the way brands are laying impetus on healthier variants of their products without compromising on taste and quality. This is certainly a conscious shift in brand values via which they have planned a newer marketing mix that caters to the health-conscious eating habits, nutritional value offered by the food products and quality of ingredients used in food products that consumers are consuming.

Change in consumption habits are also observed due to the following reasons

- Rising health-related incidences
- Increasing working population
- The sedentary lifestyle of consumers
- Greater access to global trends
- Higher disposable income levels
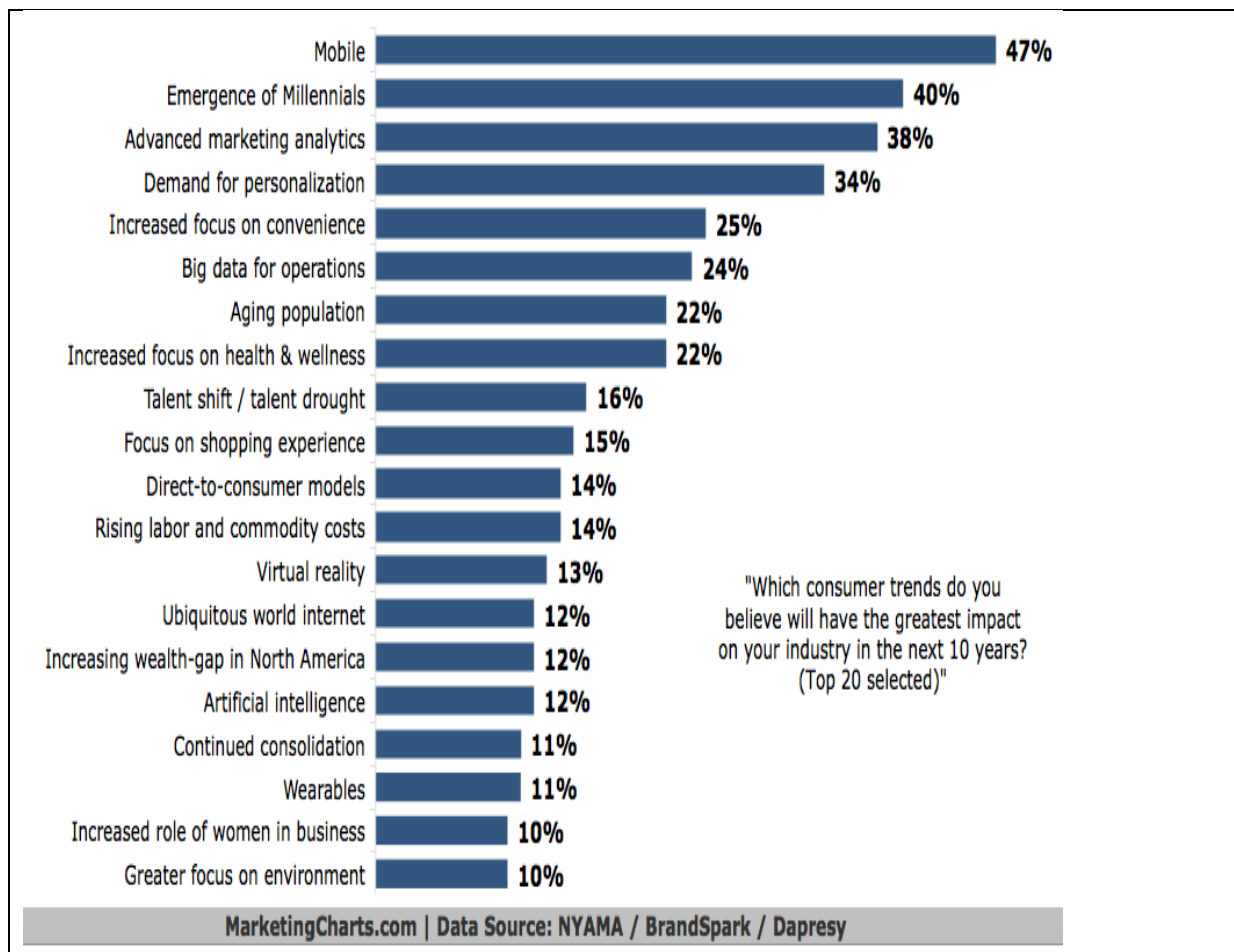
Fig. 1.1 Expected Consumer Trends for the Next Ten Years
[Source marketingcharts.com]

While the millennial generation is slated towards skewing the trend in the direction of health and wellness, the trend is simultaneously getting apparent across all the consumer categories, irrespective of disposable incomes, gender and age groups. Therefore, companies are left with no other option but to invest in finding healthier solutions to avoid the risk of being edged out in the rat race to win conscious consumer's confidence.

4. **Rural India as the Biggest Bait for Business Growth**
   Non- urban towns and rural population are the most lucrative options before the marketer for increasing their presence, enhancing their market share and broadening the consumer base because of their large population. This untapped virgin market holds immense promise for marketers to bring a new marketing mix with a price that is affordable. Penetration pricing policy is the weapon via which these rural markets can be effectively baited.

5. **Brand Resonance as a Tool for Gaining Consumer Confidence**
   The evolving consumer consumption patterns has immensely bolstered business opportunities but has also led to cut throat competition amongst brands. Brand management is also observing new paradigms with the evolution of new age educated, techno- savvy and environment conscious consumer.
   For establishing a true connect with the consumers it is essential that brand values of the company resonates with the personality of the consumers either totally or partially. Only

then an emotional bonding can be created that the marketer can reap in the long run.

6. **Rise in Business Analytics**

   Information about buying location, purchase habits, frequency of purchase can now be easily tracked on any site and analyzed further via the advancements in technology. Some business organizations have gone to the extent of hiring full-time professionals who can apply business analytics in tracking online shoppers and analytics and investigate upon finding newer ways to improve the sales once a buyer has visited a specific website or webpage.

   For example, Online retail giant Amazon.com has resorted to targeted advertising. In this, whenever a shopper searches a product on the website, he also begins to see same product pop up in advertisement space on the other sites that the shopper visited in the next or coming weeks. This way, Amazon keeps the product alive in the mind of the shoppers and encourages them to visit back and buy the product.

7. **Customization and Personalization**

   It's tough to ignore a product that compels you to feel like it's been customized for you, and names inscribed on small gifts were some of the first items to have given a start to this trend. Coming across personalized T-shirts, customized key chains, mugs with your photograph on it, or other items for sale in gift shops are among few things that go irresistible for the shopper.

   For instance, few shoe manufacturers propose the option before the consumer to upload his favorite artwork or images so as to create customized sneakers. Consumers cannot escape such customization and this is one trend which is bound to capture years to come.

Flowchart Based Representation of Consumer Trends

The cascade of events dictating the flow of consumer trends is regulated by several crucial factors like

- Unfulfilled economic recovery for core consumer segments
- Health, wellness and responsibility as the new basis of brand loyalty
- Pervasive digitization of the path to purchase
- Proliferation of personalization and customization
- Continued resource shortages and commodity price volatility
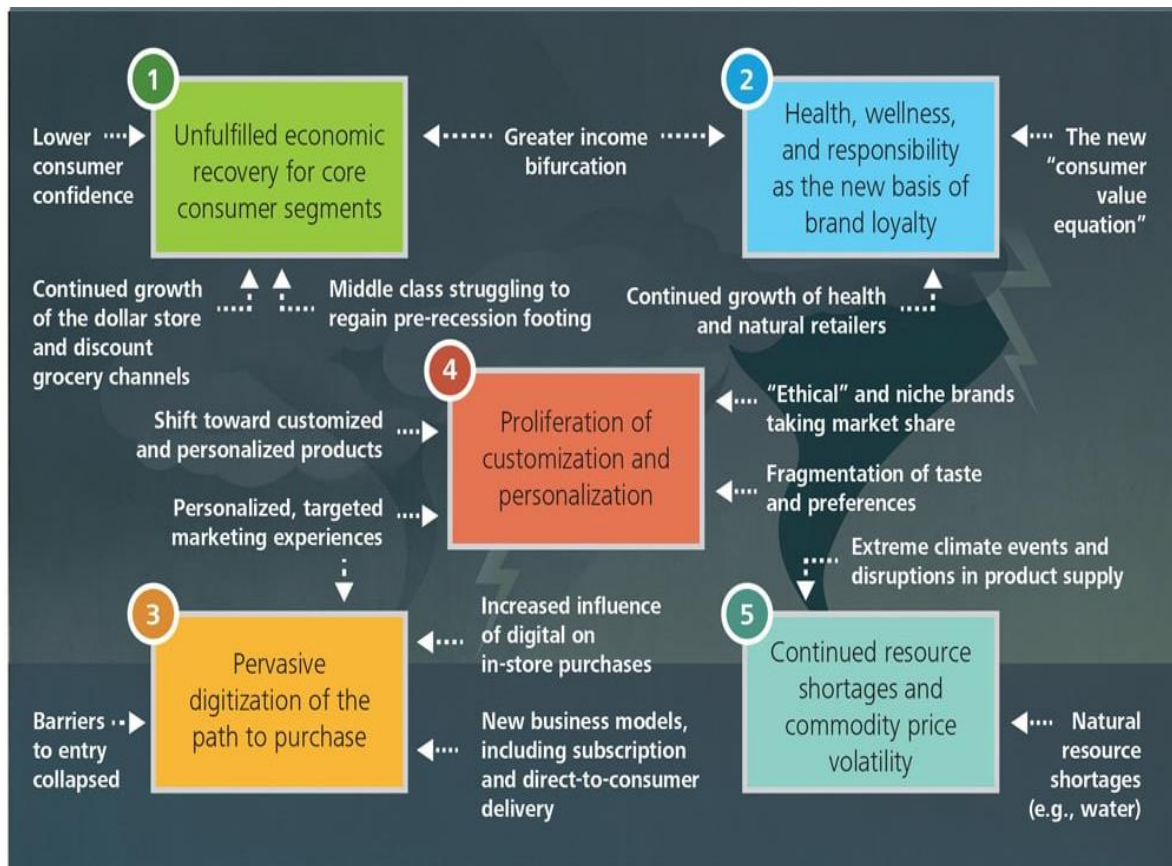
Fig. 1.2 Representation of Cascade of Consumer Trends
[Source Deloitte University Press]

1.3 Approaches to Studying Consumer Behavior

There existtwo broad theoretical approaches to the study of consumer behavior. They are

1. Managerial Approach

A managerial approach envisions consumer behavior as a branch of applied social science. It is often treated as a vital aide to development of effective marketing strategies. A managerial approach to consumer behavior bears a more micro and cognitive character. It is said to be more micro as it lays impetus on the individual consumer and takes into consideration his or her perceptions, attitudes, demographics and lifestyle characteristics. Additionally, it also considers the environmental effects which include impact of family, peer, reference groups and culture on the minds of the consumer. In being called as cognitive, managerial approach emphasizes on the thinking processes of the individual consumers and also the factors that contribute in the final purchase decision. The idea of waste management can be propagated more using this approach.

2. Holistic Approach

A holistic approach recognizes consumer behavior as a pure branch rather than putting it into frames of applied social science. As per this approach, consumer behavior is to be considered as a legitimate focus of inquiry and can be treated to be independent of marketing. Prima facie it may appear that is used to serve only the domains of marketing. However, in practice, this approach holds good promise for strategy formulation as well. In contrast to the managerial approach which is more micro in character, holistic approach is having more macro orientation. As per this, the

emphasis is more on the consumption experience rather than on purchasing process. This is because there is equivocal emphasis focus on the wider and culturally driven context of consumption. This approach observes consumption bilaterally, that is social and anti-social; normative and idiosyncratic; functional as well as symbolic. Purchase behavior is given a slight weightage. When consumer behavior is studied in the context of holistic approach, shopping experience is preferred over consumer decision making. The holistic approach delves more into understanding of the environmental perspective of the consumer's action.

Traditional Approaches to Studying Consumer Behavior

The traditional approach to consumer behavior is based on the assumption that among plethora of alternative bundles (of products or services), the consumer holds a well-defined preference order and his decision would be in favor of the most preferred bundle of benefits. This helps in building a mental model about consumer behavior and how the consumer might be feeling about 'trading off' one commodity in comparison to another.

Various approaches included under this are

1. Positivist Approach
- Also termed as modernism
- It is the earliest approach towards studying consumer behavior
- Assumes the study of Consumer Behavior as an applied science
- Lays impetus on science as a vital means of explaining consumer behavior
- Lays emphasis on the underlying causes of consumer behavior and additionally stated that these causes are correlated to effects
- Assumes consumers as 'rational' and declares consumer decision making as either 'rationality' or a mix of 'rational decision making and problem solving'
- Purchase decisions are arrived at only after collecting the required information and then rationally weighing all the available alternatives

2. Interpretive Approach
- Also termed as post-modernism or experientialists
- Lays stress on mentally understanding the customer better
- Treats the process of consumer decision making as one which is 'subjective' in nature

Modern Approach to Consumer Behavior Applying Inter- Disciplinary Analysis

The theory of consumer behavior which is centered on both cardinal   and   ordinal approaches is credited to modern economists Alfred Marshal, R. G. Allen and J. R. Hicks. The cardinal utility analysis claims that utility can be quantitatively measured in monetary units (termed as 'utils') which   attracted great criticisms and this led to the advent of ordinal utility analysis. The ordinals obviously claimed that utility is not measurable. A comparison chart applying inter- disciplinary analysis narrates the difference between the two as follows

Table 1.2 Comparative chart Cardinal vs. Ordinal Utility

Basis for Comparison	Cardinal Utility	Ordinal Utility
Meaning	Cardinal utility is defined as the utility in which consumer satisfaction derived from the consumption of good or service can be numerically expressed.	As per Ordinal utility consumer satisfaction derived from the consumption of good / service cannot be expressed in numerical units.
Realistic	Less	More
Approach	Quantitative	Qualitative
Measurement	Utils	Ranks
Promoted by	Classical and Neo-classical Economists	Modern Economists
Analysis	Marginal Utility Analysis	Indifference Curve Analysis

Popularly Accepted Approaches to Consumer Behavior

The most popular approaches to consumer behavior can be divided into cognitive, behaviorist and psychodynamic categories. They are discussed below.

1. **Cognitive Approach**to consumer behavior deals with the information processing abilities of the consumers (schmitt, 2003). As per this approach, the output of information processing in consumers and the way they behave in certain ways is due to (i) environment and (ii) social experiences that provide consumers with plentiful information to be processed. For instance, consumers may receive unreliable information pertaining to the forecasted economic downturn at a national level and this piece of information can serve as a stimulus sufficient enough to generate specific mannerism (consumer behavior) & the consumer may end up reducing the level of their spending budget as a swift response to the stimulus.

2. **Behaviorist Approach**to consumer behavior is often related to the impact of extrinsic events. Lantos (2010) has neatly linked this approach to the experiments conducted by Russian scientist Ivan Pavlov in which these experiments clearly evidenced the development of certain behavioral patterns as a result of external factors. Practical application of this approach in the area of marketing can be clearly observed in Nescafe products. In this context integrated marketing strategy of Nescafe tries to elicit a specific pattern of behavior amongst target customers in which Nescafe coffee is the first step towards beginning your day! Loudon et al. (2010) has clearly differentiated between behaviorist and cognitive approaches to consumer behavior and stated that in behaviorist approach the consumers may be partly aware of the impact of extrinsic (external) environment whereas in cognitive approach consumers process information from extrinsic (external) sources in apparent manner. Also, Loudon et al. (2010) consider the behaviorist approach to be much superior in

contrast to the cognitive approach in ways of motivating perspective consumers to the extent of getting committed to purchase.

3. **Psychodynamic Approach** encompasses all relevant theories of psychology that view human functioning as a subset of interacting drivers and forces within the individual, particularly his unconscious mind, and also between different structures of his own personality (McLeod, 2007). Within the specific domains of consumer behavior, the psychodynamic approach is more close to behavioral approach with the difference that the former approach spans greater scope compared to the latter one.

4. **Economic Man Approach** In a more economical way, this approach suggests that in order to select the optimum course of action in purchase, it is imperative for a consumer to be exposed to the entire set of available consumption options. This will permit him to correctly rate each alternative order and accordingly base his purchase decision (Schiffman and Kanuk 2007). This approach, however meets sufficient criticism because of the following reasons

   - Lack of adequate information
   - Time to make a 'perfect' decision
   - Motivational input
   - Marked influence of less rational forces such as social relationships and values (Simon 1997).

Approach to Consumer Behavior on the Basis of Nature of Purchase

Purchases influenced by consumer behavior can be segregated on the basis of nature of purchase. East et al. (2013) divided various purchase types into two categories

1. **Routine Purchases**Routine purchases refer to those set of products / services that are regularly consumed with varied frequency as per the nature of product / service. For instance, daily transportation or conveyance, utilization of grocery product and hairdressing services comes in the category of routine purchases. The consumer behavior traits pertaining to routine purchases are often ear- marked with very less time being spent on decision-making and the consumer showing high levels of customer loyalty. Routine promotions are often bolstered by the most popular marketing techniques like (a) Sales promotions (b) coupons and (c) discounts.

2. **Impulse Purchases**Unplanned purchases or purchases at the spur of the moment because the psychological levels & effective point of sales (PoS) displays play a pivotal role in triggering impulse purchases. However, in an impulse purchase, the consumer may end up in the purchase of the same product / service in a routine manner.

1.4 Consumer Behavior Applications in Designing Marketing Strategies

The strategies and tactics of marketing are normally based on both implicit and explicit beliefs about the consumer behaviour. However, decisions that are based simply on implicit intuition are not as reliable as ones that are based on explicit assumptions & sound research and theory. In the formulation of competitive strategies, accurate knowledge of consumer behaviour can prove to offer a big competitive advantage as it can vitally eliminate the chances of market failure and odds of poor decision making. Consumer behaviour reflects several elements and most of them work under orchestration of marketing strategies and tactics as depicted below.
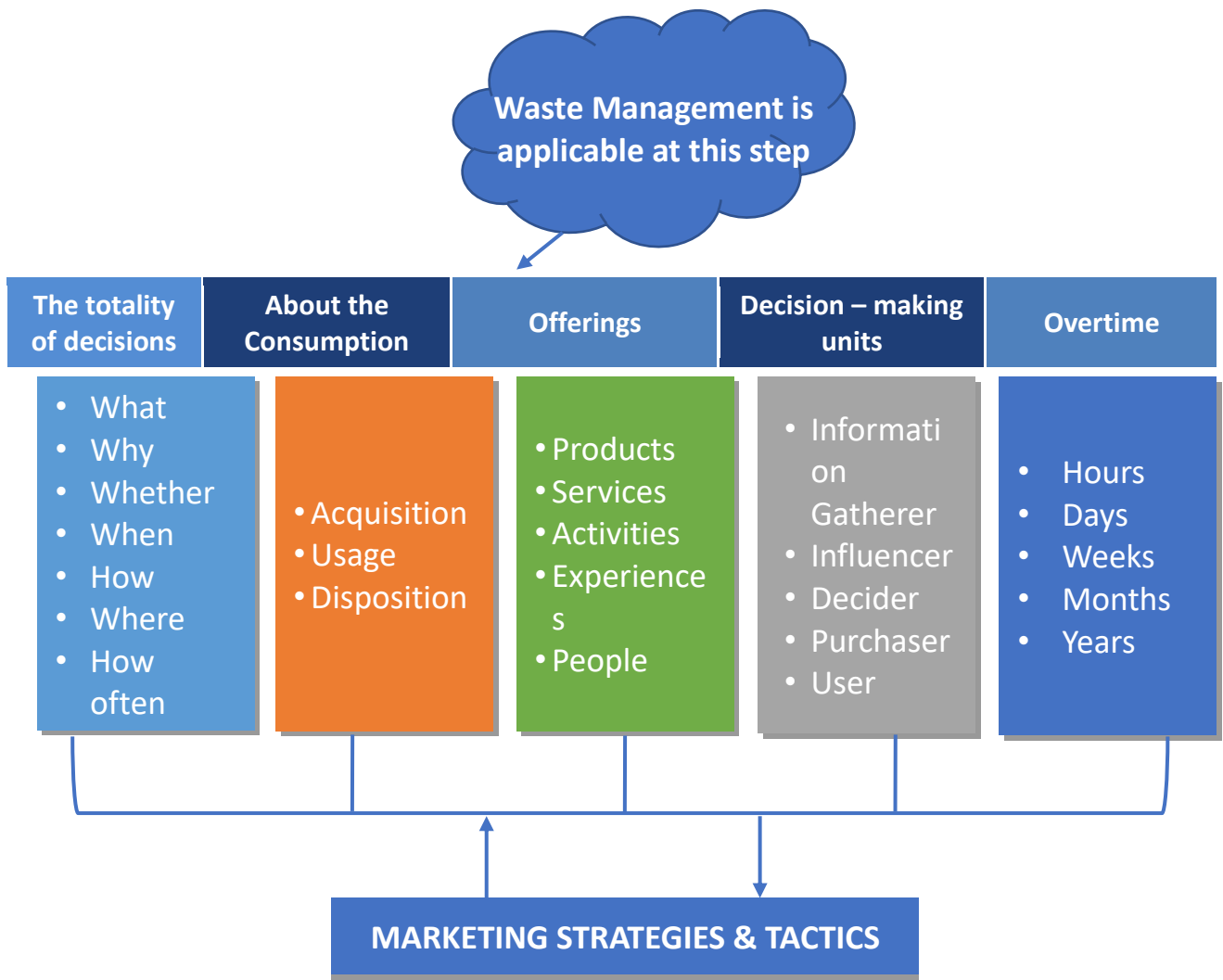
Fig. 1.3 Influence of Marketing Strategies on Various Facets of Consumer Behaviour

[Source Hoyer &Macinnis (2008). Consumer Behavior]

It is not sufficient for a business firm to prosper successfully by mere art of profit making but should also aim at sustainable development by aiming to generate a competitive edge over the rivals. This could be attained by adopting waste management and green marketing interventions at times. Competitive advantage involves creation of such benchmarks for the competitive rivals that make the company stand a cut above the rest (market leader). This can be achieved only by value creation and by keeping a well defined marketing strategy in place. To attain sustainability for decades, choice of appropriate market strategy is imperative. It can therefore be rightly said that marketing strategy is a mandate that every organization must play and this can be put into practice only if the marketer has a thorough knowledge about the intricacies of consumer behavior.

The application areas of consumer behaviour which have been found to be useful in developing marketing strategies for a sustainable growth are listed below

Table 1.3 Consumer Behaviour Application Areas for Developing Marketing Strategies

S.No.	Application Area	Description/ Justification
1	Analyzing Market Opportunity	Consumer behaviour plays a pivotal role in scanning / identifying the unfulfilled needs, wants and desires of consumers. This calls for scanning the fashion, fads, trends and conditions prevailing in the market area, the lifestyles of customers, their disposable income levels and also growing peer and other social influences. Products that are eco-friendly and based on recycling regimes are popular baits these days.
2	Selecting Target Market	Exceptional and different wants and needs can be scanned and evaluated by identifying various consumer segments in market where the opportunities lie. Learning about the buying motives and intentions after identification of these consumer segments can help the marketer in customizing the products and services with the right set of marketing mix for the selected target market.
		Example – Consumer studies have revealed that several potential and existing shampoo users were not interested in buying shampoo bottles priced at Rs 60 or more. They rather preferred a lower price packet/sachet that was economical and contained sufficient quantity of shampoo for one or two washes. This propelled the companies to come up with shampoo sachets at a minimal price. This marketing strategy worked wonders. Not only did this provide unbelievable money returns to the company but had also put the rivals on their toes.
3	Marketing-Mix Decisions	After the identification of discontented needs and wants of the consumers, the marketer has to ascertain the precise mix of four P's of marketing, i.e., (i) Product (ii) Price (iii) Place and (iv) Promotion. Environmental marketers have incorporated packaging as the fifth P which speaks for biodegradable or recyclable packaging solutions.
4	Product	The unsatisfied needs / wants of the consumers must be satiated by the marketer by tailoring the product or service as per the consumer's choice. Decisions with regard to tailoring (customization) of the product are often related to (a) size (b) shape (c) features and (d) technology up gradation. The marketer also needs to decide upon (i) packaging (ii) important aspects of service (iii) warranties (iv) conditions and (v) accessories.
		Example – Nestle initially introduced Maggi noodles in two flavours-Masala and Chicken. Subsequently, taking cognizance of consumer preferences in other parts of India, Nestle's Maggi introduced Tomato, Punjabi Tadka, Chennai Sambhar, Atta Maggi and other flavours.
5	Price	Price is the second most sensitive component of marketing mix. Marketers must decide on (i) price affordability (ii) what price to be charged for a product or service in comparison to the competitors in a

6	**Place**	Distribution channel entails where and how to offer the products / services to the consumers at the final stage. The following set of decisions are taken regarding the distribution mix – • Should the existing outlets be continued to sell own as well as products of competing brands or, should they invest in establishing new elite showrooms/outlets exclusively selling the marketer's brands? • Do the products need to be sold via all the retail outlets or only through the ones selected by the marketer? • Should the company resort to direct marketing for increasing their customer base? • Does location of the retail outlets need a second thought from the customers' viewpoint?
		rough market. The pricing decisions directly influence the Return on Investment (ROI) to the company.
7	**Promotion**	Promotion entails employing the channels of marketing communication to build a strong relationship with the consumers. Some of the accepted promotion techniques include (i) public relations (ii) advertising (iii) personal selling (iv) publicity (v) sales promotion and (vi) direct marketing and selling. The decision has to be taken by the marketer regarding which method would prove to be most suitable in order to effectively reach maximum consumers. Additionally, the marketer must have knowledge about (i) its target consumers (ii) their taste and preferences (iii) their location (iv) lifestyles (v) which media do they have access to etc.

Steps Depicting Relation Between Consumer Behaviour and Marketing Strategies

Marketers must carefully analyse their consumers and additionally make use of secondary information to take decisions regarding effective targeting of their market. They may done via (i) observation (ii) surveys (iii) interviews (iv)focus groups and (v) secondary methods (such as online research). Additionally the marketer may also decide upon a marketing mix strategy by taking cognizance of the demographics of the consumers and subsequently segmenting the market. These demographics include age, income, gender, occupation, disposable income, family structure, location and educational level. Also, the consumer decision making is a function of (a) Economic needs (b) Psychological Variables (c) Social influence and (iv) Purchase situation which are all under the effect of marketing mix (four P's). All these functions work in coherence to compel the marketer decide upon a suitable marketing strategy. This is depicted by the figure given below.
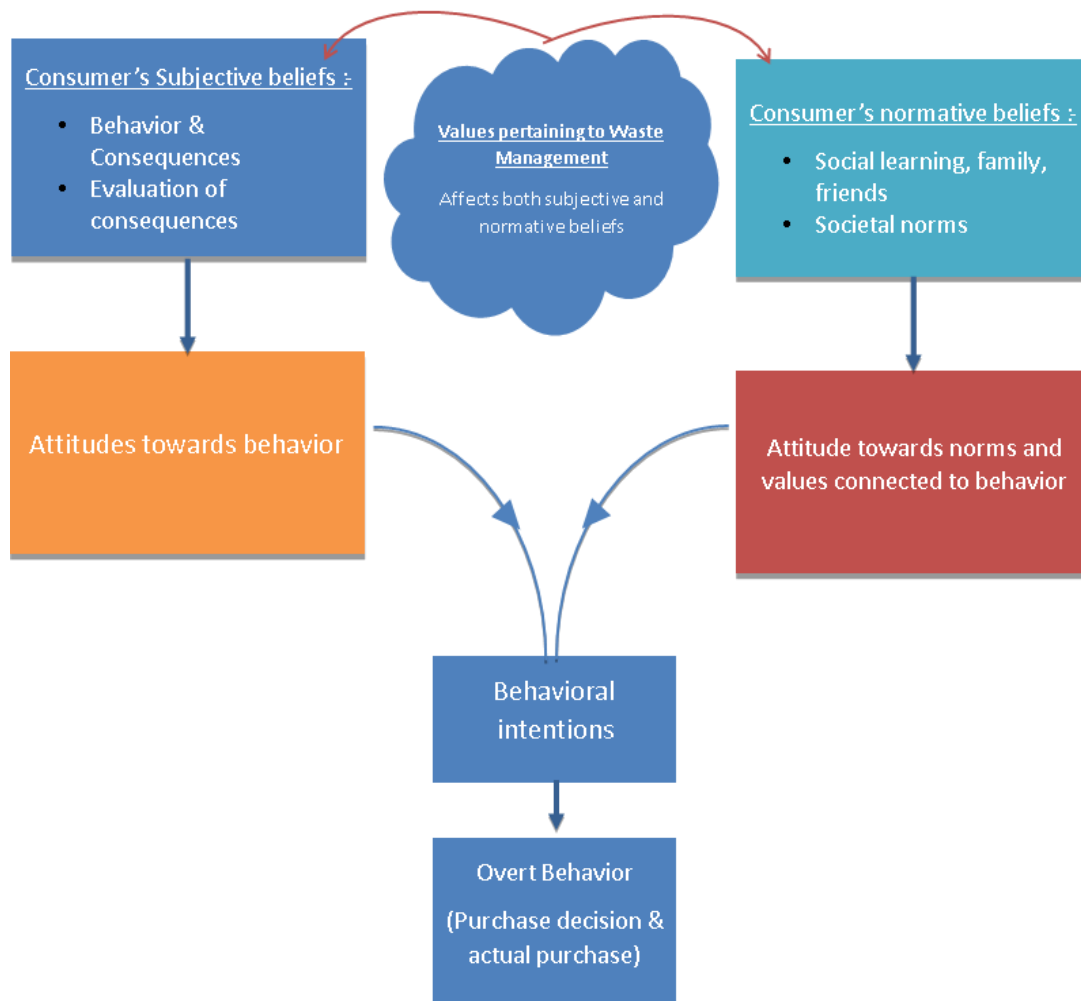
Fig. 1.4 Relating Marketing Mix with consumer decision making process

This gathered information may be used to predict the purchasing habits of the consumer and help the marketer in taking key decisions pertaining to the entire spectrum of the marketing mix. For instance, marketers targeting consumers with a lower income in a socio-economic area that is considered to be backward can be assumed to be specifically price conscious and therefore the pricing of the products can be done accordingly so that the marketer doesn't lose those set of consumers.

Marketers must also give due weightage to understand the 'value set' of the consumers. This will enable more success to the marketers in their marketing campaigns. A good example of this is 'quality'; marketers must sell the targeted consumers such quality products that deliver and re-enforce their values. This is the way to carve out a special position in the minds of the consumers called as 'market positioning'. Marketers may attain incomplete or partial success if their marketing campaign doesn't sufficiently reflect the values of the consumer. Values impacting consumer choices are their (i) morals (ii) knowledge (iii) beliefs and (iv) customs. It has an impeccable effect on the goods/ services that consumers actively seek and purchase.

Fig. 1.5 Steps Revealing the Relation between Marketing Strategy and CB [Source chegg.com]

1.5 Problems in Study of Consumer Behavior

The major hurdles and difficulties pertaining to the study of consumer behavior and its associated research areas include

1. A consumer may be clouded by multiple buying intentions & motives and might be unable to express his central motive. This becomes a prime challenge for the researcher as far as the identification of the basic buying motive is concerned.

2. Changes are a rule. The consumer's personality is subjected to changes in socio-psycho-economic structure which in turn affect their (i) behavioral attitudes (ii) beliefs and (iii) values. Subsequently his buying motives also undergo a change on this account. Therefore it can be said that the study of consumer behavior is certainly not a one-shot affair because it demands regular and consistent periodic updating. For instance, resorting to recycled and reusable products is a fashion statement these days.

3. A consumer may sometimes be in a dilemma or sometimes be too ignorant to understand his inner urge for a product / service that prompts him to either buy or not buy at all. The

consumer researcher feels technically paralyzed in this situation as he does not draw any clue to identify the main buying motive.

4. A consumer may feel hesitant in either explaining his buying motive or may end up giving a misstatement of his motive. This leads the researcher to misled information and the idea of arriving at the real motive for buying stands defeated.

5. Consumer behavior studies are a sub domain of social science and therefore the techniques involved in it are of empirical nature and cannot be precise like in the case of science or mathematics. Therefore, the conclusions drawn often tend to be distant from reality, imperfect and at times be unsuitable for implementation.

Direct Problems Encountered in Consumer Behavior Studies
   1. Dissatisfaction or Dissonance

In such sort of decision making, a consumer may experience pre or post-purchase dissonance.

   (a) **Pre-purchase Dissonance**occurs when the consumer gets confused with the plethora of available choices and feels impaired to buy with confidence under the given number of available choices and ultimately avoids the risk of not buying the best and ends up postponing his purchase.

   (b) **Post-purchase Dissonance**is observed when the product does not match with the need or does not commensurate with the consumer's expectations. This generates both anxiety and dissatisfaction with the product purchase. Such dissatisfaction is known as post-purchase dissonance as it is experienced after the purchase has taken place.

   2. Problem Recognition

Problem recognition usually occurs when a consumption situation exists. Consumption is seen as a function of degree of involvement. It may be high or low. Several situations prompt a consumer to purchase a product and finally buy it. There are few situations which are general, are of common nature & can't be recalled with ease. However, some occasions are special and can be immediately recalled. This is again dependent on the degree of consumer involvement.

   3. Threshold Level

In problem recognition, this is referred as the minimum amount of energy,tension or intensity which is necessary for the feeling of 'need' to occur. Tension is often increased by enhancing brand or peer comparison. Problem recognition is seen as a perceived gap between desired and existing consumer position. Existing consumer position is how one feels presently about the product. Desired position is his expectation and anticipation about the products and their performance. As the consumers grows financially, physically and psychologically,a perceived gap is created which keeps on getting broadened up between the existing and desired position over a period of time. For e.g., a growing

child first needs a tricycle, then a bicycle, and then a motor cycle and so on. Marketing stimuli fully influences the desired or current state of mind or both. The same is depicted via figure 1.6.
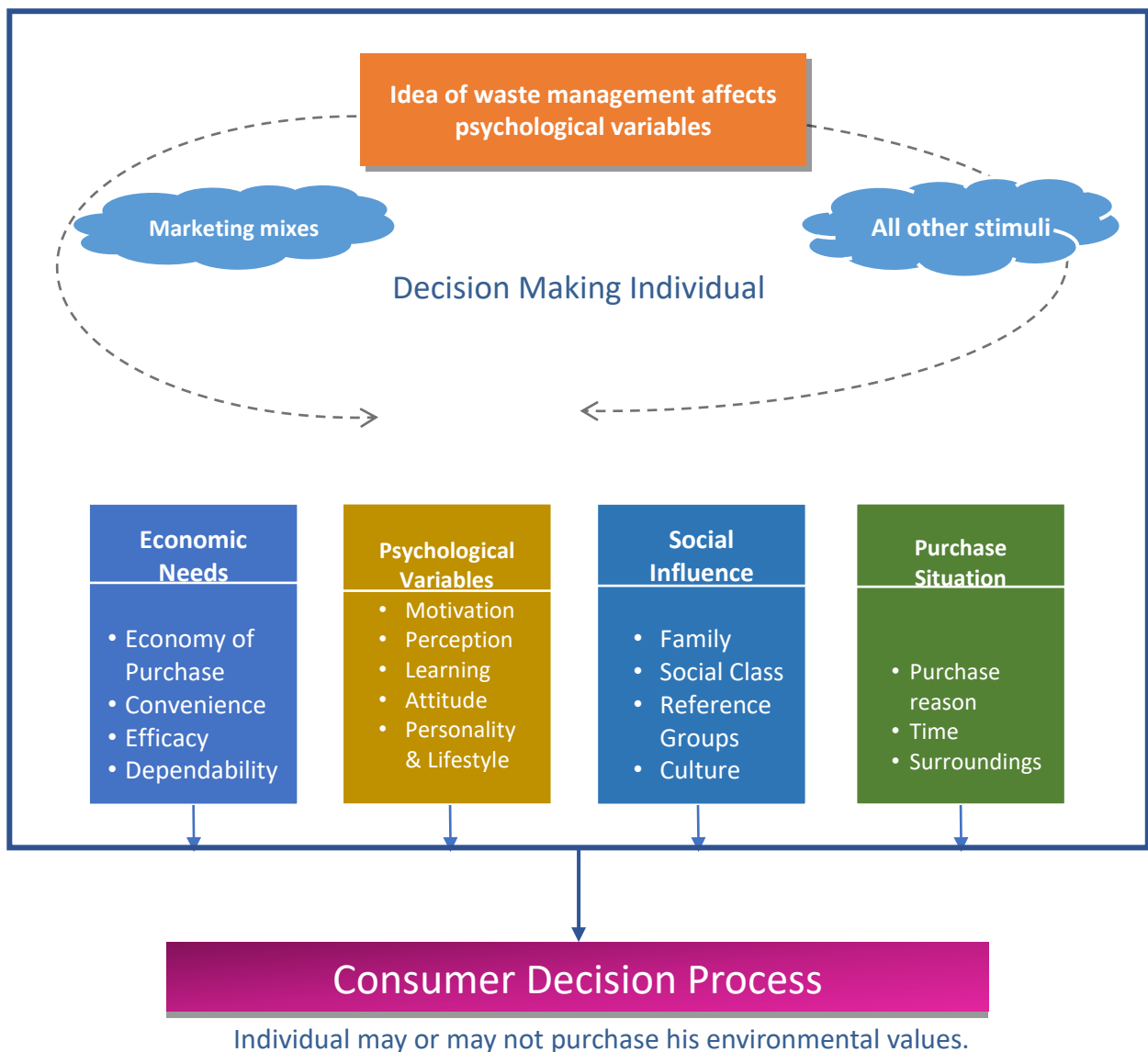
Fig. 1.6 Representation of how a perceived gap may be minimized by inclusion of waste mgt practices

The desire to resolve a problem depends on the
(a) Extent of discrepancy and
(b) The relative significance of the problem

4. **Inactive Problem**

It is a situation wherein the issue remains either hidden or an urge for finding its solution has not yet begun. For example,When the consumer is unaware of existence of gas lighter and resorts to usage of match box for lighting purposes or a consumer who doesn't know the advantages of a cell phone and only knows telephone as an instrument for distant communication. The marketer must aim at

activating such type of inactive problems.

5. Marketing Strategy and Problem Recognition

Marketers are concerned with the following issues

- The problems faced by consumers
- The marketing mix intended to solve the problem at hand
- Ways to incorporate waste management in their products / services
- Insufficient consumer education
- Issues pertaining to suppression of problem recognition.

Managers may decode the issues faced by consumers through direct interaction and decide upon the improvement areas.However, there might be a situation when the problem identified by marketer may prove to be of little importance to the consumer. It is therefore advisable to employ specific techniques for identification of problem recognition. Some such techniques are(i) survey (ii) focus group interviews(iii) product analysis (iv) problem analysis or activity analysis (v) human factor research or emotion research.

- Activity analysis- focuses on a particular activity
- Product analysis- deals with the use of product
- Problem analysis- states the problems and asks respondents to associate a product brand or activity with it.

6. Developing Marketing Mix

Once the problem is recognized, a marketing mix is offered to solve the problem product development or alteration, modifying channels of distribution, changing pricing policy, revising advertising strategy. Many people want to remain slim or stay away from diabetes, yet want to enjoy sweets. Sugar free is their solution. Weekend stores and night stores provide more shopping time. When you are financially independent you are exposed to insurance and credit cards to solve your future problems.

7. Activating Problem Recognition

By glorifying the magnitude and importance of discrepancy the competitor brand may offer such advertising benefits that are mouthwatering and promote asense of excitement among the consumers.This immediately questions the perception of the existing product or brand. A problem that was not existing previously has now percolated the minds of the consumers and the consumers are now activated enough to go for a 'brand switch over'. A point to observe here is that consumers often realize a problem only after becoming a victim and when it has got too late to react. For example, aconsumer becoming aware of insurance benefits after meeting an accident.

Model Questions

1. 'Waste management is getting a sincere push from the end of consumers and their urge is growing towards becoming environment- friendly'. Elucidate the statement in the light of applicable characteristics of consumer behavior.
2. What type of consumers can contribute to the inclusion of waste management practices in marketing? Justify your answer.
3. Explain the generic trends in consumer behavior that have propelled the concept of waste

management in a positive direction.

4. Relate the concept of waste management with the following approaches of consumer behavior
   (a) Positivist approach
   (b) Interpretive approach
   (c) Behavioral approach
   (d) Cognitive approach

5. Applying inter- disciplinary analysis bring out the difference between cardinal and ordinal utility of consumer behavior.

6. Which approach of consumer behavior best substantiates the concept of waste management?

7. Can marketing strategies mold consumer behavior in the direction of waste management? Give proper justification.

8. Which application area(s) of consumer behavior best compliment(s) the propagation of ideology of waste management?

9. Briefly narrate the steps revealing the relation between marketing strategy and consumer behavior.

10. Waste management is a concept that will slowly percolate in the minds of consumers. In the light of the statement discuss the problems related to consumer behavior that retard the acceptance of waste management practices in real world scenario?

Summary

- Consumer Behavior is the study how consumers carry the process of selecting, buying, using, evaluating and disposing of products to satiate their needs.

- Few characteristics of consumer behavior include its dynamic nature, consumer to consumer variation, product variation, demographic and psychographic variation and reflection of status.

- Types of consumers include seasonal, personal, organizational, impulse, need based, habitual and discount driven consumers.

- Generic trends that match consumer behavior with waste management practices are usage of social media, green product preference of millennial, constant demand for a healthy lifestyle and brand resonance with the environment conscious consumers.

- Managerial and holistic approaches are the two generic approaches of studying consumer behavior. Traditional approaches of direct relevance to waste management are positivist and interpretive approach. The contemporary and popular approaches of consumer behavior are cognitive, behaviorist & the psychodynamic approach.

- The marketing mix and marketing strategies have to be in consonance with the waste management practices so that sustainability can be better attained.

- The major problem in the study of consumer behavior includes cognitive dissonance which implies dissatisfaction of the consumers because their expectations are not aptly met. This could again be due to poor performance of products made from waste or recycled materials.

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Chapter 2 Internal Determinants of Consumer Behavior

Introduction

Motivation to implement the practices of waste management is vital for consumer behavior related interventions of contemporary times. Various theories have been proposed which proves that self-actualization is the ultimate motive which should necessarily include imbibition's of waste management practices for a sustainable future. This unit also narrates how the attitude of consumers can go a long way in creating a marketing schema that satiates everyone in the supply chain. The strategies for enhancing positive consumer perception about eco- friendly products have also been discussed because consumers have a preconceived perception about products that are closer to waste management practices. Learning is a continuous process that craves for integration of new environment friendly processes into the mainstream cognitive thinking patterns of consumers. Various learning theories have been discussed on these lines. Also, the personality and lifestyle of consumers dramatically dictate the way in which waste management could resonate with their self- images. Also, opting for a healthy lifestyle is a new trend that would become a way of life for the upcoming generations.

Objectives

- To familiarize the learners with the basic internal determinants of consumer behavior like motivation, learning, attitude, perception, personality and life style.
- To extend the theoretical internal determinants of consumer behavior so as to include waste management as an integral part of holistic marketing via thought proving model questions.

2.1 Motivation

Concept of Motivation

'Motivation' can be defined as the driving force within the individual that propels him or her towards a behavior or action. This driving force can be introduced by external agents and by creating a state of tension or dissatisfaction about an unfulfilled need. The millennial generation seems to be motivated enough to include waste management interventions in their consumption processes in the light of alarming after- effects of environmental degradation. Motivation has a significant role to play in shaping the behavioral pattern of people. It is basically the fulfillment of a need or achievement of a goal or satisfying some motive that drives an individual to make a purchase.

'Motives' can be defined as the underlying reasons for occurrence of particular purchase behavior. When these motives get aroused they energize and illicit a specific consumer behavior. Many a times the need of the individuals remain dormant for a long time and an arousal of any particular set of needs at any given time may get triggered by an individual's physiological condition, emotional or thinking processes or due to situational stimuli.

Process of Motivation (Diagrammatic Representation)
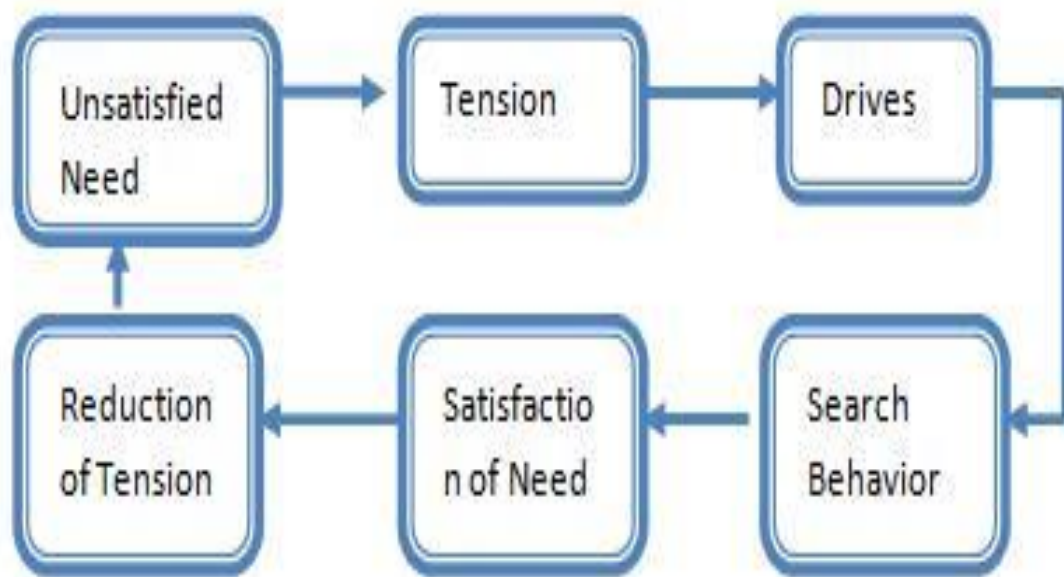
Fig. 2.1 Diagrammatic Representation of the Process of Motivation
[Source mbaknol.com]

Role of Motivation in Molding Consumer Behavior (Justification via Theories)
Motivation indeed plays a significant role in influencing as well as shaping the consumer behavior. Various motivation theories have been proposed so far to explain the process of motivation. Among these theories two theories have gained eminence in the field of motivation in consumer behavior. These are

1. Abraham Maslow's Need Hierarchy theory
2. McGuire's comprehensive scheme of psychological motives.

These theories are discussed as under
   1. **Abraham Maslow's Need Hierarchy Theory**

Maslow's need hierarchy theory is based upon the fact that people attach different priorities to different needs that they become aware of. This theory tries to generalize the five level hierarchies in which different needs of an individual surface yet it cannot be seen as a definitive specification as to what these priorities may be. Despite several criticisms this theory is widely used by marketers to know how various products or services fit into the plans, goals and lives of potential consumers. This theory is quite useful in developing advertising appeals that are focused on a specific needs level that is shared by a large number of target market audience.

The model has been diagrammatically described as
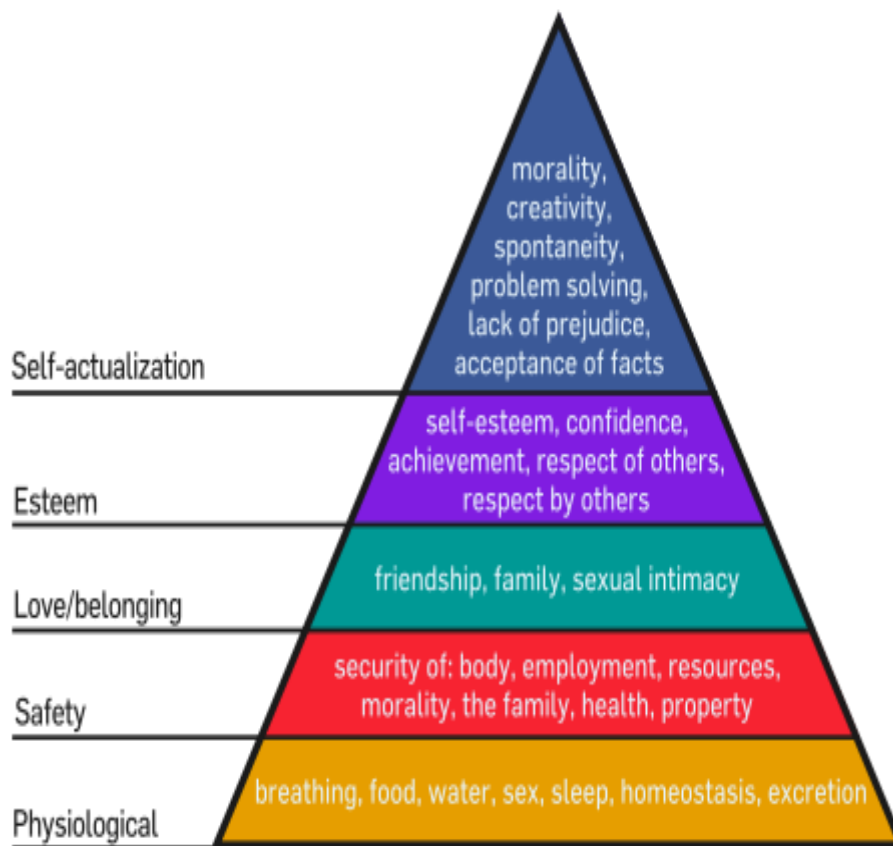
Fig. 2.2 Diagrammatic representation of Maslow's need hierarchy theory
[source en.wikiversity.org]

Explanation of various levels of needs as given by Maslow

Table 2.1 Explanation of Various Levels in Maslow's Need Hierarchy Theory

S.No	Need Level	Description	Example
1	Physiological Needs	These are the first and most basic level of needs and are very potent when they are chronically unfulfilled.	Axe deodorant advertisements using sex appeal are actually harping upon these needs of the target audience.
2	Safety Needs	They are concerned with routine, familiarity, security, certainty & stability.	The advertisements of life insurance, vaccines focus on such needs.
3	Social Needs	These needs include love, affection, acceptance & belongingness etc. Since man is a social animal it needs strong attachment with family, friendsand relatives and among his social circle.	Personal care products often emphasize on appeals based on social acceptance.
4	Esteem Needs	These needs are concerned with status, reputation and self- esteem, success and independence etc.	Advertisements of luxury brand of cars, watches, designer clothes, jewellery etc. appeal to this need of

S.No	Need	Description
5	**Self Actualisation Needs**	This level of need refers to a person's desire to become what one is capable of. In this, the individuals strive for excellence in whatever they do. Since these needs are different for different people therefore they cannot be profitably captured as a marketing opportunity by marketers in most of the cases. Environment conscious consumers strive for inclusion of waste management principles in the products due to self actualisation.	Army Recruiting Organization appealing to its target candidates by focussing on glory, pride and patriotic duty.

(Note: the first row at top reads "target audience.")

2. McGuire's Comprehensive Scheme of Psychological Motives

William J. McGuire presented a more comprehensive list of 16 motive categories which he divided into four categories based on two criteria

    a. Cognitive or Affective Motivation

    b. Preservation or Growth Motivation

The comprehensive scheme of classification of these motives that influence consumer motivation, is narrated in the table below.

Table 2.2 Classification of Needs given by McGuire Along with Explanation

S.No	Need	Description
		Cognitive Preservation Motives
1	**Consistency Need**	This is an active, internal need and relates to the maintenance of a consistent and coherent view of oneself and the world. The main intention here is reduction of cognitive dissonance. It is because of this need that consumers are often reluctant to accept the information that does not agree with their existing beliefs.
2	**Attribution Need**	This is an active, external need and focuses on understanding and inferring causes for various occurrences.
3	**Categorization Need**	This is a passive, internal need and relates to need for categorizing variety of information that a consumer is exposed to.
4	**Objectification Needs**	This is a passive, external need and focuses on observable stimuli or symbols that help people draw conclusions about how they feel and know.
		Cognitive Growth Motives
5	**Autonomy Needs**	This is an active, internal need that focuses on individuality and personal growth. It is based on realization of self-actualization need and is fostered mainly through cultures.
6	**Stimulation Needs**	This is an active, external need that focuses on getting stimulated through new experiences, explorations, events and circumstances. This need is well displayed in case of variety seeking buying situation such as in the

		case of shopping goods.
7	**Matching Needs**	This is a passive internal need that is based on ideal situations that people can often create in the mind about a particular situation, event, product or brand. While making purchase decisions they tend to compare the actual situation with the ideal situation.
8	**Utilitarian Needs**	This is a passive, external need and is focused on the need to make use of different sources of information in the external environment for one's advantage. Consumers view sources of marketing information as a means of learning about products, services and lifestyle etc.
Affective Preservation Motives	
9	**Tension Reduction Needs**	It is an active, internal need that is felt when our unfulfilled need causes undesirable amount of stress and tension which nobody wants to experience and everyone wants to avoid.
10	**Self- expression Needs**	This is an active, external need and deals how an individual projects his identity to others by letting them know about his lifestyle via clothing, jewellery, car etc.
11	**Ego Defence Needs**	It is a passive, internal need in which people often try to protect themselves from social embarrassment and other threats to self concept
12	**Reinforcement Needs**	This is a passive, external need that focuses on the theory of instrumental conditioning in which people experience a strong motive to act and behave in a certain manner because that particular behaviour brought rewards in similar situations in the past.
Affective Growth Motives	
13	**Assertion Needs**	It represents an active, internal need and focuses on a drive to be successful by competing and striving for power and admiration. People with such type of motivation have a strong sense of dominance, accomplishment and success.
14	**Affiliation Needs**	It is an active, external need that focuses on establishing warm, affectionate, personal relationships with others.
15	**Identification Needs**	It is a passive, internal need that drives people to adopt new roles and identities as to increase one's self concept. People enjoy adopting new and satisfying roles by assuming or taking up new responsibilities.
16	**Modelling Needs**	This is a passive, external need in which groups recognize and approve some endorsers and often consider them as role models. This motive is aptly used by advertisements that use celebrity endorsements in order to convince a group of customers, with whom that particular endorser is very popular.

2.2 Learning

Meaning and Concept

Consumer learning is how an individual (consumer) acquires information and knowledge in the matter of consumption. Consumer learning is mostly an unstructured and personalized process. Varying from individual to individual, the process uses one or more of the channels reading, observing, listening, experiencing or discussing. Inclusion of waste management principles in the mainstream marketing is a resultant of what the consumers learn about the environmental degradation in newspapers, magazines, internet, television etc. Learning is also subject to eclipse and fading. At any given time, the behavior of the consumer is dictated and influenced by the

learning retained till that time. This explains why marketers continuously strive to refresh the minds of the consumers by their advertisements, communications and messages to reinforce learning favorable to their products.

Theories of Learning
The process of learning has recognized two theories which are directly applicable to consumer behavior. They are discussed as follows

1. **Stimulus- Response Theory (Behavioral Learning Theory)**

This theory is backed up by the fact that the human beings receive stimuli continuously, react and recognize the stimuli and associate the stimuli with experiences before reacting. Initially, the receiver just recognizes the simultaneity of the actual experience generated and the stimulus. In course of time, when the same stimulus is repeated and the experience is also repeated, the brain of the individual learns the relationship between the cause (stimulus) and the effect (experience) and creates a short- cut. Due to this short- cut the brain makes the individual react much faster on repeat occasions even before the experience is felt. It makes the individual expect a particular pre- tasted experience as soon as stimulus is observed.

Its prescripts are discussed in the table below.
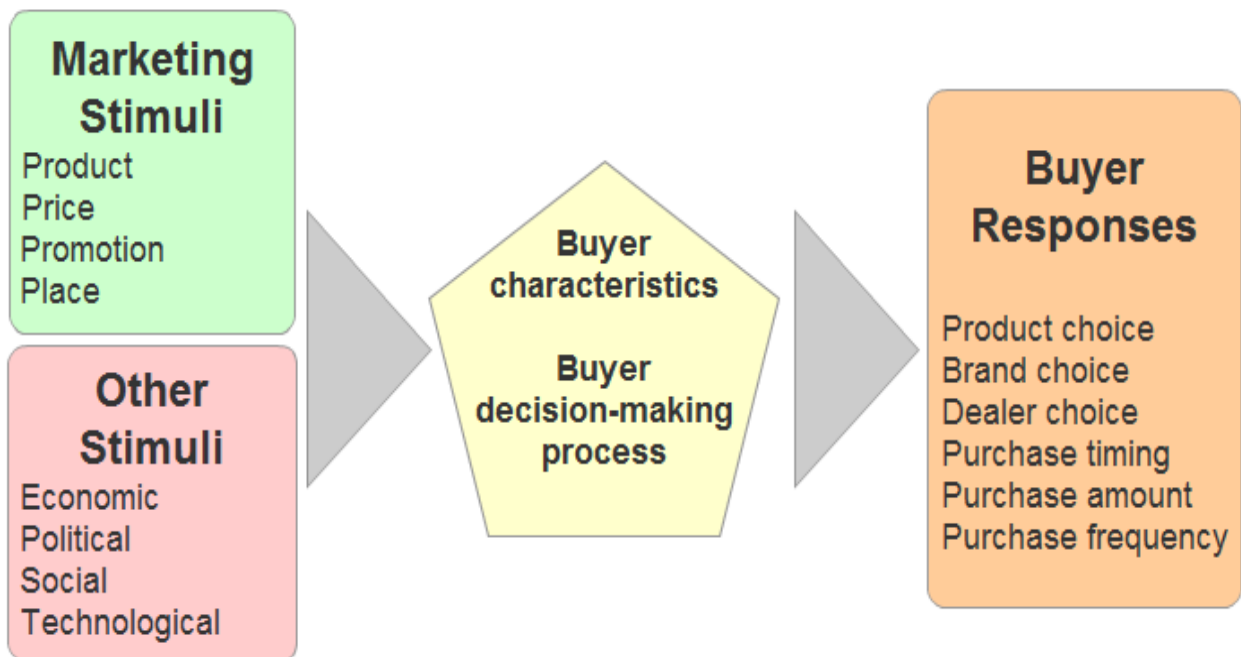
Fig. 2.3 Stimulus response model
[Source cellcode.us]

Table 2.3 Prescripts of the Stimulus- Response Theory

S. No.	Phenomenon	Description
1	**Generalization**	This is a phenomenon where the receiver generalizes the information in a marketing message without paying attention to the brand or recognizing the originator of the message. To overcome the possibility of loss of message due to generalization, the marketer should design the stimulus in the message that is somewhat distinct to make the individual discriminate and not generalize. The effects of generalization are in fact enjoyed by the 'small time', unbranded and 'me too' products. Their business grows due to increase in generic demand created by the advertisement efforts of the majors.
2	**Fade out**	Learning once made is neither permanent nor erodible. Therefore, for a proper implantation of learning, the marketer generally agreed that the consumer requires at least three exposures to a message (or commercial). Even after learning is so implanted, over a period of time, a slow fade out and erosion takes place. Marketers therefore always plan to refresh or reinforce the implanted learning favorable to their products.
3	**Retention**	Retention is facilitated by continued usage of the product and continued imaging of the brand. Opportunities provided through innovations and novelty help a lot in refreshing the minds of consumers and create retention. The best examples of this process are seen in the promotion of items like toothpastes, soaps, shampoo etc.

2.Cognitive Learning Theory

Cognitive learning theory believes that much of the learning that matters is based on active search for information and active participation and thinking by the learner. It assumes that individual is not a passive receiver but seeks and processes information and formulates own learning by experiences and perceptions. The individual forms mental images of everything and uses these images for making choices. The principle schema of cognitive learning theory is depicted as
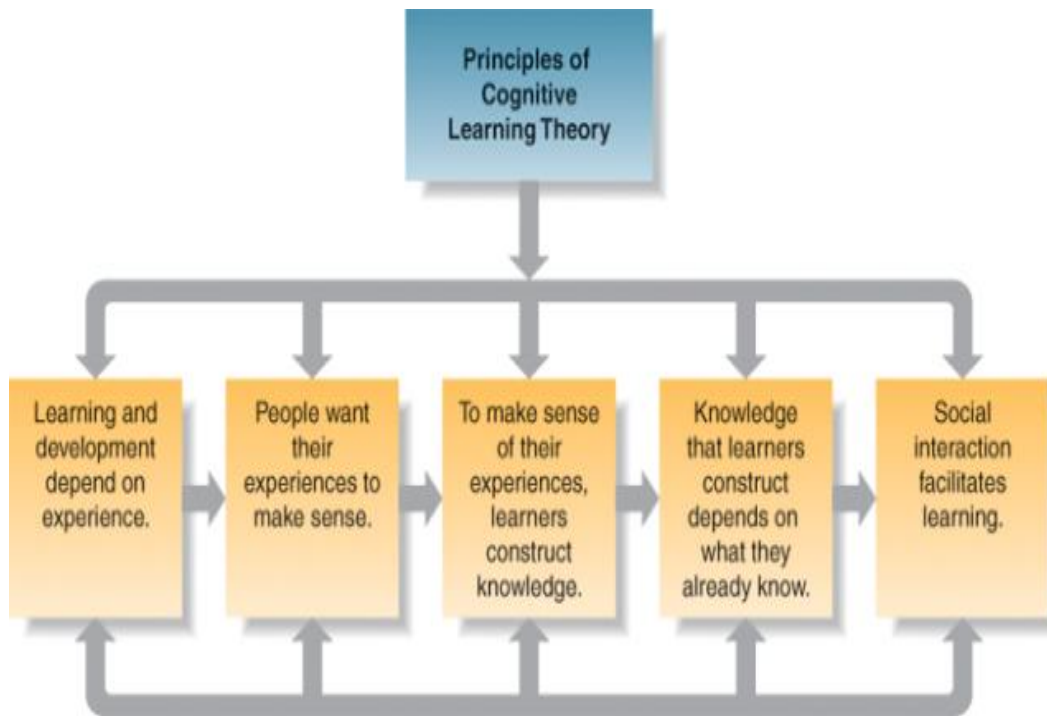
Fig. 2.4 Principles of cognitive learning theory
[Source wordpress.com]

The functions of human brain pertinent to cognitive learning theory are listed in the table below.

Table 2.4 Functions of human brain as described in cognitive learning theory

Function	Description
Memory	Theorists of cognitive learning theory assume that all information received by the individual is temporarily carried into the brain but only a small portion of this is cognized and the rest is ejected. The cognized bits of information are rehearsed, packaged and sent into memory, short term or long term, depending upon the importance.
Logic	The logic of the human brain comes into play not only after memorizing but also during memorizing. Once, the information is cognized, logic comes into further play to decide as to where it should be carried- to the long term memory or to the short term memory.
Retrieval	Retrieval occurs when commanded by the logic of the brain. It is a play back of the entire learning and the imagery for the individual's benefit, and helps the individual to make choices. It works like a CD replay that occurs when the rewind select play buttons are pressed.

Branding as an Indispensable Tool for Consumer Learning

The ultimate objective of any marketer is to create a meaning or equity connotation to his brand. If the consumer can be made to remember and recall the brand, more than half the job stands done and the entire circle of learning that was delivered earlier now comes handy. Products and services based on the principles of green marketing or environmental marketing are consistently trying to carve a more eco- friendly acceptance of their brands. Branding is the fundamental weapon to impart learning to a consumer. While brand in itself may not cover any information, it acts as a

wonderful tag. You can propel the consumer pick up the brand tag and along with it all the related information that he learned and stored becomes a facilitator.

2.3 Perception

Meaning and Concept

'Perception' is defined as the set of processes by which an individual interprets various stimuli received and attaches certain meaning to it in order to form a picture of the world. The stimuli are received through the sensory organs namely eyes, ears, mouth, nose and skin and sorted out by the brain and stored as information for further usage by recall. While doing so the individual's brain colors and tags the information usage its own logic and the previous experience/ memory, if any. In fact, the reality of the world and everything that surrounds is merely the perception of the individual. For instance, any organization which chooses to base its products on eco- friendly guidelines will be perceived as an organization with a sense of environmental stewardship.

Process of Consumer Perception

The process of consumer perception involves the following steps and depicted in the figure below
- Select certain stimuli by pre- tuning them (Selective attraction)
- Filter certain stimuli attenuating or Chaptering them (Selective attention)
- Amplify accepted stimuli for forming perceptions (Interpretation)
- Based on the understanding & interpretation generate a response
- Store away certain Chaptered stimuli for future reference
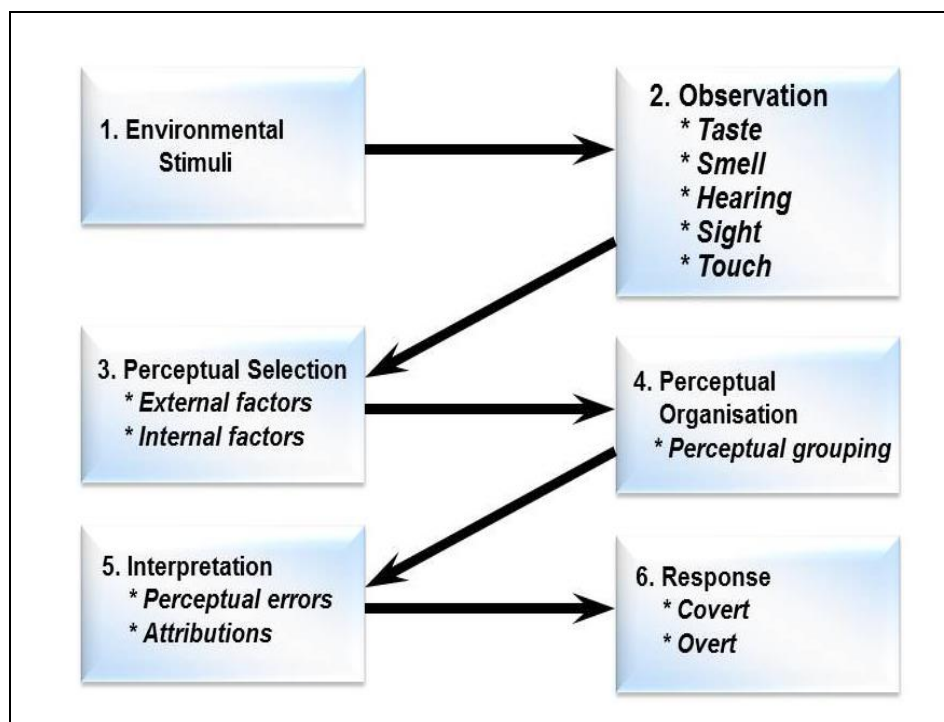
Fig. 2.5 Process of Perception

[Source samyoung.co.nz and adopted from Hellriegel et al. (1999)]

for notice is called the Just Noticeable Difference (JND). The JND is a main problem for the various dry cell battery manufacturers. Even the market leaders capable of giving marginal improvements.

Significance of Consumer Perception and JND

Perceptions so formed will come into play when the individual has to take any consumption decision. Therefore, perceptions about a product or service that are formed in the minds of the consumers are vital factors for the success of the product or service in the market. Astute marketers therefore take extraordinary care to study how perceptions are formed and how they can be positively manipulated.

When a person receives two similar stimuli in succession, the second stimulus may not be noticed at all unless it has at least a minimum difference in strength (intensity) when compared with the first. The minimal difference needed wait for a major breakthrough that can give improvement well above JND. JND, the phenomenon applicable for all stimuli and sensations, is of particular importance when marketers introduce changes in the packaging. Reducing the quality and quantity of a product below JND keeping the packaging and price same is unethical. The marketer has to determine the JND of a product and employ it wisely in communicating with the consumer especially through advertisements in the following cases

    a)   Incremental change in price
    b)   Improvement in the product

Factors Influencing Consumer Perception of Quality (before, at the point of purchase and after purchase)

<div align="center">

Table 2.5 Factors Affecting a Consumer at Different Points of Purchase

</div>

Before purchase	At point of purchase	After purchase
Company's brand name and image	Performance specifications	Ease of installation and use
Previous experience	Comments of salespeople	Handling of repairs, claims, warranty
Opinions of friends	Warranty provisions	Spare parts availability
Store reputation	Service and repair policies	Service effectiveness
Published test results	Support programs	Reliability
Advertised price for performance	Quoted price for performance	Comparative performance
*Not necessarily in order of importance.		

Subliminal Perception in Consumer Behavior

Certain stimuli are weak or transient and go unnoticed by the consumers. These stimuli appear to get registered in the individuals at the subconscious level. When such registration gets repeated or strengthened by another stimulus, the subliminal perceptions surface and guide the individual. The stimuli that can cause subliminal perceptions are

- Whispered or low amplitude audio messages
- Hidden or embedded imagery or text
- Flashed visual images of duration less than a second

Strategies for Enhancing Positive Consumer Perception

A company marketing its products constantly strives to make the consumers form a positive and favorable perception about the company and its products. For this, the stimuli sent out by the company through its messages, packaging, advertisements and the very products themselves should stand out. Some strategies to make the stimuli stand out are given in the table below.

Table 2.6 Description of Strategies Stimulating Positive Consumer Perception

S.No.	Strategy	Description
1	**By Contrasting**	Inviting attention to an advertisement by employing contrast with the surroundings in size, color, color- reversal, or style is common. For example A short silence in an audio commercial or a blank space in a closely printed page or a color sot in a black and white visual create contrast & can be used with advantage. Printing a message upside down, using a different language and symbols, printing a teasing message etc. are some of the other methods which broadly fall in this category.
2	**By Projecting the Unexpected**	Delivering the blow where and when it is least expected is another strategy to grab consumer attention. Stimuli that demolish certain prevailing myths or certain preconceived notions are always better observed. In fact one would tend to notice a message that contradicts a belief than another message which goes along with the belief. For example if you notice a commercial that depicts Dubai as a cool and green place; or Bangkok as a place for family holiday and religious pilgrimage, you are tempted to read the message fully.
3	**By Motivating**	At times, highlighting consumer dissatisfaction & subsequent projection of solutions can motivate a person to go for a purchase. By a roper design of the messages, the advertiser can grab the attention of the persons who are dissatisfied with a particular situation. Their perceptions of the cause of dissatisfaction can be molded and a positive perception about the solution created. For example The promotional campaigns for soft drinks in tropical countries have always projected how one gets thirsty and how thirst can be quenched by the soft drink.

Consumer Perception of Risks

Every consumer perceives some possible risks even with purchase decisions already taken. Apprehensions about these risks are not openly expressed. Even after a transaction is completed without any risks materializing, the consumer may carry the perceptions that there were risks. These perceived risks are

- Functional risk of the product not performing as expected
- Financial risk of having paid a higher price than necessary
- Risk of effort and time being wasted consequent to a possible product failure

Marketers can certainly do a lot to reassure the consumers post-purchase, on the correctness of the choice. Most importantly they should follow up every successful transaction and lay the foundation for repeat purchase and erase perception of risks.

2.4 Attitude

Meaning and Concept

The attitudes influence consumers' purchase and consumption patterns, therefore, the marketers are very much interested to know the consumer attitudes prevalent in a particular target market. Some significant definitions of 'Attitude' are mentioned in the table below.

Table 2.7 Few significant definitions of 'Attitude'

S. No	Propounder	Given Definition
1	**Gordon W. Allport**	'Attitudes are learnt dispositions to respond to an object or class of objects in a consistently favorable or unfavorable way.'
2	**D. Krech& R. Crutchfield**	'An attitude is enduring organization of motivational, emotional, perceptual and cognitive processes with respect to some aspect of our environment.' This definition assumes the attitude to be composed of following components (i) Cognitive (Knowledge) (ii) Affective (Emotional) (iii) Conative (Behavioral)
3	**Martin Fishbein**	According to Fishbein, attitude has multidimensional aspects & the formation of overall attitude towards an object is believed to be a function of (a) Strength of each belief the individual holds about various attributes of the object and (b) The evaluation that he gives to each belief as it relates to the object in focus

Properties of Attitude Relevant to Consumer Behavior

Two fundamental properties of attitude are their valence and extremity. They are described in the table below.

Table 2.8 Properties of Attitude

S.No	Properties	Description
1	**Attitude Valence**	It refers to whether the attitude towards a particular object is negative, positive or neutral.
2	**Attitude Extremity**	It reflects the intensity of like or dislike.

For example A consumer may like brand A or B of a particular product, may dislike brand C and be fairly indifferent towards brand D (valence). However, he may like both brand A and B but his liking towards brand B may be more than brand A.

Components of Attitude
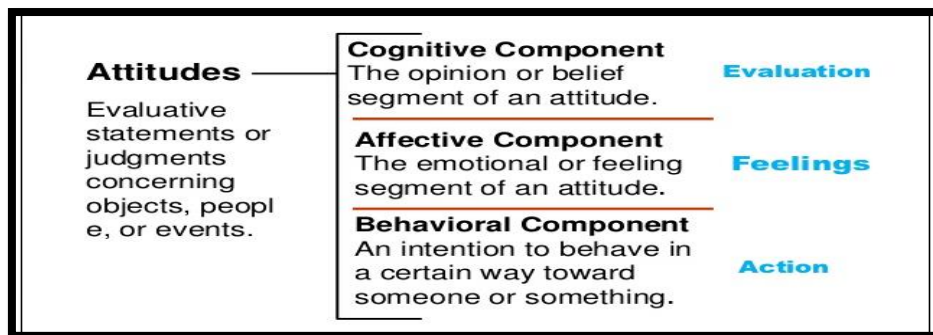
Fig. 2.6 The three components of attitude

[Source slideshare.net]

Models of Attitudes as Applicable in Consumer Behavior

1. **The Tri-Component Attitude Model**
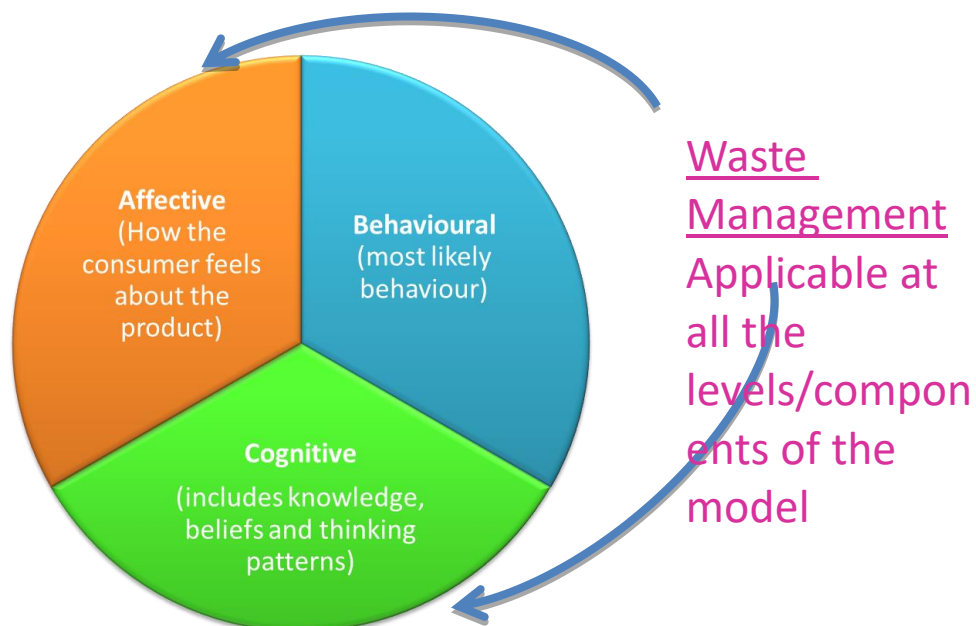
Fig.2.7 The Tricomponent Attitude Model (A B C Model)

This model is based on the context that attitude is made of three components

(i) Cognitive Component It consists of individuals knowledge, beliefs etc.

(ii) Affective Component It includes generation of feelings and emotional reactions to an object.

(iii) Behavioral or Conative Component It includes the likely behavior that the consumer shows towards object/ product/ brand.

Fishbein's Model

This model focuses on an individual's attitude towards his involvement in the purchase process and the behavior involved or with respect to an object rather than only the attitude towards the object itself. In other words, this model focuses on the perceived consequences of a purchase. From this model, one can conclude that a person may have a positive attitude towards a product/ service but his attitude regarding purchase behavior might be negative due to any reasons.

Attitude Theories to Explain Post Purchase Consumer EXPERIENCES

The two theories proposed to explain the role of post purchase experiences in the formation of attribute are

1. **Attribution Theory**
   - Proposed by D.J. Bem
   - In this, the consumers determine causes (attributions) for events after the occurrence of events.
   - According to this theory, consumers often look at their own behavior and then make judgments about it.
   - These evaluations in turn leads to the formation of consumer attitudes and at times bring in attitude changes.
   - For eg. A consumer regularly using Colgate toothpaste may conclude that it is good toothpaste based on his or her own usage of the product over years or months.

2. **Cognitive Dissonance Theory**
   - Proposed by Leon Festinger
   - As per this theory, in case of high involvement decisions consumers experience a state of discomfort, doubt and anxiety in post purchase condition. These feelings are called as cognitive dissonance.
   - The probability of the occurrence and the extent up to which this dissonance may occur depends upon
     o The extent of commitment
     o The importance of the decision to the customer
     o The inability or difficulty to choose between the available alternatives
     o Personality characteristics of the buyer also have an influence

Fig. 2.9 Personality traits relevant to consumer behavior [Source slideshare.net]

Strategies for Change of Attitude

Table 2.9 Marketing Strategies to Change Consumer Attitude

Consumer's attitude	Marketing strategies
Brand A is made by a company which is very large and therefore good.	Bring out that quality has nothing to do with the size of the manufacturer. In fact B's quality is equal or may be better and company B is small enough to devote greater attention.
Brand A has been giving good service for many years and why should I opt for anything new.	Bring out the specific advantage of Brand B. Compel the customer to try something new and novel.
Brand A is a tried product.	Highlight the innovations and latest techniques that go into the making of Brand B.
Brand A is the most popular one in the market and therefore must be good.	Brand B is popular in overseas market and many people are resorting to B now.
Brand A claims to be the best in the market.	Claims and counter- claims are not to be taken at face value.

[Source M.S. Raju & Dominique Xardel (2014). Consumer Behavior- Concepts, Applications and Cases]

Kenneth B. Ranyon has suggested five strategies that will help reduce post purchase dissonance and favorably influence consumer attitudes towards products. They are

1. Provide post purchase support through good services and immediate follow up on complaints.
2. Reliable product quality and performance should be advertised so as to reassure recent purchasers of the product.
3. Warranties and guarantees will help reduce risk and hence the dissonance.
4. Make direct contacts to ensure the customer understands how to use the product and to ensure post purchase satisfaction.
5. Brochures or advertisements can be used to provide additional product information and suggestions for product care and maintenance.

2.5 Personality and Lifestyle

Meaning and Concept of Personality &Traits

Personality is defined as combination of consistent and enduring characteristics like physical, mental, emotional and moral qualities of an individual that makes them unique and direct & dictate the person's responses to the environment. Personality is by nature enduring and consistent. However, battered by the environment and events that curtail freedom of action, personality may go into shell occasionally, to re- surface when freedom of action is restored.

The important inner characteristics of a person that have an additive effect in creation of a wholesome personality are referred to as 'personality traits'.

These personality traits are usually ingrained in a person and differ from individual to individual. The traits possessed by a person influence him and exhibit themselves through consistent and enduring behavior of the person. It is possible to observe these traits and classify a person and to predict the behavior of the person in consumption choices and purchase references.

Relating Consumer Behavior with Personality

Certain affinities are formed or exhibited by humans due to influence of personality. Persons of a particular type of personality feel an affinity towards other persons of the same type. They may also exhibit such affinity towards inanimate objects and the abstract when these match their personality. A clever marketer exploits the phenomenon of affinity and creates a personality projection for his product also. One has to only browse through exclusive magazines and journals to realize how many products there are today with a personality of their own- manly, womanly, young, adventurous, sporting, stylish, generous, mature, global etc. These are the products that are supposed to bring out the best in you, announce you to the world and sometimes take you to the pinnacle. For eg. Lifebuoy soap matches the personality of a rugged sports person whereas Lux soap matches beauty admirers like film stars.

Self- Image and Consumer Behavior

A self- image or self- concept is developed and nurtured by all persons who graduate as consumers. It can and does change with time as the consumer matures and moves you, down or side-ways in the social hierarchy. While the consumer makes purchasing and consuming choices compelled by the economic and social influences, he tends to defend them and merges these choices into his self-image.

The co- relation between self- image and consumer behavior and the consistency of findings by researchers have led to a detailed study of the phenomenon of self- image. In these studies the consumers give their perceptions and opinions.

Admiration of waste management practices and recycled products is often a part of self- image where theconsumer exhibits environmental citizenship in his basic character.

The marketer tries to mentally exploit the higher societal hierarchy to 'make symbolic statement through product consumption'. Such consumers are also exploited to define, protect, refine and further these symbols. Such exploitation does not confine itself to class consumers. For the masses too, marketers develop, personify and promote a hierarchy of products that match different self-images.
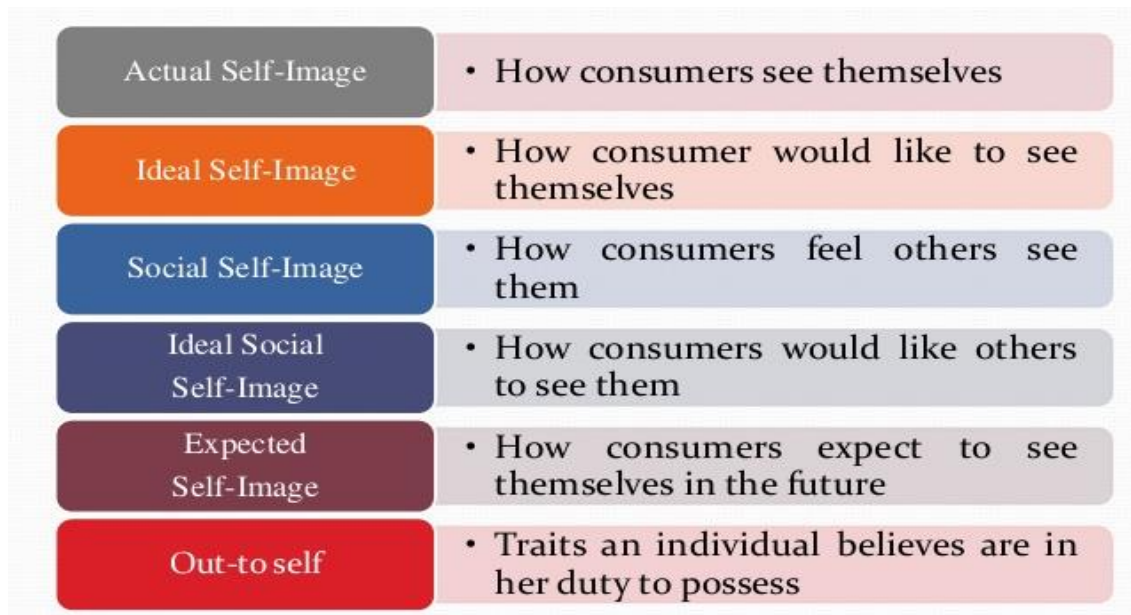
Fig. 2.10 Kinds of self images

[Source yogamysticism.today]

Depiction of relationship between brand & self- image

The satisfaction arising by superposition of self- concept and brand is like a boomerang that reinforces the cause that initiated it. This has been depicted in the flowchart below.
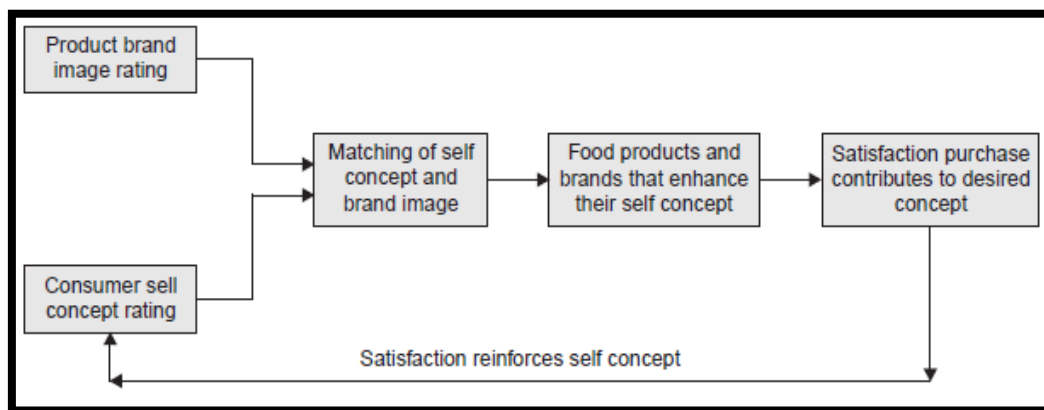
Fig. 2.11 Relationship flowchart between brand and self- image[Source slideshare.net]

Measuring personality traits in consumer behavior

The actual detection and measurement of the traits the marketer is looking for is done by administering tests which are to a certain extent psychometric and use techniques which are quantitative. The common tests and techniques are

- Self- assessment reports
- Projective techniques such as word- association, picture sorting, story completion etc.
- Direct observation of selected individuals

The tools used for measurement include voice recorders, video recorders, camcorders, hand writing & voice analyzers, retina cameras, skin galvanometers etc.

Lifestyle and Consumer Behavior

Meaning & Concept

Lifestyle basically refers to how a person lives and this influences the needs and desires of the individuals and hence their use and purchase behavior. Desired lifestyle is a major determinant dictating an individual's consumption patterns and decisions and this in turn reinforces or alters consumers' lifestyle in totality. Measurement of lifestyle in quantitative terms is termed as 'psychographics' and these studies typically include following determinants as mentioned in the table below.

Table 2.10 Determinants of lifestyle along with the description

No.	Determinants	Description
1	**Values**	These are widely held beliefs about what may be considered to be desirable or acceptable.
2	**Attitudes**	They are marked predispositions which may include evaluative judgments about other products, individuals, laces, ideas etc.
3	**Demographics**	This include gender, education, age, family structure, occupation, education standards, background, geographic location etc.
4	**Interests & Activities**	These include non- occupational behaviors in which consumers devote both effort and time such as sorts, dance, hobbies, dramatics etc.
5	**Media patterns**	It comprises the specific media the consumers utilize
6	**Usage rates**	Consumer categorization as heavy, medium or light user or as non-user.

Impact of Lifestyle on Consumption Process

The determinants of lifestyle pose a major platform in guiding how the needs of the consumers and the craving for a said lifestyle can be attained. This is manifested in the form of certain purchase behavior and subsequently affects the consumption of goods or services as depicted in the chart

below.

Molding Marketing Tactics to Propel a Favorable Lifestyle
The marketer needs to be hyper careful when dealing with a lifestyle conscious consumer. Certain do's and don'ts pertaining to it have been mentioned in the chart below.
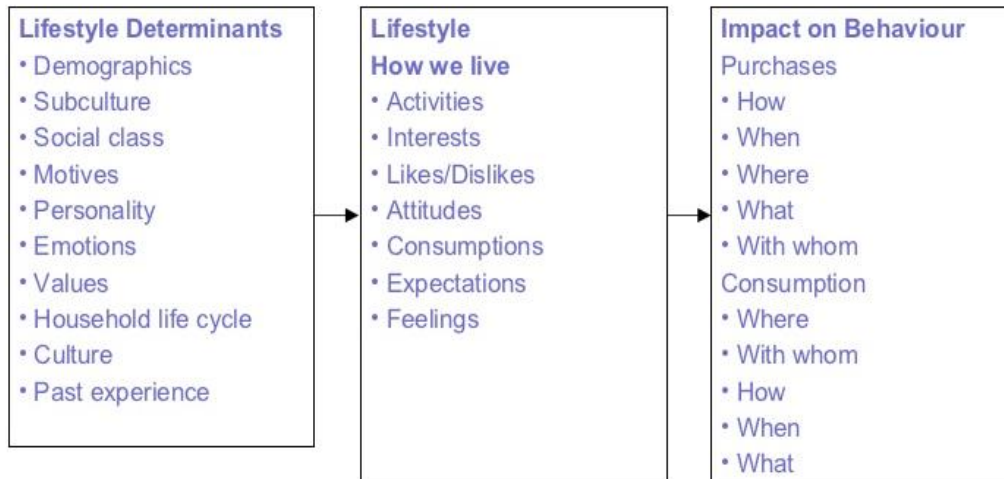
Fig 2.12 Chart deriving relationship between lifestyle and consumption process
[Source slideshare.net]

Fig. 2.13 Lifestyle marketing tips as applicable in consumer behaviour
[Source brewbound.com]

The VALS™System
One of the most popular applications of psychographic research as done by marketers of Strategic Business Insight's (SBI's) is the VALS™ program that provides for a systematic classification of consumers based on enduring psychological traits that correlate with purchase decisions. Its framework including brief explanation has been narrated via diagram mentioned below.
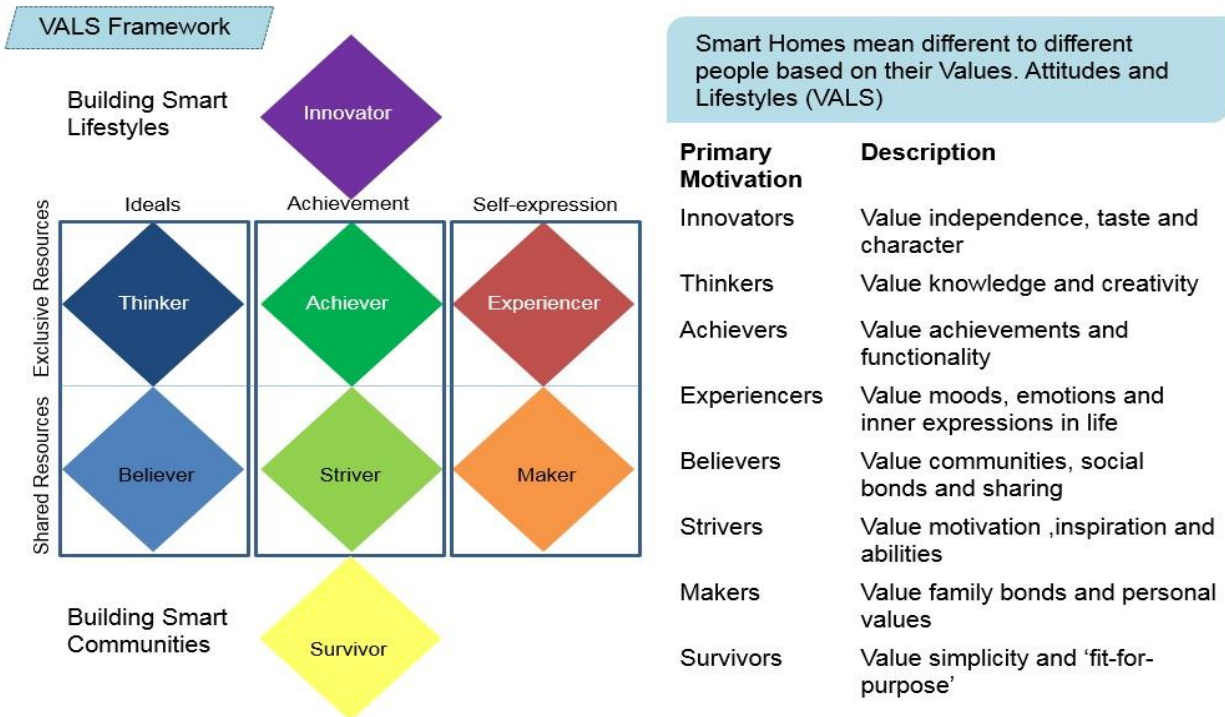
Fig. 2.14 Representation of VALS™ Framework Along with an Example of Smart Homes
[Sourcearilliance.com]

Summary

- Motivation is a driving force that propels an individual towards a specific course of action.
- Role of motivation in consumer behavior can be justified via Maslow's Need Hierarchy theory in which self-actualization needs crave maximum for inclusion of waste management practices as a matter of pride and universal applause. Almost all cognitive motives justify environment friendly notions in marketing and consumer behavior.
- Stimulus – response theory of learning indirectly denotes environmental degradation as a stimulus against which the conscious consumer must give a response by inculcating waste management interventions as their first priority.
- Consumers often hold perceptions that products stemming out of waste management practices (recycled products) are often poor in performance. This perception needs to be eliminated by strictly observing strategies that enhance positive consumer perception about recycled and reconditioned products.
- The Tri-component attitude model and the Fishbein's model both speak volumes about inclusion of waste management practices through their cognitive and conative dimensions. It is only this attitude that can steer consumer behavior in the direction of eco-friendliness.
- There should be a good consonance between the brand and personality traits of the consumer. A brand that works well on the lines of waste management would attract environment conscious personalities with a magnetic effect.
- A healthy lifestyle obviously calls for an environment friendly marketing atmosphere that integrates lifestyle with green products.

Model Questions

1. 'The motivation to work for environment by recycling the waste comes from within the individual & involves lot of self- actualization'. In the light of the statement, explain the Maslow's need hierarchy theory and its relevance in waste management.

2. In context to McGuire's comprehensive scheme of psychological motives, relate the following with waste management

3. Cognitive or Affective Motivation

4. Preservation or Growth Motivation

5. How can the concept of waste management be used as a stimulus to create favorable buyer responses? Relate your answer to the Stimulus- Response theory.

6. Apply the principles of cognitive learning theory to waste management.

7. 'Waste management practices can be glamorized to enhance positive consumer perception about the brand.' Use this statement to highlight certain perception related marketing strategies that make the brand a cut above the competing brands.

8. What are the consumer perception risks attached to buying such environment friendly products that are a result of waste management?

9. Apply the following models of attitude to waste management

10. The Tri-component Attitude Model

11. The Fishbein's Attitude Model

12. Express the various kinds of self- images as applicable in consumer behavior.

13. How can personality traits affect consumer behavior and help in adopting waste management practices?

14. Apply VALS™ framework to accommodate green waste management practices.

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Chapter3 External Determinants of Consumer Behavior

Introduction

The Chapter considers external determinants of consumer behavior which comprises those extrinsic forces that influence consumer behavior. Waste management principles are not just an outcome of individual's personal characteristics but also a result of how external forces synergistically act to speak in favor of environment management. This Chapter neatly covers up the influence of social class, family, reference groups and opinion leaders on the consumer decision making. The entire gamut of these forces has the potential to direct the purchase behavior in favor of environmental stewardship. Culture and sub- culture also play a pivotal role in determining the direction and quantum of purchase. Diffusion of innovation in collaboration with relationship marketing has also been discussed in this Chapter. The aim is to cover up all the factors that assist or sometimes retard the decision making process and how waste management principles sometimes become a bone of contention under the impact of these operational forces.

Objectives

- To discuss the impact of social class, family, reference groups, culture, sub- culture and opinion leadership in purchase decisions & how principles of waste management get imbibed into it.
- To discuss the essence of diffusion of innovation and find out how percolation of new products occurs in the minds of the buyers.
- To find out how relationship marketing can accentuate the imbibitions of the concept of environmental citizenship.

3.1 Family and Social Class

Concept of Family

The word 'Family' is defined as a group constituting two or more related individuals either by marriage, blood or adoption who reside together. There can be two types of families

Table 3.1 Types of families with brief description

S.No.	Type of family	Brief Description
1	Nuclear Family	It is comprises father, mother & children all living together
2	Joint or Extended family	It comprises the nuclear family plus other relatives inclusive ofbrothers, grandparents, uncles, aunts etc all living together

Relating family with consumer behavior

Family stands as the most basic consumption unit for all set of consumer products & it is the members of the family who exerciseutmost influence on the purchase behavior of the individuals. Purchase done by one member of a family is rarely independent of the influence of other family members. Apart from seeing family as a consumption unit; it can also be observed as an indispensable instrument to promote the socialization process of the children and offspring. Often a

sense of environment citizenship and inclusion of waste management practices in daily life stems from family values. Children often imbibe values by observing their parents / other family members and this not only molds their personality but also affects their cognitive patterns and mannerisms of decision making.

For instance, those children who have been brought up in a family environment where the price of a product is given heavy importance during purchases often grow up as extremely price sensitive buyers. Similarly those children who have observed their parents recycling products would be more interested in implementing waste management practices.

Variables Affecting Household or Family Purchase Decisions

Table 3.2 Variables Responsible for Family Purchase Decisions

S.No.	Variables	Brief explanation
1	**Structural Variable**	It includes the age of the head of the family, marital status, presence of children, employment status etc.
2	**Sociological Variable**	It helps a marketer in understanding the process of family or household decision making. It includes three sub variables (i)Cohesion (ii) Adaptability (iii) Communication

Role of Family in Purchase Decision Making

Every family brings its own set of rituals, values, codes and is a representative of a special reference group where family members are frequently in the habit of exchanging feedback on consumed products. This interaction becomes a fundamental building Chapter in the process of influencing purchase behavior within a family.

Family exhibits a certain type of role behavior called as 'Instrumental Role' (if it involves financial performance) or it exhibits an 'Expressive Role' (if it entails supporting other family members in the process of decision making process byupholding family norms and at the same time expressing the family's aesthetic or emotional needs).

Consumption decisions in a family involve at least eight definable roles as stated in the table below.

Table 3.3 Roles in Family Decision Making

No.	Role	Brief Description
1	**Influencer**	Family member(s) who gives information to other members about a product / service.
2	**Gatekeepers**	Family member(s) who exercises full control over the flow of information about a product / service into the family.
3	**Deciders**	Family member(s) who possess the power to determine unilaterally or jointly whether to shop for, use, consume, purchase, or dispose a particular product / service.
4	**Buyers**	These include the family member(s) who make the actual purchase.
5	**Preparers**	Family member(s) who transform the product into a palatable form that is suitable for consumption by other family members.

6	Users	Family member(s) who personally use or consume a particular product / service.
7	Maintainers	Family member(s) who aim at serving or repairing the product so that it provides continued satisfaction.
8	Disposers	These include those family member(s) who initiate or carry out the disposal / discontinuation of a particular product / service.

Family Life Cycle (FLC) and Consumer Behavior

A series of changes that a family passes through, over a course of time is called as family life cycle or FLC. It is often used as a tool for segmenting the markets on the basis of family patterns. The various stages in the family life cycle have been demonstrated as

Bachelor stage	Young, single person <35	⬇ Income	⬇ Expense
Newly married	Young couples no children	⬆ Income	⬆ Expense
Full Nest I	Young couples with <6 yrs children	⬆ Income	⬇ Expense
Full Nest II	Young couples with 6-12 yrs children	⬆ Income	⬇ Expense
Full Nest III	Old married couples with dependent teenage	⬆ Income	⬆ Expense
Empty Nest I	Old married couples with no children living	⬇ Income	⬇ Expense
Solitary Survivor	Older single person	⬇ Income	⬇ Expense

Table 3.4 Stages of Family Life Cycle (FLC)

[Source consumerpsychologyweb.wordpress.com]

Social Class and consumer behavior

Social class is defined as a multitude of social positions that exist in a specific society. Social class is also termed as the societal rank or social standing held by a person, that determines his / her position in relation to others on several parameters such as income, education, occupation, ownership of durables etc. For a long time now Indian society has been classified into three major classes

a) Upper class
b) Middle class
c) Lower class

A society always establishes some subjective values which are used as yard sticks to ascertain the ideal types of people in that society. For instance, people belonging to elite class tend to be more fashion conscious and environment friendly in comparison to the middle class. Middle class people who don't have much of a purchasing power look for price tag first in contrary to the upper class for whom the brand name and style matters more.

Characteristics of Social Class

1. Social classes are based on plethora of components and are never a function of one or two components. For example, many societies set education as the sole criteria for implementing waste management practices in pragmatic conditions but it is not the only criteria.

2. Social classes are dynamic in nature and social stratification can be of two types
   (i) Open system stratification In which people have freedom to move upward or downward from one class to another.
   (ii) Closed system stratification In which people are born in a class and they cannot leave it. In fact they inherit a status.

3. Social classes are considered as homogenous divisions of society where people of particular class show many similarities and it is due to this reason that a marketer is able to tailor market offerings for them. For example, almost all people belonging to middle class are price sensitive. Taking cognizance of this, Koutons had designed attractive discounts in order to lure their middle class target market.

Social Class and Brands

Within a society, a 'Status Group' reflects a community's expectations for a lifestyle among each class as well as the positive or negative social estimation of honor given to each class. While social class categorization is based on their education, occupation and acquisition of goods; on the other hand, status groups are categorized according to the lifestyle and principles of consumption of goods. However, in study of consumer behavior, the two terms – social class and status groups are used interchangeably. Social class affects consumer behavior in a variety of ways.

The brand of car you own, the locality in which you live, the brand of college to which your children go, number and types of educational degrees you possess, the brand of apparel and accessories you wear, the level of waste management practices you endorse etc. are all determined by or are determiners of your social class or reflect the class to which one belongs. Consumers associate brands of products and services with specific social class.

For example 'Apple' brand of electronics is perceived to be a brand of upper class whereas 'Nokia' is perceived to be a brand of lower class. 'Samsung' is perceived to be a brand of middle class. Similarly, SUVs and Sedans are considered to be cars for the elite class whereas brands such as Wagon R, Alto, Santro are cars for middle class. Based on these characteristics of social class, marketers use social class as a criterion for segmenting markets. The method for adopting market segmentation within it is

a) Identifying the usage of product(s) by a social class
b) Comparing social class variables for segmentation with other variables such as lifestyle, income etc.
c) Describing the social class characteristics identified in the target market
d) Developing the marketing program (that includes product attributes, media strategies, creative strategies, channels of distribution and pricing) so as to maximize the effectiveness of marketing mix based on the consistency with social class attributes.

3.2 Reference Groups and Opinion Leaders

Reference Group- Meaning and Concept

A 'reference group' refers to any person / group of people who holds potential to significantly influence an individual's behavior. Reference groups might be individuals such as celebrities, sports persons and political leaders or they, might be groups with which individual's identify, such as rock groups, religious groups, political parties, social groups, sports teams etc. People often tend to conform to the group norms established by the members of the group. Going against group norms or adopting a behavior not approved by the group members is a tendency rarely seen among youngsters.

There are different kinds of reference groups that depend upon various characteristics exhibited by the members. Reference groups facilitate points of comparison through the medium of which behaviors and attitudes can be evaluated. Irrespective of the sort of reference group, input from other individuals can be observed as binding. In such a case, the input would be referred to as 'normative influence'. At certain times, input can be observed as comparative, which would serve to be yet another source of information in purchase decision making.

Ways in Which Reference Groups Influence Consumer Behavior

A reference group may exert three types of influences on the buying behavior of an individual. These three types or ways are discussed in the figure below.

The mechanism by which reference groups attempt at influencing the consumer mind is discussed in the figure below.

Informational — When individuals alter their behaviors or beliefs to meet the expectations of a particular group

Utilitarian — When people have difficulty assessing product or brand characteristics by their own observations or contact

Value-Expressive — When a need for psychological association with a group causes acceptance of its norms, values, attitudes, or behaviors
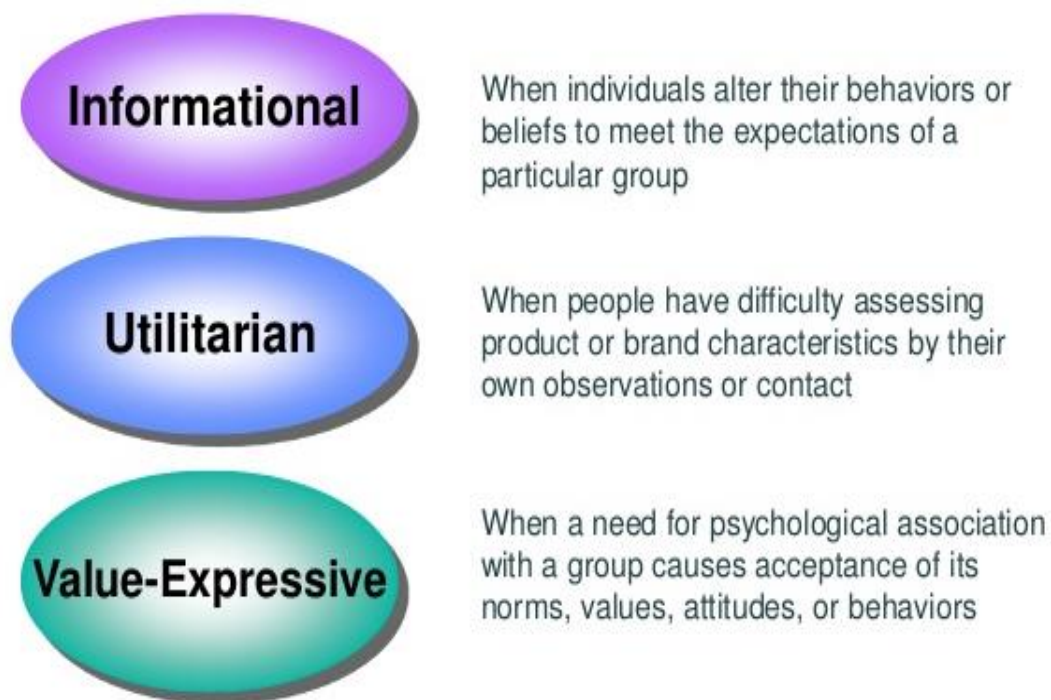
Fig. 3.1 Ways in which reference groups influence consumer behaviour
[Source slideshare.com]
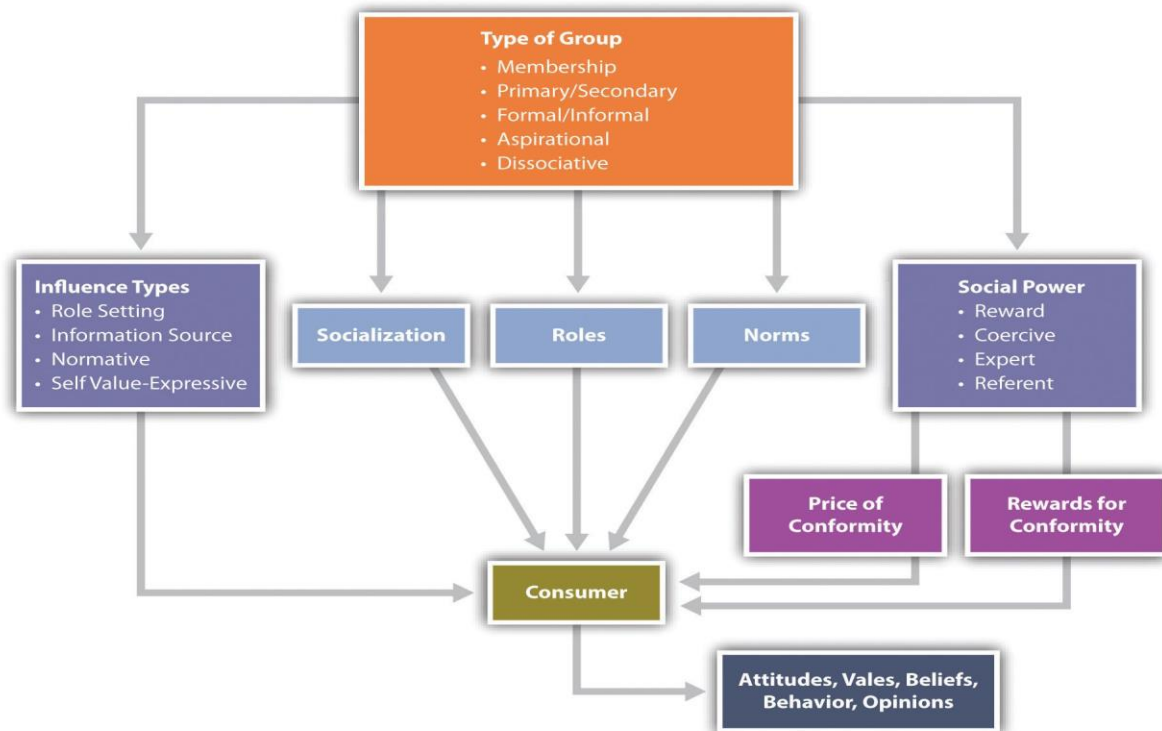
Fig. 3.2 Mechanism showing the influence of type of social group on the consumer

[Source wordpress.com]

Types of reference groups

Table 3.5 Categorization of Reference Groups

No.	Type	Description
1	**Membership Groups**	In this individuals are recognized as members of a group only when they have achieved formal acceptance status in the group.
2	**Primary Groups**	It is a social aggregation that is sufficiently intimate to permit and facilitate unrestricted direct interaction. It exerts maximum pressure on consumers. These groups hold good potential in convincing consumers about resorting to waste management and green principles.
3	**Secondary Groups**	It is less influential in contrast to primary groups, is sporadic but with a direct influence.
4	**Formal Groups**	These groups are characterized by a defined structure and a known list of members & requirements for membership.
5	**Informal Groups**	Involves high degree of face to face interaction but with less structure. Since there is a high degree of intimacy, therefore there are good chances that waste management stewardship can be easily bred among the members.
6	**Virtual membership Groups**	These groups come into existence through virtual communities rather than geographical ones. It involves usage of social networking websites. This holds potential for sensitization of waste management practices.
7	**Aspirational Groups**	Includes those groups whom an individual wants to willfully join or become a part of.
8	**Dissociative Groups**	These are those groups which an individual try to avoid association with.

Opinion Leaders and consumer behavior

Meaning and Concept

Individuals, whoare able to exert a personal influence on people and affect their buying behavior are said to act as 'opinion leaders'. They tend to influence others through word-of-mouth (WoM) communication because other people seek advice and information about products from them. Such people have power to instill a sense of environment protection and encourage people to opt for waste management practices. Opinion leaders play a pivotal role in influencing the behavior of consumers towards products / services. This influence can positive or negative. The attitude that the opinion leader has formed about a product / brand after its use, is transferred in the form of opinion through word- of- mouth (WoM) communication and this transfer in turn proves successful in molding the behavior of individuals either as positive (favorable) or negative (unfavorable) attitude towards that particular product / service.

Consumers get influenced by those personalities with whom they identify. This happens because opinion leaders exist at each status level of the society but the quantum of personal influence is observed maximum in higher status and income levels.

Role of opinion leaders

It is imperative for a marketer to identify and subsequently influence the key opinion leader operating in a particular stratum of society so that they can be approached / influenced in such a manner that may positively influence the behavioral pattern of the specific social strata that calls them as significant. Individuals are likely to seek information and advice from opinion leaders in those situations where their involvement in the product or purchase situation is high but they have limited or no information about the same. However, in conditions of purchase where their own involvement is low, taking advice from opinion leaders is relatively low. However, opinion leaders may well volunteer information about low involvement products either verbally or through demonstrated product use.

Key traits of opinion leaders

It is tough to identify the opinion leaders operating in a particular strata or group of society. There are few key traits of opinion leaders which have been suggested. Through the assistance of these traits a marketer can possibly identify the opinion leader(s) and accordingly approach them. Some such traits are narrated below

- Opinion leaders are more product /service specific because of their enhanced knowledge &experience about the product that makes it feasible for them to act and behave like opinion leaders.

- In majority of groups / strata of society one of the members of the family or extended family often acts in the capacity of an opinion leader. This occurs because opinion leadership often operates through inter- personal communication and observations & family members have maximum opportunity of the same. In addition, these interventions occur most frequently among individuals with almost the same social class position as the non- leaders, however, opinion leaders are more likely to be considered as possessing having higher status in their social class.

- Opinion leaders generally tend to be more gregarious and willing to act differently. This is either meant to attract the attention of their peers or to simply flaunt off their additional knowledge. They also possess a greater exposure to the mass media which is relevant to

their fields of interest andthis, therefore, enhances their potential to become prospective opinion leaders.

3.4 Diffusion of Innovation in Consumer Behavior

Innovation

An innovation is a practice, idea or product / service, perceived to be novel and new by an individual / group. A product is proclaimed to be innovative in character when it is observed by the potential market as a change and not a mere technological add-on to the existing product.

Types of innovation

Table 3.6 Types of innovation

S.No.	Type of innovation	Characteristics
1	**Continuous innovation**	▪ Very slight or marginal behavioral changes are necessary for adoption of the product. For eg. Environment friendly sustainable products which are recyclable in nature.
2	**Dynamically continuous innovation**	▪ The adoption of the product requires behavioral changes at the level of communicator. For eg. CD players, mobile & cellular phones and disposable diapers.
3	**Discontinuous innovation**	▪ Adoption of the product needs major behavioral changes because the product is (i) new and (ii) requires high user involvement.
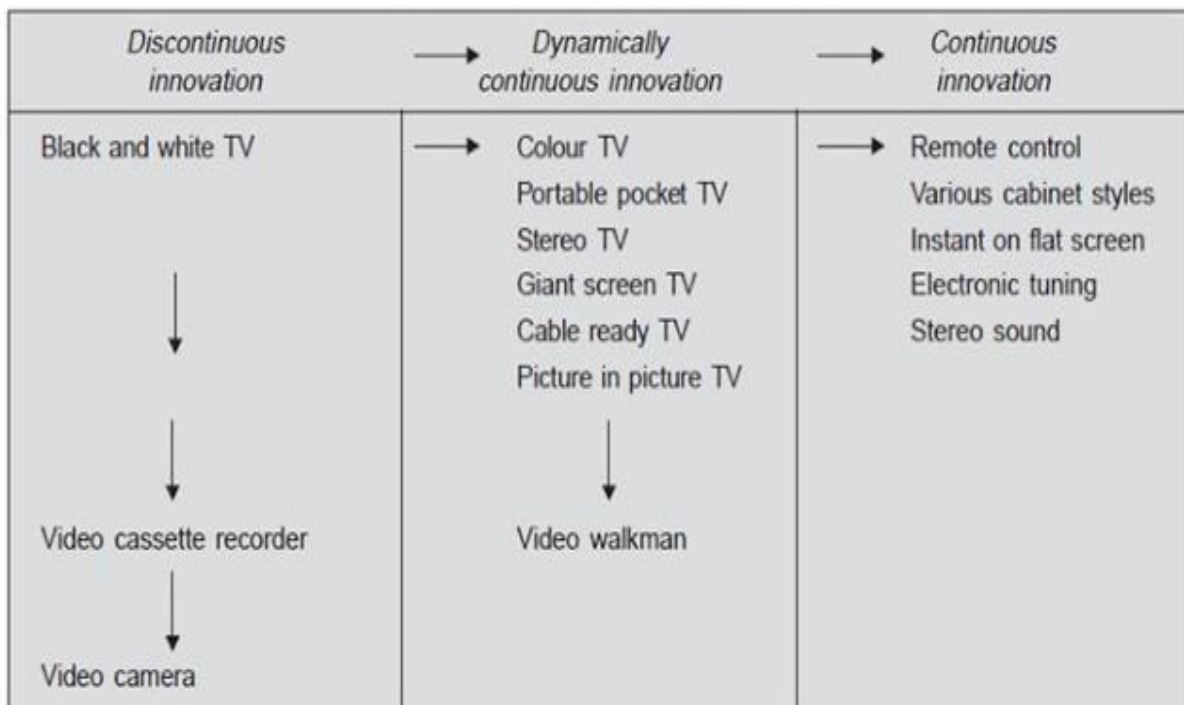
Fig.3.3 Demonstration of various kinds of innovation
[Source slideshare.com]

Stages in Innovation

<p align="center">Table 3.7 Unveiling the stages in innovation</p>

Stage	Percentage	Brief Description / Characteristics
Innovators	2.5%	▪ They are the first set of consumers to try & adopt an innovation ▪ Innovators are young, risk takers, usually possess the highest social class with immense monetary lucidity & maintain close proximity to scientific sources with good interaction amongst other innovators ▪ They are among the first ones to try articles arising out of waste management practices and make them a fashion statement
Early Adopters	13.5%	▪ Includes the second fastest cohort of individuals who try & adopt an innovation ▪ Possess the maximum degree of opinion leadership in comparison to other adopter categories ▪ They tend to possess a higher social status, are younger, equipped with advanced education, considered to be more socially forward than late adopters & possess better financial lucidity ▪ In comparison to innovators , they are more discrete in their adoption choices
Early Majority	34%	▪ Their time of adoption is appreciably longer than both innovators& early adopters ▪ They exhibit slower adoption process, rarely hold positions of opinion leadership & possess an above average social status
Late Majority	34%	▪ They adopt an innovation after the average number of society members have tried the product ▪ They are typically skeptical about a new product or innovation, with less financial lucidity, possess a below average social status and are poor in opinion leadership
Laggards	16%	▪ These include the last individuals to adopt an innovation & typically exhibit little to no opinion leadership ▪ They are averse to change-agents and are usually advanced in their age groups ▪ Laggards usually have lowest social status, typically focused on old traditions, probably have least monetary fluidity, are aged with limited peers and social circle & hardly any opinion leadership ▪ Their environmental stewardship is usually very less and they are not very open to waste management practices

Diffusion of Innovation in Consumer Behavior

Diffusion is defined as process through which a new product is first accepted and then it spreads throughout the market & other members of a social system within a specific period of time. It is said to be a group phenomenon in which the spread occurs through some continuing regularity.
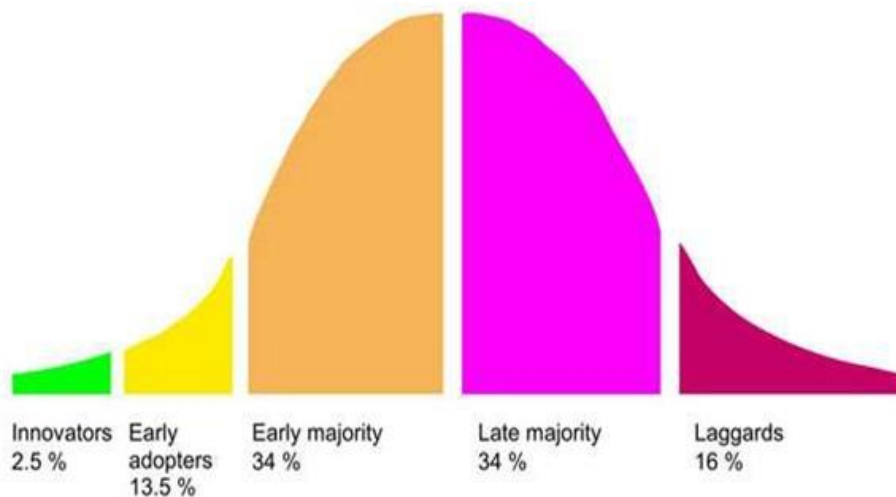
Fig. 3.4 Demonstration of various stages of innovation on a continuum

Types of innovation diffusion spread

- The typical diffusion process follows a slow adoption or growth which later rises rapidly transcended by a period of slow growth.
- Fast diffusion process, in which the product clicks the audience with its functional or aesthetic appeal almost immediately. People begin to patronize the product instantly and the spread of innovation is very quick in nature in the initial stages which dips later on.
- Slow diffusion process, in which, the product takes quite a lot of time in diffusing and spreading by slowly percolating in the minds of the consumers.
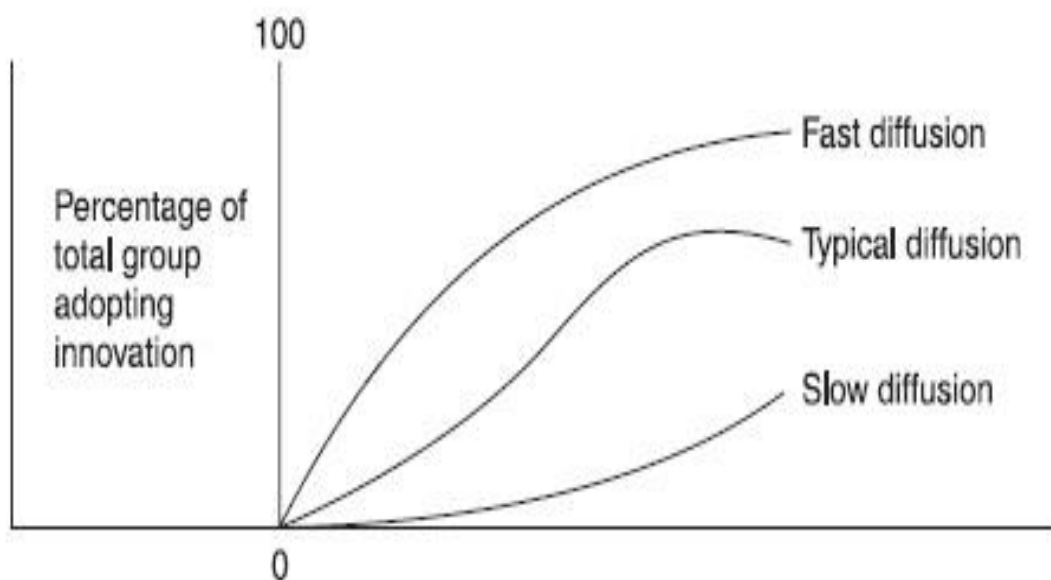
Fig. 3.5 Types of innovation diffusion spread
[Source professionalshiksha.com]

Stages of Diffusion Process

Table 3.8 Stages Involved in Diffusion Process

S.No.	Stage	Description
Stage 1	**Knowledge Acquisition**	Involves initial knowledge about product's existence & some basic understanding about its functioning. This knowledge is often a resultant of initial exposure to mass media (selective perception) and the consumer is not judgmental about the product. For example, initial knowledge about recycled products (as an outcome of waste management).
Stage 2	**Persuasion Stage**	Consumers begin to frame anunfavorable or favorable attitude towards the product innovation. Consumers cognitively weighs the functionality of the innovation, its price of switching (in case the product fails), carefully examines the advertising intricacies and resort to evaluation by product rating agencies.
Stage 3	**Decision making stage**	It involves three sub stages namely (a) Acceptance- Means adopting a product innovation (b) Rejection- Refers to outright rejection of product innovation (c) Active rejection- Means rejection after taking a product trial
Stage 4	**Implementation stage**	In this stage, the consumer actually puts the purchased product innovation into action to arrive at a level of satisfaction or dissonance. Few products developed as an outcome of waste management interventions have yielded cognitive dissonance at this stage.
Stage 5	**Confirmation stage**	In this, the consumers evaluate their purchase experiences and actively seek approval / reinforcement of their purchase decision. The effective evaluation leads to a firm conclusion about continuing and discontinuing the product. Additionally, the consumer can make a mental comparison with other similar products that he might have used in the past. Green or environment friendly products (produced via waste management interventions) often suffer tremendous comparison with their counter –parts in this stage.

Stages in adoption process

1. **Awareness Stage**
   - Involves consumer's first exposure to product innovation
   - Consumer has little information about the product

2. **Interest Stage**
   - Consumer gets curious about the products and hunts for additional information.
   - Consumer wants to know the product, its functionality, usage and disposal.

3. **Evaluation Stage**
   - Consumer gets skeptical about the product and wants to evaluate it in the light of other alternatives.
   - Consumer considers how the product can satiate his needs.
   - Consumer is excited enough to go for a mental trial of the idea.

4. **Trial Stage**
   - This stage typically involves small scale experimentation of the product and uses limited amount of product.
   - Consumer is very judgmental about the product at this stage.

5. **Adoption or Rejection**
   - Consumer decides on acceptance or rejection of the product as per his trial experience.
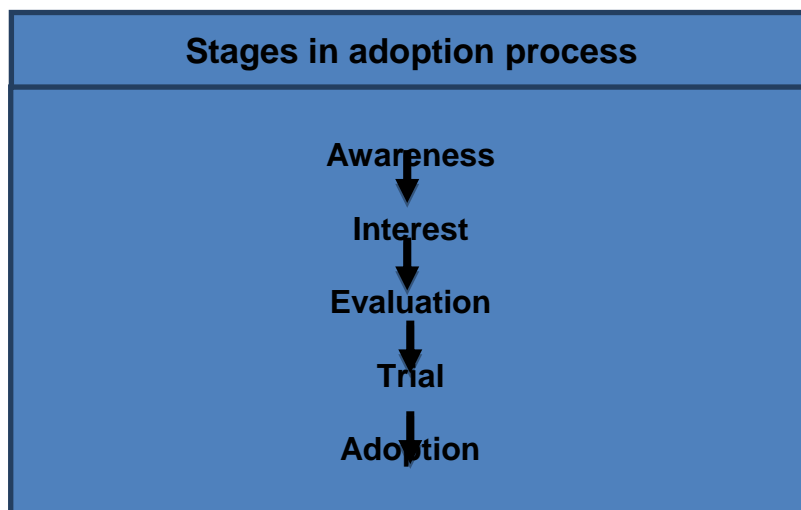
Fig. 3.6 Flowchart Representing the Stages in Adoption Process
[Sourceprofessionalshiksha.com]

3.4   Culture and Sub- culture

Meaning of culture

Culture is stated as a 'shared bundle of beliefs or practices among a group / cohort of people living in a particular place and at a particular time'. Analysts, marketers and consumers use the entire gamut of awareness about culture in learning how and why consumers of a particular culture behave.

Significance of studying culture in context to consumer behavior

Culture is a significant factor in determining consumer behaviour due to following reasons

- It expresses the rationale so as to why a particular product sells more at one place / region / among specific groups than the other.
- Knowledge of culture assists in ascertaining purchasing decisions.
- Understanding of culture explains how the consumers will potentially use the product and dispose it.
- Comprehensive knowledge about culture helps the marketer appropriately position and differentiate the product.
- Effects of culture can decide government's role in adopting recycling and waste management strategies and its subsequent acceptance.

Characteristics of Culture in Consumer Behavior

Culture has following significant characteristics

1. Culture is comprehensive in nature and must holistically convey some meaning to its manifestation.
2. Culture is learned over a period of time and no individual naturally inherits it.
3. Culture is exhibited within the boundaries of socially acceptable behavior. For instance, some nations show high range of corporate environmental stewardship towards waste management practices and their citizens consider using recycled material as a socially acceptable norm.
4. Awareness of cultural standards is never absolute and is always limited. This means within the same cultural pretext, there might be variations within individuals.
5. Cultures fall anywhere in between the spectrum of continuum ranging between static and dynamic. This in turn is dependent on the acceptance level of change. For instance, some cultures are open to resorting waste management practices in daily life while others are not. This is dependent on the internal and external mental states (components) of the culture as depicted in the chart below.
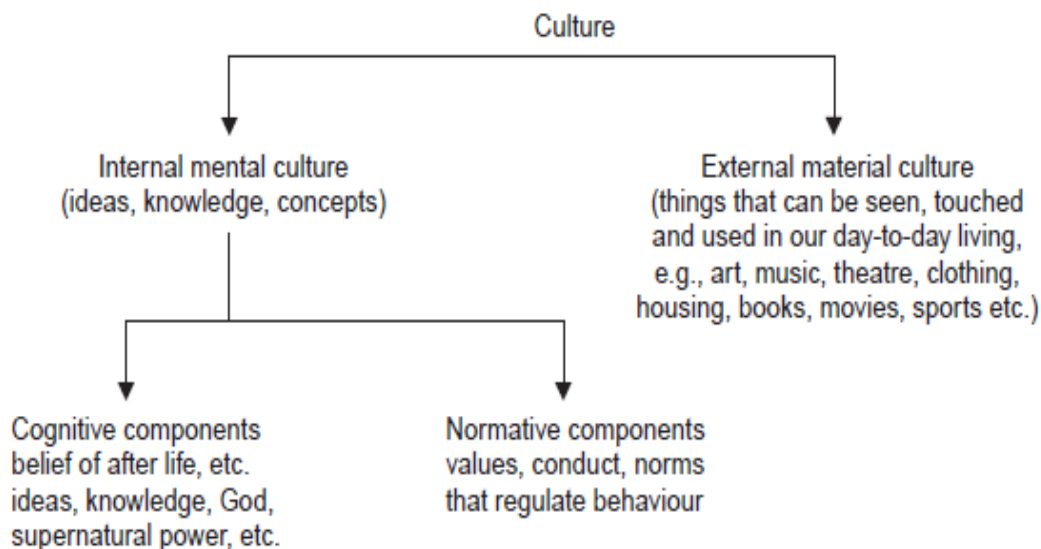
Fig. 3.7 Components of culture
[Source wisdomjobs.com]

Relating culture with consumer behavior

Culture affects the values, mental representations and injunctive norms of the consumers which in turn affect various facets of marketing (in turn consumer behavior studies) like advertising appeals, product evaluations, information processing, brand comparisons and service expectations as demonstrated in the figure below.
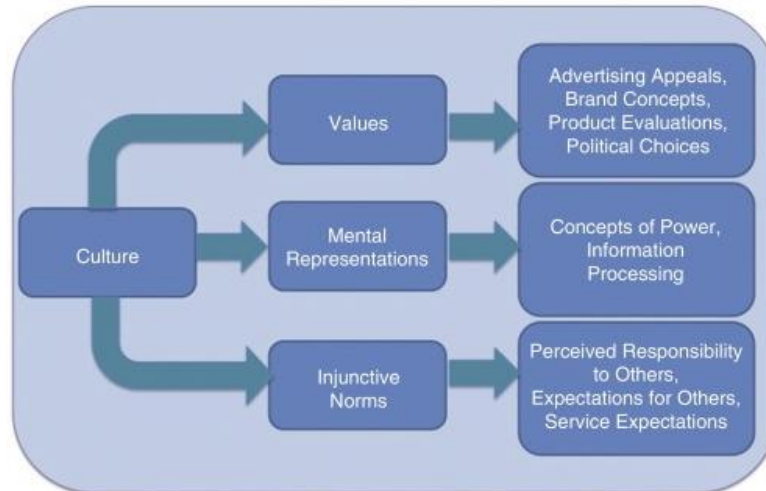
Fig. 3.8 Model relating culture with consumer behavior
[Source ScienceDirect.com]

Also the personality traits, subjective cultural contexts (like region, ethnicity, linguistics etc) affect the cognitive beliefs which in adjunct to social norms affect the behavior intention of consumers. The same is represented in the chart below.
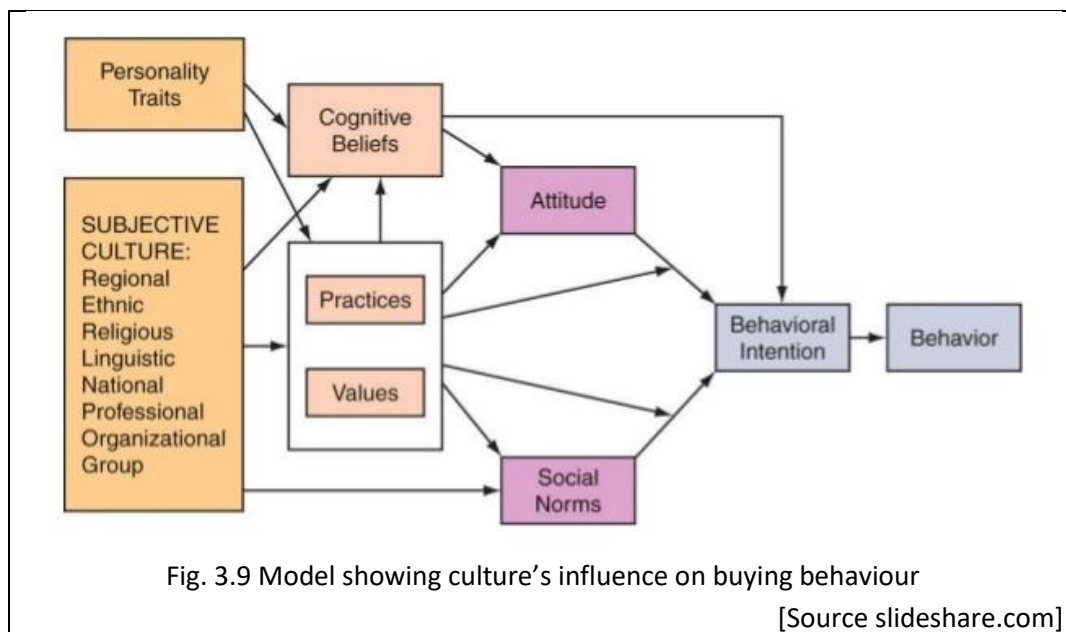
Fig. 3.9 Model showing culture's influence on buying behaviour
[Source slideshare.com]

Cultural Factors Influencing Consumer Behavior

During the early stages of life, socialization with friends, family and peers result in the development of preferences, behavioral patterns, perceptions and set of values that dictate the buying behavior of consumers. Some such factors are

1. **Culture** Culture refers to the set of beliefs, norms, rituals, customs and practice that a particular cohort / group of people follow. Since, childhood the baby is groomed as per the culture and slowly his purchase decisions get based on that only. For instance, people from North east India exhibit high magnitude of environment friendliness and are open to resorting to waste management interventions. Similarly, sale of 'Sarees' and 'Lungis' is more pronounced in South India than the Northern counterparts. It is therefore imperative for marketer to use specific marketing mix as per the cultural frame of the consumers.

2. **Subculture** The concept of culture is further subdivided into sub-culture in which the division occurs on the basis of niche homogeneity in terms of their geographic origin & ethnicities, religious beliefs, linguistics, nationalities etc. These sub- cultures need to be minutely studied by the marketer so that it can be treated via unique marketing mix. For instance, certain subcultures are more aligned towards waste management principles than others and they treat Mother Nature (ecological) as their Goddess.

3. **Social Class** It is observed that people within the same social class exhibit similar attitudes, interests, beliefs, purchasing power and predisposition towards goods & services. Our society is segregated into three social classes, namely- upper class, middle class, and the lower class. This social class directly influences the buying decision because an upper class consumer might be interested in buying sophisticated and luxurious goods and may resort to recycled products as a style statement.

Subculture and Consumer Behavior

Every culture is further sub-divided into various subcultures on the basis of religion, age, gender (male/female/ transgender), geographical location, corporate environmental stewardship, social status, economic stature etc. Various sub- cultures are studied under

(a) Religion (Hindu, Muslim, Christianity, Sikhism, Jainism etc.)
o   Hindus consider red, orange, yellow etc as colours of life, positivity and festivity and prefer buying such shaded sarees or lehengas in wedding times. White is a shaded associated with death and mourning and a Hindu bride would never prefer wearing it. On the contrary, white gown is a preferred dress for Christian brides which are forbidden for Hindu brides. Muslim population on the other hand prefers wearing green as it is considered holy.

o   Muslims and Christians relish eating beef which is completely forbidden among Hindus. Similarly, eating pork is forbidden in Muslims which is usual among Christians.

o   An elderly individual may not be comfortable with bright and trendy clothes. They may resort to light and dull clothes with which the youngsters may never relate to. On the contrary, a teenager may prefer loud and funky dresses.

(b) Status (Upper Class, Middle class and Lower Class)

Individuals belonging to upper class may spend on items of luxury and sophistication like BMW, Skoda, Citizen watches etc. They may also exhibit certain degree of corporate environmental stewardship and an interest in waste management practices. This is usually not the case with lower

income groups because of lack of purchasing power and focus on living for survival. On the contrary, individuals from middle income segment are more concerned about securing their future and show interest towards such products.

(c) Gender (Male/Female/ Transgender)

Males are usually expected to be strong and tough and are not expected to buy fairness products and cosmetics like females. Transgender are usually related to loud make-up.

Examples of cultural impact on consumer behavior

- In India, people believe in joint family system and continue to remain with their parents even after marriage. In contrast, people in western countries are more independent in nature and leave their parents as soon as they begin earning a livelihood. This is a difference in culture.
- Northern India prefers eating chapattis (wheat) over rice which is reverse in south and eastern part of India where rice is the staple food.
- Culture also dictates the attire we wear. While ladies in northern India prefer wearing salwar kameez; the girls of Assam prefer sarees; the females in South India find skirt and blouses to be more preferable. Therefore, their purchase of dresses on special occasions is also dictated by their customary traditional attire.

3.5 Relationship Marketing

Meaning and Concept

Relationship marketing is that particular dimension of customer relationship management (CRM) that lays impetus on generating customer loyalty by embarking on long-term customer engagement rather than focusing on shorter-term goals (like prompt customer acquisition and immediate individual sales). The objective of relationship marketing is to create strong emotional bonds with the customers by connecting them to a brand that can lead to (i) continued business interventions (ii) free word-of-mouth promotion (iii) effective lead generation. Relationship marketing is compositely based on the principles of customer experience management (CEM), which emphasizes on building better customer interactions for enhancing brand loyalty. Waste management tenets are proving to be an important tool in relationship building because such recycling principles speak for the philanthropy of the business corporations by adding an element of corporate environmental citizenship to their character. While such interactions should ideally occur in person or may be over the phone, the business corporations are however employing web for the purpose of installing such waste management-based positioning in the minds of customers for relationship marketing. In contemporary times, relationship marketing entails creation of a dialogue (two-way communication) between business and the customers, tracing customer activities and providing knowledge of ecological environment-oriented philanthropy.

Strategies for Relationship Marketing

The basic tenet of relationship marketing is to develop a sense of customer focus called as 'customer centricity' which can be attained by

(i)   Customer focused leadership
(ii)   Understanding your customer
(iii)   Designing the positive experience

(iv) Developing sound waste management matrix for gaining customer support through a soft image.
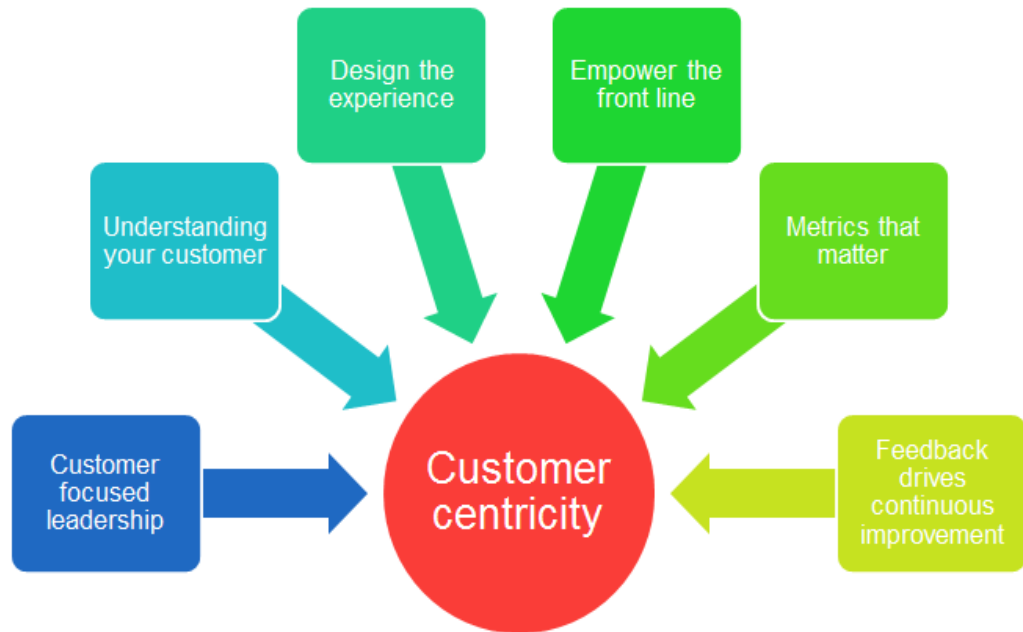
Fig 3.10 Ways of Developing Customer Centricity for Relationship Marketing
[Source yourstory.com]

(v) Taking regular feedback for continual improvement

Fig 3.11 Strategies that contribute in building relationship with customers

[Source searchcrm.techtarget.com]

(vi)   Empowering the first line of interacting business personnel with all kinds of

    (a) Customer support information.

    (b) Any environment based practice (waste management) that can positively position the company's image.

Such strategies have been diagrammatically summarized in figure 3.11.

Elements of Relationship Marketing

CRM is an important intervention of marketing that aims at fostering healthy relationships with the customers so that the business can be translated from mass marketing to customized (individualized) marketing. Waste management has proved to be a pivotal tool in this direction because it places the organization in a positive light by stating that the organization is more than a money minting machine. The prowess of relationship marketing can be enhanced by applying the six elements of it namely

  (i)Buyer Differentiation

  (ii) Long haul emphasis

  (iii) Continuing deals

  (iv)Two way communication

  (v) Retention focus

  (vi) Share of values

Brief description of the same has been demonstrated in the table below.

Table 3.9 The six elements of relationship marketing

Element number	Element Name	Brief Description
1	**Buyer Differentiation**	Relationship marketing is an individual (customer) centric way of conducting business. The business aims at differentiating its products and services by looking at the customer's profile. Waste management principles and recycling ratios comes handy in differentiating the company's brand image in the eyes of the customer.
2	**Long Haul Emphasis**	The objective here is to establish a long term association with a plethora of inbound marketing techniques including cyberspace. A constant touch with the customer results in lasting commitment and yields both revenue and price benefits. This is because continuing with an already established customer is easier than finding a new customer.
3	**Continuing Deals**	This aims at creation of multiple deals instead of resorting to one single deal with the customer. It can be dealt via following forms (a) cross-sales (b) add-on product sales (c) by becoming a preferred provider of niche products / services.

		Sometimes, this can prove to be a financial requirement because the price of getting an initial exchange can be so high.

4	**Two-Way Communication**	Generation of customer centric services is vital to the organization survival and growth. Ample of platforms need to be created in order to create a dialogue between employees (customer service providers) and the customers. This helps in
		    (a) Clarifying product / service-related doubts
		    (b) Infusing trust
		An interface can be established between employees and customers via
		    (i) Social networking
		    (ii) e-mail
		    (iii) SMS (short message service)

5	**Retention Focus**	Rather than focusing on customer acquisition, the concept of relationship marketing focuses on customer retention. This is achieved by making the customers brand loyal. Waste management interventions and green marketing can be one such way of retaining millennial employees who are environment centric. Lowered pricing, valued feedback, regular greetings are ways of creating retention focus that actually bonds the customers with the business firms.
6	**Share of Values**	Customers get emotionally attached with business organizations only when there is some kind of connect of values. This connection of values is often at behavioural and cognitive level wherein the superposition of organizational philosophy over buyers values results in a lasting unseen bond. Over a period of time, these powerful connections get translated into brand associations. Due to a personality match, the individual buyer tends to become brand loyal. Sharing of values is often observed by organizations offering waste management solutions wherein the buyer's environment stewardship matches with the organization's green marketing interventions and the customer believes that the business organization has something more to offer to the environment rather than just making money.

Types of Relationship Marketing Programs

In context to positioning of waste management principles in the minds of customers for developing long term associations, three types of marketing programs have been identified

    (i)   Continuity Marketing
    (ii)   Individual Marketing
    (iii)   Co-marketing / Partnering

These identified programs are then further segregated as per the type of customer (Individual; Distributor/ Retailer; Institutional buyer). This has been demonstrated via table given below.

Table 3.10 Types of relationship marketing programs

Program Type	CUSTOMER TYPE		
	Individual Customers	Distributors / Resellers	Institutional Buyers (Business to Business)
Continuity Marketing	Loyalty Programs	Continuous Replenishment and ECR programs	Special supply arrangements (e.g.. JIT, MRP)
Individual Marketing	Data Warehousing and data mining	Customer Business Development	Key Account Management
Comarketing / Partnering	Cobranding	Cooperative Marketing	Joint Marketing and Codevelopment

[Source topgrademba.com]

Best Practices of Relationship Marketing

- Organize regular polling and surveys to invite valuable feedback from the customers
- Give due weightage to the feedback incorporate the suggestions into the organization's business practices
- Utilize social media platforms to establish connection with the customers
- Install effective technologies for customer monitoring
- Utilize policies to assist employees interact with customers under both negative and positive situations
- Gain maximum leverage via valuing warm leads (prospects who have already expressed in the organization's offerings)
- Build on a comprehensive CRM strategy
- Organize regular training sessions for entire staff members
- Continue with the cutting edge of product offerings (may be based on recycling)
- Do not let quality suffer for innovativeness
  - Aim at attaining a high customer satisfaction rate in all facets of the organization
  - Inform customers about the extent the organization values customers and appreciates them

Model Questions

1. Principles of waste management can be incorporated in family values through various roles the individuals play in the family. Briefly describe these roles in family based purchase decision making.
2. How social class responds to the inclusion of waste management interventions in their routine life?
3. Diagrammatically show the mechanism to reveal the influence of various kinds of social groups on the consumer's minds.
4. How the key traits of opinion leaders help in imbibitions of the concept of waste management?
5. With reference to the stages of innovation, narrate the steps in which waste management practices can be put into practice.
6. Narrate the influence of culture and sub- culture on the buying behavior of consumers

diagrammatically. Also identify which subjective cultural factors can directly contribute to waste management.

7. Environment philosophy can be interjected among consumers through relationship marketing. Explain how it can be achieved.

8. How can the strategies of relationship marketing be extrapolated to cover the issues of waste management?

9. Where does the concept of environmental stewardship fit in the stages involved in adoption process of new innovative products?

10. Categorize the reference groups and also justify how each one of them can pressurize individuals to implement waste management practices in daily life.

Summary

▪ Social class can be defined as a range of social positions that exist in a particular society. Social class is also known as social standing or the societal rank held by an individual.

▪ The influence of social class is not as significant or influential as in the case of family or reference / peer groups but it is actually an indicator of common values and similar buying pattern. Green values and an urge to opt for waste management practices may be influenced by the social class to which we belong.

▪ Status group(s) reflects a community's expectations for lifestyle among each class as well as the positive or negative social estimation of honor given to each class.

▪ Social classes are broadly classified into Upper class, Middle class & Lower class.

▪ Family is the most basic consumption unit for all consumer products and members of the family exert most important influence on the buying behavior of the individuals.

▪ Diffusion of innovation takes slow time in percolating the minds of consumers and gaining a final acceptance.

▪ Culture and sub- culture dictate the manner and extent to which we become open to certain products. Culture often dictates the level up to which a particular clan might be ready to accept recycled products based on vitals of waste management.

▪ Opinion leaders, if believe in material recycling and waste management can play a pivotal role in generating environmental stewardship among the followers. Individuals are likely to seek information and advice from opinion leaders in those situations where their involvement in the product is high but they have limited or no information about the same.

▪ A reference group is any group of people who significantly influence an individual's behavior. This reference groups can also effectively breed the concept of waste management. Reference groups might be individuals such as celebrities, sportspersons and political leaders or they might be groups with which individual's identify.

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Chapter 4 Consumer Decision Making

Introduction

This chapter we will introduce the meaning and importance of consumer behaviour from the perspective of waste management. It is important to understand the consumer behaviour, consumer dissonance, consumer decision making models. The reason for a business to exist is the consumer. It is essential to understand the needs and wants of a consumer for the growth of an organization. Consumer behavior is defined as the behavior that consumers display in searching for, purchasing, using, evaluating and disposing of products and services that they expect to satisfy their needs. Consumer behavior is also defined as "decision process and physical activity engaged in when evaluating, acquiring, using or disposing of goods and services". Consumer behavior gives an insight into how individual consumers and their families make their decisions, how they use their resources like time, money and effort on consumption related goods.

Objectives

- To understand the concept of Consumer Decision Making Process
- To know the Consumer Decision Making Model
- To access the Organizational Buyer Behaviour
- To know the Consumer Behavior influences on Waste Management

Structure

4.1 Consumer Decision Making Process

4.2 Consumer Dissonance

4.3 Consumer Decision Making Models

4.4 EKB Model

4.5 Organizational Buyer Behaviour

4.1 Consumer Decision Making Process

Consumer decision making process involves a series of steps which is utilized by the marketers to identify and keep track of the decision making process of a customer from beginning to end. In order for the markets to be successful, it is very important to understand the way customer makes a decision to purchase a product. This helps the organisations to formulate new strategies and improve the product they develop. Therefore having knowledge about the buying behaviour of a consumer based on various internal or external factors will help the marketers to improve their marketing campaign strategies to reach out to the consumer or the customer. The factors that affect the buying behaviour includes the psychology of a consumer (how they think or how they feel), comparing various alternatives (brand, price, quality), also the environment (family and society, media).

4.2 Consumer Dissonance

It is a state where the consumers are confused about the purchase of a product. It causes a conflict at the time of purchasing. The marketers try to reduce or eliminate dissonance by providing positive emotions when they buy a product. At the time of purchase, the consumers also need to consider the post buying wastes that have an adverse effect on the environment.

Example

A person "X" went to a nearby store to purchase an electronic device such as mobile phone. Here "X" is the consumer of the product "Mobile Phone". The salesman of the store showed few models of the phone and explained him all the features of those phones. After so many negotiations, the person "X" finally selected a mobile phone. This example summarizes the following

- Need to buy a phone
- Gathers information about various phones
- Evaluates and compares other models
- Finally purchases the product
- Evaluates the product after purchasing of the product

This means that a consumer undergoes various stages or processes before buying or purchasing a product.

Example from Waste Management Perspective

The consumers must make careful decisions at the time of purchasing a product and should reject the unnecessary packaging and products that may lead to disposal problems. Consumer decision making is an important factor that is useful in reducing the amount of waste that the household contribute. In order to avoid excessive amount of waste post-consumer purchase, it is necessary to consider the following questions before the purchase.

- Can the product be re-used? Purchase materials like cloth instead of plastic or rechargeable batteries
- Does the product have a longer life? Purchase those products that can be repaired if needed.
- Does the product have minimum packaging? Either buy it in bulk or in a very large container
- Does the product have minimum toxicity? Purchase those products that have very less hazardous substances, avoid chemicals that harm the people.
- Is it really important to purchase that product? Resist buying entertainment items that may lead to disposal problem.

> **To Do Activity**
> 1. Identify various factors that affect the consumer decision making?
> 2. What impact will the consumer dissonance will have on the consumer buying process?
> 3. Identify the ways in which the post-consumer product waste can be managed effectively.

Stages in Decision Making Process
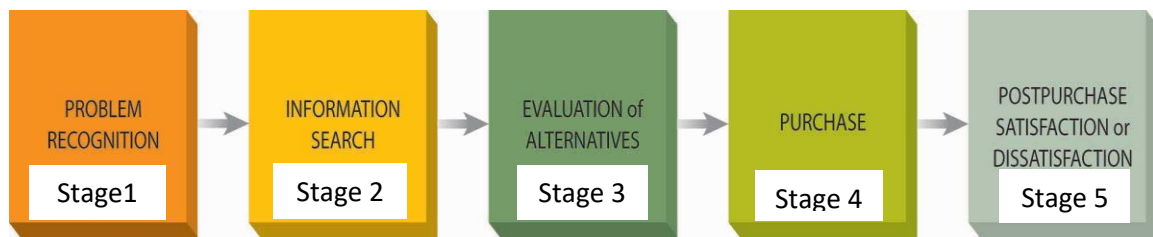
Fig 4.1 Steps in Consumer Decision Making Process

Stage 1 Problem Recognition

The first stage in the consumer decision making process is the problem recognition. This stage helps in identifying what the consumer needs are. In order to recognize the consumer's want, it is important to gather some information to satisfy their wants. This is the most important stage in consumer decision making process. Consumer needs may be influenced due to both internal and external factors. Internal factors include basic needs such as to satisfy thirst, hunger etc. External factors include those that are driven by the review of other people.

Example

If suppose a person "X" has to attend a birthday party or a reception, he/she needs to purchase a grand looking dress to wear on a grand occasion. So here the customer's want is "to purchase a good looking party dress".

Stage 2 Information Search

This stage involves the process of searching about a product. Searching about a product simply means gathering as much information as possible about the product that the consumer is planning to purchase. The Information may be gathered through recommendations or through their past experiences with the product. At this stage, the customer is concerned with the risk of purchasing a product. They may gather information either from a physical location or through online search engines like Google.

Example

Continuing the above scenario, the person "X" begins to gather information about various party dresses. The person "X" might simply type "Branded Women/Men party wear" and analyzes the reviews and the customer's feedback on that product. Or the person "X" may see a beautiful party wear worn by another person which makes them enquire about the dress.

Stage 3 Evaluation of alternatives

This stage helps the consumers to evaluate and decide if the product they are planning to purchase is the right product or not. If yes then it continues to the stage 4. If not, it goes back to stage 2 and resumes the stage 3. The transition from stage 3 to stage 2 continues as far as the consumer is satisfied with the product being purchased. If the customer has decided to purchase the product that satisfy their needs, they start seeking other information such as pricing, best deals, offers, quality and other factors such as colour, or the product availability that are quite important. They start comparing the price and the brand with many other alternative products. The product comparison is

usually represented using a Venn diagram.

Example

Continuing the above scenario, the person "X" will look for a particular brand for purchasing the party wear. He/she may look for a bright coloured or lighter ones based on their personal choices. All these factors give person "X" the alternatives to choose from.

Fig 4.2 Consumer Dissonance in product comparison

Stage 4 Purchase

Based on the information gathered, the consumer will now decide what they are actually going to purchase and will determine if the purchase will satisfy their needs based on the knowledge gathered. At this stage, the consumer would have evaluated or assessed the facts gathered based on the marketing campaigns or advertisements or based on the reviews and past experiences. If the consumer is satisfied with the information gathered, then the consumer will finally purchase the product.

Example

From the above scenario, after the person "X" compares different party wears from different company, he/she finally avails the party wear from the company that offers 50% discount. After confirming the quality of the dress from feedback or customer review, he/she places an order online or purchases it from a physically located store.

Stage 5 Post purchase satisfaction or dissatisfaction

This stage has an impact on both the marketers as well as the consumers. This stage helps in analyzing if the product met the consumer's needs and expectations and also if the promise made to the customer about the quality of the product is provided. If the product satisfies the customer or if it exceeds the expectations of a consumer then it will help to trigger the other customers to purchase the same product by providing information about the purchased product at stage 2.

Example

The product purchased by the person "X" satisfied his needs and expectations. In such cases, the person "X" will leave a positive review about the product which makes other customers to purchase it.

Therefore these five stages are important to assess and track the consumer decision making process from the time of their decision to purchase the product to the time they purchase it. This helps the marketers to develop strategies to reduce the probability of consumer churn or to retain the customer for longer time.

4.3 Consumer Decision making models

The customer models refers to fluctuating introductions and viewpoints with which purchasers approach the commercial center and how/why they carry on as they do. They refer to how the fluctuating introductions affect the purchasing choice process and generally speaking purchaser conduct. Different models have been proposed by analysts.

These models can be named

> (a) General models---Economic model, Psychological model, Psychoanalytic model.
> (b) Specific models--- Howard and Sheth's model and Nicosia's model.

Howard Sheth Model

Howard and Sheth utilized the term purchasing conduct and not buyer conduct as the modern purchasers and buyers are comparable in many viewpoints. While the model was proposed during the 1960s, for modern purchasing, the expression "purchaser" is utilized to imply both modern buyers and individual customers. Through the model, Howard and Sheth, attempted to clarify purchaser sanity while settling on buy choices even in states of deficient data. While they separated between three dimensions of choice making, EPS, LPS and RPS, the model spotlights on continue purchasing/buy.

The model has four components majorly, i.e stimulus inputs (input variables), hypothetical constructs, response outputs (output variables) and exogenous variables.

a) **Stimulus inputs (Input variables)** The input variables refer to the upgrades in the environment, they appear as educational signs about the item/benefit offering. These data prompts could identify with quality, value, uniqueness, administration and accessibility.

The enlightening prompts could be significative, symbolic, (the two of which are business and can be constrained by the advertiser) and Social (non-business and wild by the advertiser; family, reference gatherings and social class). All these three kinds of boosts give inputs concerning the item/brand to a buyer.

Significative improvements The item/mark data that the advertiser gives, includes the significative segment; it bargains basically with the brand qualities.

Symbolic boosts This is the psychological form with which a purchaser sees the item and administration offering (mark). It is allegorical (verbal and visual item qualities) and perceptual and relies upon how the offering has been situated. It exudes from publicizing and advancement endeavors.

Social upgrades This is the data about the item or administration offering that originates from the social condition viz. family, gatherings, society and culture on the loose.

b) **Hypothetical constructs** Howard and Sheth characterized the theoretical builds into two

noteworthy gatherings, viz., perceptual develops and learning builds. These comprise the focal piece of the model and manage the mental factors which work when the customer is experiencing the basic leadership process.

Perceptual develops the perceptual builds manage how a purchaser gets and forms data got from the info factors. When the purchaser is presented to any data, there is a consideration. This consideration towards the improvements relies upon the purchasers' affectability to data as far as his inclination and receptivity towards such data.

Not all data would be prepared and the admission of data is liable to saw vulnerability and absence of significance of data. This is alluded to as boost uncertainty. This mirrors that how much the purchaser controls the improvement data stream. Improvement equivocalness happens when a purchaser does not comprehend the message from the earth.

It could trigger off a requirement for a particular and dynamic scan for data and accordingly lead to a plain look for data. The data that is accumulated and handled may experience the ill effects of perceptual predisposition if the buyer twists the data got in order to accommodate his/her built up requirements/convictions/values/encounters and so forth.

Learning builds the learning develops identify with purchaser learning, arrangement of demeanors and suppositions, and an official choice. The learning builds are seven in number, and range from a purchaser's rationale in a buy to the last fulfillment from a buy. The interchange of these develops eventually prompts a reaction yield or a buy.

The thought processes allude to the objectives that a purchaser tries to accomplish through buying and the relating inclination towards activity or the buying movement. The brand cognizance is the learning and data that the purchaser has about the different brands in his evoked set. The purchaser shapes a request of inclination for the different brands. This request of inclination depends on the decision criteria (choice middle people). The choice of between the evaluative criteria and the utilization of choices manages by the purchaser to the different buying choices. In view of the decision criteria, the frames of mind are shaped for the shifting brands. The frames of mind mirror isthe inclination of the purchaser.

Inclination toward elective brands and sentiments of like/detest towards the contributions. The brand capability of the evoked set decides the purchaser's recognition and certainty dimension of the brands that he is thinking about to buy. The buying aim is a total result of the collaboration of purchaser intentions, decision criteria, mark perception, resultant brand mentality and the certainty related with the buying. Fulfillment, another learning build, includes the post buying assessment (regardless of whether desire from an offering matches the execution) and resultant effect (positive/negative) on brand appreciation.

c) **Response outputs (output variables)** The output variables refer to the purchaser's activity or reaction to improvement inputs. As indicated by Howard and Sheth, the reaction yields contain five constituents, viz., consideration, appreciation, frame of mind, goal and buying. These could be organized in a progressive system, beginning from consideration and winding up with buying.

- Attention refers to the degree or dimension of data that a purchaser acknowledges when presented to an improvement. It mirrors the greatness of the purchaser's data consumption.
- Comprehension is the measure of data that he really procedures and stores; here, it alludes to mark appreciation which is purchasers' learning about the item/benefit classification and brand.
- The disposition is the composite of cognizance, influence and conduct towards the offering; the frame of mind mirrors his assessment of the brand and so forth/despise dependent on the brand potential. Intention alludes to the purchaser's expectation to purchase or not to purchase a specific advertising.
- Purchase conduct alludes to the real demonstration of purchasing. The buying conduct is an aggregate aftereffect of the other four constituents.

d) **Exogenous variables** The Howard and Sheth show additionally includes certain steady exogenous factors that impact a few or the majority of the develops clarified above, and in this manner affect the last yield factors. These are clarified as inhibitors or natural powers that limit the buying of a favored brand; e.g., significance of the buying, cost, budgetary status of the purchaser, time at the transfer of the purchaser, identity attributes, social pressures and so forth.

Working Relationships between Constructs and the Model

Through their model, Howard and Sheth clarify the purchasing choice process that a purchaser experiences, and the components that influence his decision choice towards a brand. The procedure begins when the purchaser is presented to a boost. Because of the presentation, boost uncertainty happens, which prompts a plain scan for data. The data that is received is dependent upon the exchange between the dispositions and the thought processes.

At the end of the day, the scan for data and the ends drawn would be separated by perceptual inclination (that would be a consequence of mentality, certainty, pursuit and intentions). It might adjust the current examples of thought processes and decision criteria, in this manner prompting an adjustment in the disposition towards the brand, mark cognizance, thought processes, buying expectation and additional activity.

The last buying choice depends on the association between brand cognizance, quality of frames of mind towards the brand, trust in the buying choice and buying aim. The genuine buy is affected by the purchaser's goals and inhibitors, which he stands up to. The whole procedure is affected by different exogenous factors like the significance of procurement, value, time accessible to make the buying, social and social impacts and so on.

After buying, the purchaser encounters fulfillment if the execution coordinates and surpasses desire; this fulfillment would fortify brand appreciation, strengthen the certainty related with the purchasing circumstances, and reinforce the expectation to rehash buying of the brand. With a wonderful buying choice, the purchaser finds out about purchasing in comparative circumstances and the conduct will in general get routinized. The buying input hence impacts the buyers' mentalities and aim.
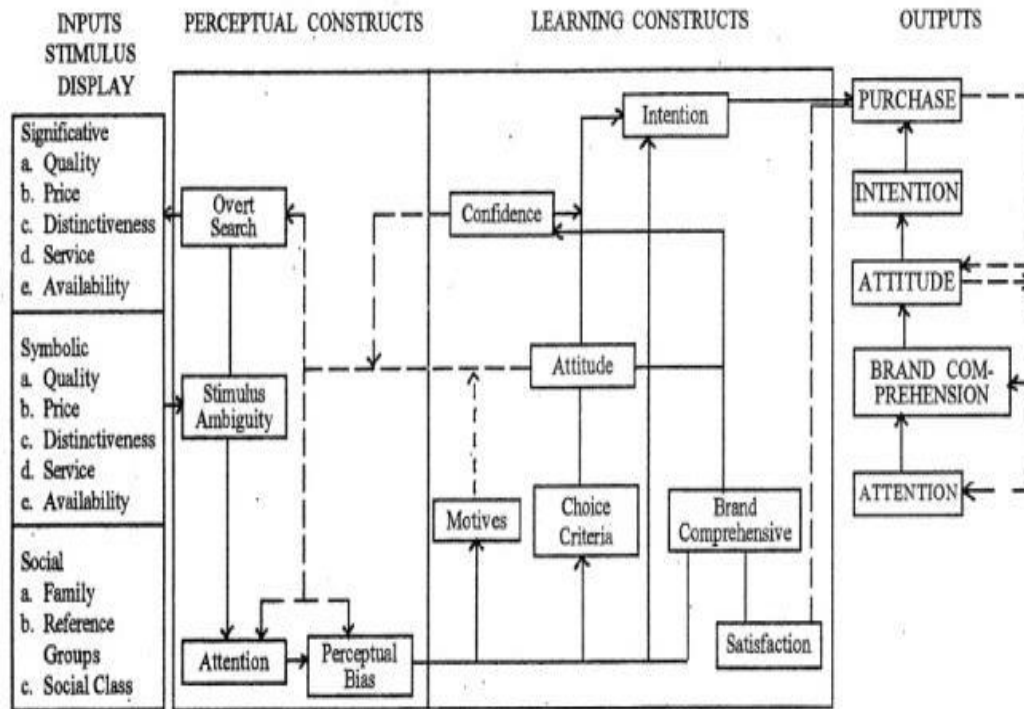
(Source: John A Howard, Jagdish Sheth. The Theory of Buyer Behaviour, John Wiley, 1969)

Fig 4.3 Consumer Decision Making Model

4.4 EKB Model

The Engel, Kollat and Blackwell Model, also known as the EKB model, have been proposed organize and describe the growing body of knowledge / research on consumption behaviour. As complete model, it shows the different components of the consumer decision-making and the relationships / interactions between them. The model was revised and modified numerous times, with attempts to develop interrelations between the different components and subcomponents, and finally, another model was proposed in the 1990s, known as Engel, Blackwell and Miniard Model (EBM).

The consumer behavioural model Engel Kollat Blackwell was created to describe the growing and rapidly growing body of knowledge about consumer behavior. As in others, this model has undergone numerous revisions to improve its descriptive ability of the basic relationships between components and subcomponents. The model consists of five parts, namely information capture, information processing,decision process, decision process variables and external influences.

1. Information Entry

The information entry includes all types of stimuli that the consumer is exposed to and triggers a type of behavior. The consumer is exposed to a many stimulus both marketing (advertising, publicity, personal sales, demonstrations, in-store displays, point-of-purchase stimuli) as well as non-commercial activity sources (family, friends, peers). Thus, the different stimuli compete for consumers attention. These stimuli provide information to the consumer and trigger the decision manufacturing process.

At this stage, the consumer receives information from marketing and non-marketing sources, which also influences the recognition stage of the decision-making problem. If the consumer still fails to

come to a specific decision, the search for external information will be activated in order to arrive at a choice or, in certain cases, if the consumer feels a dissonance because the chosen alternative is less satisfactory than planned.

2. Information processing

The stimuli received in the first step provide information, which is processed as meaningful information. The scene includes exposure, attention, 0perception / understanding, acceptance and retention of information. The consumer is exposed to stimuli (and the information that accompanies it), the attention determines the stimuli on which it will concentrate, subsequently he would have interpreted and understands, accepts in his short-term memory and keeps it by transfer the entry into the long-term memory.

This step consists of the visibility, the attention, the perception, the acceptance and the conservation of the incoming information by the consumer. The consumer must first be exposed to the message, allocate space for that information, interpret the stimuli and retain the message by transferring the entry to the long-term memory.

3. Decision process stage

At any point in the process of processing the information, the consumer could enter this step. The model focuses on the five basic steps of the decision process, namely problem recognition, research, alternative evaluation, choice and results (post-purchase evaluation and behavior).

There is an acknowledgment of the problem, this is followed by a search for information that can be internal depending on the memory. The search for information is also impacted by environmental influences. Subsequently, the consumer evaluates the different alternatives, whereas evaluation leads to the formation of attitudes which, in turn, affect the purchase intent. The next step is choice and purchase, which is impacted by individual differences. Finally, there is a result, in the form of satisfaction and dissatisfaction. This result acts as a feedback on the input and again influences the cycle.

Environmental influences, individual differences and social influences, directly and indirectly influence each step of the decision process. However, EKB has proposed that it is not necessary for every consumer to go through all five steps, it would depend if the problem is a large one or a routine problem-solving behavior.

The model focuses primarily on five fundamental steps of the decision-making process problem recognition, search for alternatives, alternative evaluation (in which beliefs can lead to the formation of attitudes, which can in turn lead to an intention to purchase), the purchase and the results. But it is not necessary for all consumers to go through all these steps. It depends on whether it is an extended problem-solving or routine behaviour.

4. Variables in the decision process

The model proposes individual influences that affect the different stages of the decision-making process. Individual characteristics include constructions such as demographics, motivations, beliefs, attitude, personality, values, lifestyle, normative compliance, etc.

This stage consists of individual and environmental influences that affect the five steps of the

decision process. Individual characteristics include motivations, values, lifestyle and personality, social influences are culture, reference groups and family. The influences of the situation, such as the consumer's financial situation, also influence the decision-making process.

5. External Influences

The model also proposes certain environmental and situational conditions influences that affect the decision-making process. Environmental influences include "Circles of social influence", such as culture, subculture, social class, reference groups, family and other normative influences, influences of the situation include financial condition
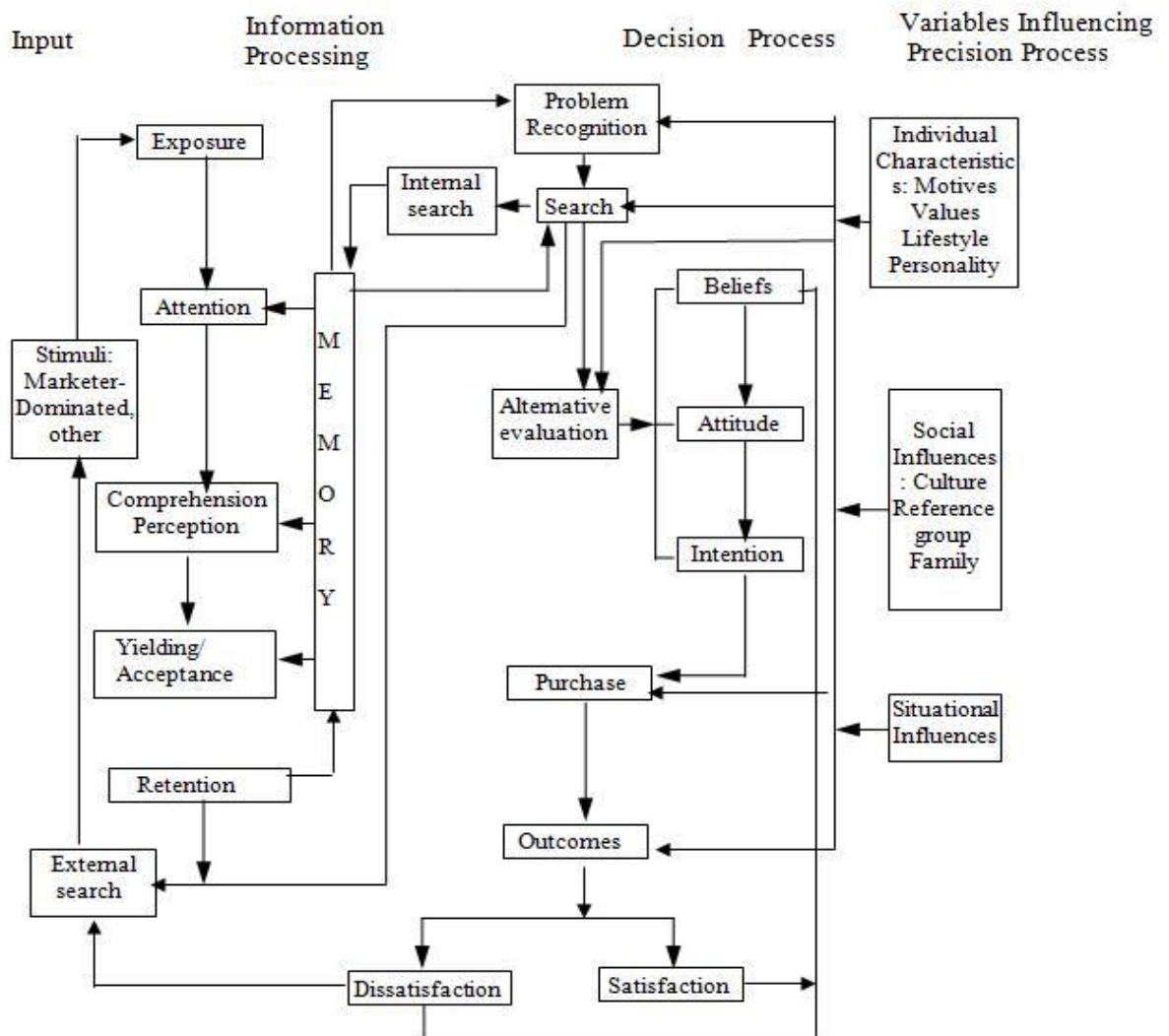
Fig. 4.4 EBK Model

(Source John AHaward, Jagadish Sheth. The Theory of Buyer Behaviour, John Wiley, 1969)

4.5 Organizational Buyers Behavior

What is an organizational buyer's behavior?

"Organizational Buying Behaviors is defined as a business management approach, with the purchasing behavior of companies is analyses as a collective process."

"The behavior of an organization shown in buying goods or services is called organizational buying behavior."

Model of Organizational Buyers Behavior

Organizational buying usually involves group decision making, which is known as the 'decision making unit' (DMU) or what Webster and Wind16 referred to as the buying centre.
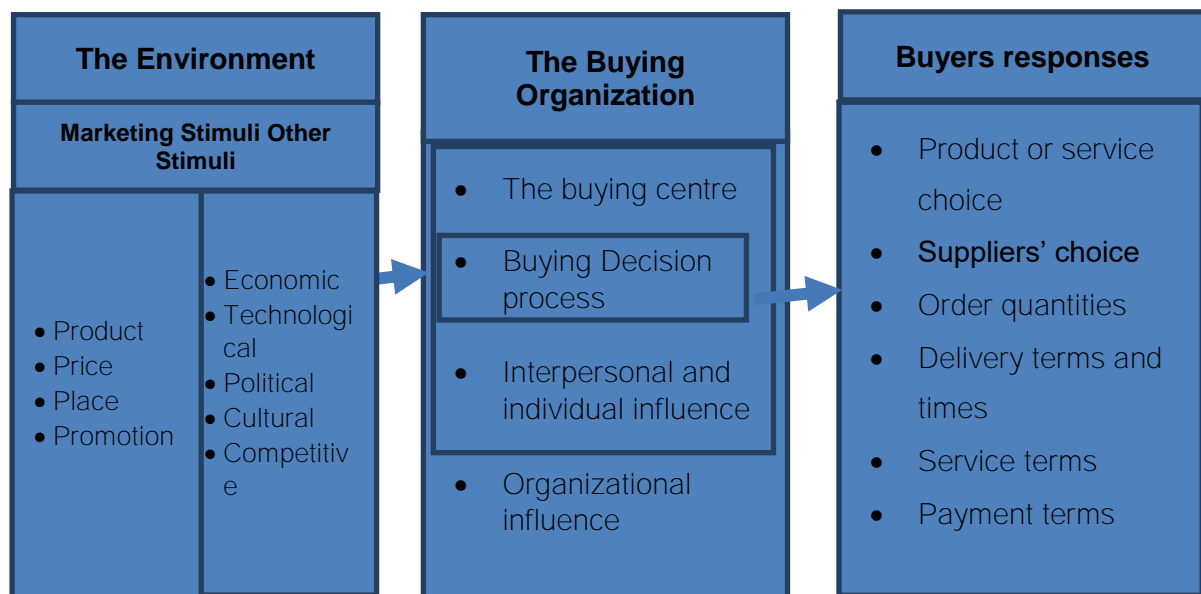
Fig. 4.5 Model of Organisational Buyer Behaviour

(Source John AHaward, Jagadish Sheth. The Theory of Buyer Behaviour, John Wiley, 1969)

Features of Organizational Buying Behaviour

The features of organizational buying behaviour are

1. Few buyers

Organization buyers live scattered in different places (i.e. live in different geographic locations). Organizational buyers are few in number, But they buy in huge quantity.

2. Close relationship

Organizational buyers and suppliers have close relations. It may be long lasting. Such relation has positive effect on future buying. They help in providing/supplying materials faster for production in order to stay ahead from their competitors.

3. Rational buyers

Professional and trained buyers are the main people involved in buying. Therefore, buying decision becomes rational.

4. Direct channel

As company buyers buy a huge quantity, they buy goods directly from producer. So, marketing channel becomes direct, whereas some organizations buy goods through intermediaries or agencies.

5. Purchase policy

The buying method of organization and persons become different. An organization makes certain policy for buying and buys goods according to the policy. Buying through quotation, buying through tender, buying through contract etc. are the major buying policies of organizations.

There are three categories of organizational purchasers

1. Institutional buyers (e.g. buyers in the police service, fire service and public authority).
2. Retail buyers.

3. Industrial buyers.

In a group, individuals have different roles in the purchasing process, categorized as
1. Initiators – these are people requisition or suggest purchasing a product or service.
2. Users – these are people in the organization who use the product. Sometimes they will also be involved in devising product specifications.
3. Influencers – influencers affect the buying decision in different ways e.g. they may be technical personnel who have developed product specifications.
4. Deciders – deciders make the buying decision (in most cases this is the buyer).
5. Buyers – buyers have formal authority to purchase the product.
6. Approvers – these people authorize actions of deciders or buyers.
7. Gatekeepers – gatekeepers control the flow of information to and from DMU or buying centre members e.g. a buyer's assistant or a telephonist.

Organizational Buying Process

Organizational buying has certain process. The following figure shows organizational buying process. There are eight stages. An organization may go through all of these stages as following or it may change some of them. This depends on buying quantity, buying price, nature of goods, buying frequency etc.

Fig. 4.6 Organisational Buying Process

(Source John A Haward, Jagadish Sheth. The Theory of Buyer Behaviour, John Wiley, 1969)

1. Need Recognition

Organizational buying process starts from need recognition. In an organization, a certain person recognizes need of certain goods and after buying the needed goods, need is fulfilled. Needs in organization can be recognized in two ways. They are external stimuli and internal stimuli. If a company decides to produce new goods, it is internal stimuli. It needs to buy new goods and equipment's. Similarly, when a buyer observes trade exhibition. They may make his/her idea to buy new goods. Such idea is external stimuli, because this idea is made from outer environment and materials should be purchased for this.

2. Need Description

After the need is recognized, the buyers should describe need. This task is completed in the second stage of organizational buying process. While describing need, features of needed goods and needed quantity should be described. If the goods have standard, this task becomes easy; if otherwise, it becomes complicated. Help of engineers, users and consultants should be taken for complex goods.

3. Product Specification

The task of preparing specific description of goods is the third stage of organizational buying process. In this stage, description performance of goods is prepared to solve the problems. Technician's help should be taken for this task. In this stage, the value of goods is analyzed.

4. Supplier Search

At this stage of organizational buying process, the buyer searches proper suppliers or sellers. Buyer prepares a list of suppliers to select good and proper suppliers. This list is prepared by looking at trade directory, searching in Internet, asking other companies for suggestions etc. If the goods to be bought are new, complicated and costly, it needs long time to search suppliers.

5. Proposal Solicitation

Proposal solicitation is the fifth stage of organizational buying process. At this stage, buyer calls best suppliers for submitting proposal. As the reaction, some send catalog or sellers to the organization. If the product is costly and complicated, the buyer demands detailed proposal, and if the product is technical, business organization calls for presenting the product itself.

6. Supplier Selection

At the sixth stage of organizational buying process, buyers assess the proposal and select one or more suppliers. For selecting the suppliers, a list is prepared and rating is made on the basis of their attribute and importance. Then the best supplier is selected. Analysis of the suppliers is done in different ways.

7. Order Routine Specification

After the best suppliers have been selected, the buyer prepares final order. In this order, all the matters such as attribute of goods, quantity, specification, time for supply, warranty, method of payment, service after sale etc. should be clearly mentioned.

8. Performance Review

This is the last process of organizational buying. At this stage, the buyer reviews suppliers' performance. This type of review helps to take decision whether to continue relation with the supplier or change or end the relation. If the performance of the supplier is satisfactory, the relation can be continued; if it is somewhat defective, if partial correction is made and the relation is maintained. If the performance is disagreeable then it will break.

Table 4.1 Stages of the buying process and buying situations

Stages of the buying process	Buying situations		
	New task	Modified rebuy	Straight rebuy
1. Problem recognition	Yes	May be	No
2. General need description	Yes	May be	No
3. Product specification	Yes	Yes	Yes
4. Supplier search	Yes	May be	No
5. Proposal solicitation	Yes	May be	No
6. Supplier selection	Yes	May be	No
7. Order-routine specification	Yes	May be	No
8. Performance review	Yes	Yes	Yes

Influences on Organizational Buyer Behavior

There are many types of customers in the market. Companies and other organizations also need goods and services to operate and run their businesses. Customers may include producers, resellers, government and nonprofit groups, or anyone buying any goods or services such as equipment, raw materials, finished goods, labor, and other services. Some organizations sell exclusively to other organizations and never come into contact with consumer buyers.
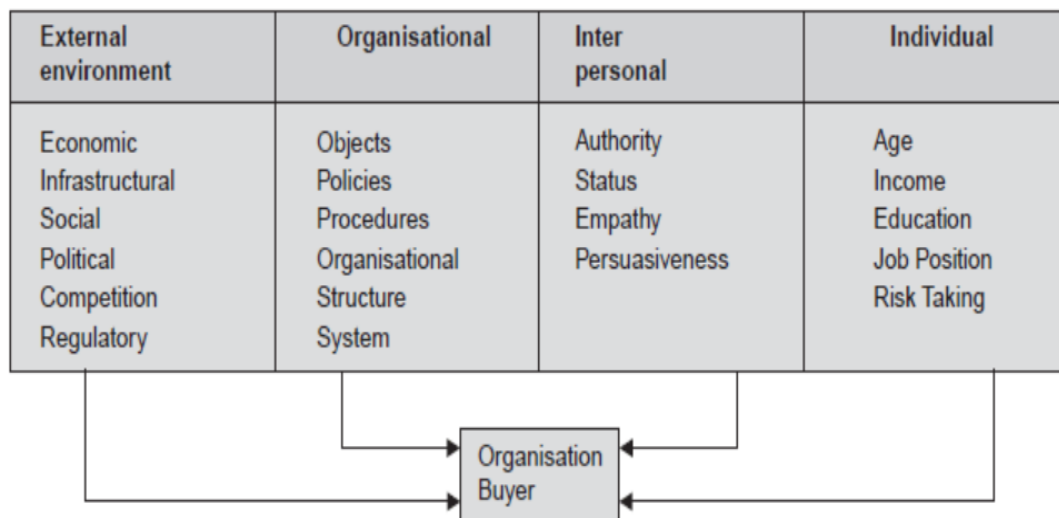

Fig. 4.7 Factors influencing Organisational Buying Process
(Source John AHaward, Jagadish Sheth. The Theory of Buyer Behaviour, John Wiley, 1969)

External Factors

1. **Economic Environment**

   Environment is an important factor that determines organizational purchasing. This includeseconomic factors, government policies, competitiveness in the market, technological advancements etc.

   For example

   If the organizational buyer feels that the government is going to increase tax on industrial buying, his buying of material will increase as buying will become expensive in future due to increased tax. An organization buyer may upgrade his technology if equipment's are available at nominal rates and interest charges are low. Purchases will be made at lower level, if the recession trends are transparent in the economy.

2. **Social Environment**

   Societies and cultures are evolving continuously, and every business has to change its practices and procedures to meet up with the societal changes.

   Example With the rise in the number of animal lovers, pure leather suppliers have their business go down gradually. The clothing and footwear manufacturers have shifted to artificial leather suppliers. This shows how the social environment can affect the buying patterns of organizations.

3. **Political Environment**

   A change of the government or policy has a direct impact on the economy, and this leads to shift in the organizational buying patterns.

4. **Competition**

   Business is about beating competition and staying ahead. So when an organization's competitors move on to a newer product or service, or if they have a competitive edge because of their suppliers, it's more likely that organization will change its trends too and hence its buying pattern will change accordingly.

5. **Regulatory Changes**

   Any changes in the corporate laws, rules and regulations will also affect how, when and what the organizations buy. There are also regulatory changes that may affect a particular industry and based on that the related organizations will change their buying patterns to stay with the new regulations.

Organizational Factors

Purchasing decisions, especially big-ticket expenditures, may be influenced by the organization's strategies, and performance. Generally the decision makers and the providers competing for the business must present a compelling explanation for how the new purchase will help the organization become more effective at achieving its mission and goals.

organizational structure plays a major role in determining the participants role in the buying process. Internal organizational politics and culture may also impact the decision makers, and the pace of the buying process. An organization's existing systems, products, or technology might also influence the buying process when new purchases need to be compatible with whatever is already in place.

Internal Organization factors are

- Organization's Goals and Objectives

- Organizational Structure
- Policies and Procedures
- Technological Levels
- Manpower Skills

Inter-personal factors

Industrial buying decisions are normally collective and also as per the procedures decided. The buying center involves several individuals with different authority, status. Buying center consists of individuals of the organization concerned with purchase decision process. There is interaction among the members of a buying center as regards purchases to be made. There is also a possibility of conflict among the members in marketing buying decision. The suppliers need to know about such conflicts in order to resolve them so that the marketing/purchasing program can be adjusted accordingly. Conflicts among buying center participants need to be solved so that buying will be done i.e. as per the production schedule prepared. A knowledge of group dynamics helps the marketer to settle conflicts and early release of purchase order.

Organisational Factors

1. **Participation and Authority**

   In organizational buying situations, there are rules as to who can participate in the purchase decision and who is the ultimate deciding authority.

2. **Interpersonal Conflict**

   Interpersonal conflicts and conflicts of interest amongst the decision makers often results in delays and changes.

3. **Education and Awareness**

   Educational background of the decision makers and their level of awareness have a major part on what type of purchases they will make.

4. **Risk Taking Ability**

   If the buying department constitutes high risk takers, they will not have the idea of choosing the latest technology or new suppliers. While on the other hand, decision makers with a low risk-taking tolerance are more likely to stick to proven and tested technology or well-established suppliers.

Individual Factors

- Individual factors such as age, cultural and social status, of the members on the buying team, also influence the buying decisions taken by them.
- Final decision is based on the above-mentioned individual factors even when their importance is limited in the decision-making.
- The industrial buyer may have assertive or co-operative attitude. The supplier's representative has to adjust with all types of industrial buyers in order to finalize purchase deal and sell the product.

Summary

Consumer Behaviour comprises the entire spectrum of activities and processes which individuals engage in when buying, using, acquiring or disposing of goods and services. The importance of the study is the individual making the purchase, but sometimes making the purchase on behalf of others. During the decision-making process the consumer is influenced by both internal and external factors. Where as in Organizational buying the decision varies based on the evaluation criteria of selecting the vendors. This chapter also talks about the role of influencers, deciders, buyers, deciders. The

problem recognition refers to consumer attention to gap between the ideal or desired state and existing state of mind for waste management. This unit also discuss the various information processes for the reusage of products. Thereafter, a thought was given to evaluate and eliminate the process in per view of the waste management. Once the purchase process is completed, the marketer's attention has to shift to the phase during which consumers handle their reactions to product purchase and use keeping in the waste management perspective.

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Chapter 5 CRM Concepts and Components

Introduction

Customer Relationship Management (CRM) is a strategy for managing the company's relationships and interactions with customers. It helps to improve profitability. More commonly, when people talk about CRM they are usually referring to a CRM system, a tool that helps sales management, workflow processes, productivity.

Customer Relationship Management enables to focus on organisation's relationships with individual people – whether those are customers, service users, colleagues or suppliers. CRM is not just for sales. Some of the biggest gains in productivity can come from moving beyond CRM as a sales and marketing tool and embedding it in business.

Objective
- To understand CRM concept and components
- To Know the challenges in implementing CRM
- To understand the CRM measurement Tools
- To identify the CRM practices in various sectors
- To observe CRM in waste management industry

5.1 Concepts of CRM

Customer Relationship Management (CRM) is a term that refers to the practices, strategies, and technologies that organizations use to manage and analyse customer interactions and data throughout the customer's lifecycle, with the goal of improve customer service relationships, build customer loyalty and drive sales growth. CRM systems compile customer data across different channels - or points of contact between the customer and the company - that can include the company's website, phone, live chat, direct mail, marketing materials and social media. Customer relationship management systems can also provide staff in contact with the customer with detailed information about the customer's personal information, purchase history, preferences and concerns.

Now-a-days, sales or marketing meaning is much more than a classic definition of the dictionary "the exchange of goods for an agreed sum of money". To make effective sales and marketing, it is best to have as detailed a knowledge as possible of everything that happens in the process.

The CRM concept has been around since man started selling products. There is nothing new to trying to manage customers and sales, to promote products and to ask how much amount is earned from promotions, or to assist and retain customers. Whether it's haggling a market stall or using post it stickers, Excel files, paper tracking systems, more advanced web-based CRM software. Everything is "CRM", the only thing that has changed is the scale and efficiency with which we do it.

With the advent of the internet and web technology, this can be more easily achieved with the implementation of "customer relationship management software", which has led to changes in the way organizations approach management. Now more than ever, businesses of all sizes, from small businesses to large corporations, to individual businesses, small and medium-sized businesses, it is

necessary to automate services and personalize communication with customers.

If a company has a system to automate repetitive processes, record important communications, report sales activities and potential revenue, and effectively manage the sales process and customer relationship, it will have an advantage over others.

In summary, an effective customer relationship management program will give a360-degree view of business. That's why customer relationship management systems have grown in popularity in recent years.

Aim of CRM

The ultimate goal of any customer relationship management process or software is to(1) initiate marketing, (2) process sales, including quotes and invoices, and (3) provide assistance.

Benefits of CRM

CRM is often understood as software. In fact, it's a human thing; it's a way of doing business. Several reasons can motivate a company to implement CRM. Here are some of the most common benefits

360-degree view of business, Organizational data sharing, reduce customer acquisition costs, Centralized customer interaction, Improved customer support, increase customer satisfaction, High rate of customer retention, Booster new business, Increase low-cost revenue.

It's a fact that CRM is becoming more and more important among businesses of all sizes. You may think that you do not need it if you are a home-based business or a sole trader, but this should be seen as a way to increase your efficiency so that you can do more with less and free up time spent on repetitive tasks such as quotes, invoices, etc., so you can focus on your strengths and your business.

> **To Do Activity**
> 1. Discuss the benefits and impact CRM can have on your organization/institution.

CRM Evaluation

Before implementing a customer relationship management initiative, businesses of all sizes should take some time to evaluate the wide variety of software available on the market.

They should also take the time to review the "customer relationship management measures" they would like to improve, by measuring the current measures and then developing realistic plans for improvements over time, for example 6 and 12 months. The CRM software is designed to be used by people, to serve people. It can be customized by CRM providers to match the team's ideas and changes to the business. Often, frequent changes are made, especially at the beginning of the project, when users see to whom it can be useful for and how to help them in their work. With this in mind, it is probably best to limit metric revisions to shorter timelines, rather than "3 years" or "5 years", due to the dynamic nature of CRM.

Implementation of the CRM

Depending on the complexity of requirements, CRM implementation may or may not require an implementation project. It is advisable to seek advice from CRM partners, but not essential, especially if technically competent or if have IT resources. A customer relationship management partner will help as he or she knows the product thoroughly and can advise on best practices and solutions for customer relationship management implementation projects. Generally, the project should be treated as another and include milestones, tasks, deliverables and tests.

5.2 Components of Customer Relationship Management

A number of different components of customer relationship management are essential to the proper functioning of an organization. Each component is unique in itself and plays an undeniable major role in the process.

Components of CRM

Sales force Automation

Sales force Automation is the essential component of customer relationship management. This is one of those elements undertaken by the maximum professional organizations. This includes forecasting, recording sales processing, and tracking potential interactions.

It is useful to know more about income generation opportunities, which makes them very important. The component also includes the analysis of sales forecasts and labor performance. To achieve an overall improvement in the development and growth of the sector, many components work hand in hand to form the automation of the sales force in a consistent unit. Some of its' key elements are lead management, account management, opportunity management, forecasting, pipeline analysis, contact management, activity management, email management, and reports.

Human Resource Management

Human resource management involves the efficient and correct use of human resources and skills at the specific time and situation. This requires ensuring skills and intellectual levels of the professionals that match the tasks they undertake based on their professional profile. This is essential not only for large companies but also for medium-sized companies. This implies the adoption of an effective human resources strategy and the study of skills or manpower and generated growth, which allows to design and implement the necessary strategies accordingly of development.

Lead Management

Lead management, as the name suggests, is about keeping track of leads and their distribution. The activities that benefit most from this component of CRM are the sales industries, marketing companies and customer service centres. This involves effective campaign management, designing custom forms, finalizing mailing lists, and more. An in-depth study of customer buying patterns as well as potential leads helps to capture the maximum number of leads to improve sales.

Customer Service

Customer Relationship Management focuses on collecting customer information and data, information about their purchases and their models, and also involves providing the information

collected to the necessary and relevant departments. This makes customer service an essential part of CRM.

Almost all major departments, including the sales department, marketing team and management staff, must take steps to develop their knowledge and understanding of customer needs as well as claims. This undeniably encourages the company or business to provide fast and perfect solutions, customer support and responsiveness, which increases the trustworthiness and confidence of customers and individuals within the organization.

Marketing

Marketing is one of the most important components of customer relationship management. It refers to promotional activities adopted by a company to promote its products. Marketing could target a particular group of people as well as the general public. Marketing involves the development and implementation of strategies to sell the product. Customer relationship management facilitates the marketing process by enhancing and improving the effectiveness of marketing and promotion strategies.

This is done by making an observation and a survey of potential customers. It is a component that brings various sub-elements or aspects. List management, campaign management, activity management, document management, call management, bulk email and reporting are all major elements of marketing. The use of the items varies from company to company depending on its nature and requirements, as well as the target clients.

> **To Do Activity**
> 1. List out different sources of marketing.
> 2. Find out leading marketing service providers, plans, costs and benefits.

Workflow Automation

There are multiple processes that run concurrently when it comes to management, which requires cost-effective cost reduction and streamlining of all processes. This phenomenon is called Workflow Automation. This not only reduces excess expenses, but also prevents repetition of a given task by different people by reducing the labour and wasted labour for preventable jobs. Document routing and form filling are part of the process and are designed to avoid unnecessary time and effort.

Business Reporting

CRM comes with sales management, customer service reports and marketing. Customer service reports help a company's management better understand the management of their day-to-day work and operations. This makes it possible to know the precise position of the company in each particular case. The CRM provides reports on the company, which gives it a major role. It is ensured that the reports are accurate. Another important feature is the forecast and the ability to export activity reports to other systems. To make comparisons, it is also possible to save historical data.

Analytics

Analytics is the process of studying and representing data to observe market trends. Creating graphical representations of data in the form of histograms, graphs, figures and diagrams using current and past data is essential to allow for a thorough understanding and study of trends. Analysis

is an extremely important element of customer relationship management, as it allows for in-depth study of the information needed to calculate the progress of the business. Different components of CRM are associated with different elements, including customer acquisition, customer value enhancement, and customer loyalty. Various marketing applications are designed to attract more customers, while data warehousing and analytics tools help the company maintain better communication and relationships with its customers and analysis tools. Overall, each of the components addressed in CRM is critical to improving the work structure and the market response to the activities and their products.

5.3 Evolution of CRM

Initially started in the 1980's, CRM was a collection and analysis of customer interaction and information. Organizations' stored the customers information's in a traditional database.
Database marketing made its first appearance in the 1980's.

It used statistical modelling to manipulate data and personalize communications with customers. The initial systems were unorganized, not easy to track and it was hard to update especially with the limited use of email and internet.

In 1990's – The term "CRM" was first coined.
Also, businesses started giving back to the customers to help with interactions such as bonuses and incentives to satisfy the customer's needs and wants.

From database marketing came "Sales Force Marketing" (SFA) which took most of the features from database marketing and automated them also combining them with contact management software which provided organizations with more useful customer information. Automated processing increased productivity in tasks which were difficult such as inventory control and tracking sales tasks related to customer interactions.

Siebel systems innovated SFA software to further evolve it to modern day CRM software.

SAP entered the market in the mid to late 90's focusing on innovation and developing technologies.

In 1995
Around this time SFA and CMS took on the aspects of modern CRM software. Lacking a definitive name for this product, it was commonly referred to in such terms as enterprise customer management (ECM) and customer information system (CIS). Ultimately it was called CRM which also identified the industry.

In 2000's
Like many industries, the CRM market was grately impacted by the dot com bust.

Salesforce introduced cloud-based CRM solutions. Many criticize cloud-based software for the lack of customization.

In the late 2000's Comcast Cares is introduced bringing a boom to social CRM concept.

The mid-2000s

Microsoft formed Dynamics CRM and Oracle bought other application vendors, Siebel being one of them.

In 2007
This year saw the emergence of cloud-based CRM called Force.com, introduced by Salesforce. It resolved the concerns of many users that cloud-based applications could not be customized.

The late 2000s to Present
Cloud-based and SaaS CRM systems have become the primary conduit for integrating an array of features. Social Customer Relationship Management (CRM) became part of the business world when businesses decided that they needed better software to manage their contacts and customers. Applications dealing with customer service and social CRM have become vastly popular given decreasing costs and compatibility with mobile devices.

With the advent of Social CRM tools and the emphasis on social media, the focus has significantly expanded to be that of interaction with customers, as opposed to the traditional emphasis on transactions of much earlier days. Through Social CRM, businesses have enhanced their capability of gathering data, engaging with customers, obtaining their feedback about products and service, and building strong customer relationships. Facebook, Twitter, Google+, Yelp, Trip Advisor, special communities, and forums, etc., are few examples of the vast opportunities business and customers have to engage with each other.

Stagesof Growth
- Single-functions client/server systems
- Cross-function integration The process of combining the various functional business activities within an organization by bridging the boundaries and enabling the flow of information among the various organizational functions.
- Internet-based evolved with technological advancements, helped in eliminating unnecessary activities.

Current Events
- Now CRM has increased presence in social media.
- Continues to provide better customer service.
- Increases customer revenue for businesses
- More accessible with mobile technologies.

CRM has evolved from an unorganized system to a beneficial system for businesses and customers. Cloud based CRM systems give businesses an advantage of storing and tracking information about future and present customers.

CRM will continue to evolve along with emerging technology. Top companies like Sales force and Microsoft have more recently designed AI tools which help to predict customer leads that are most likely to produce positive results. These tools assimilate current customer and prospective customer data from various sources and the analytic software predicts the leads that have the most likely positive outcomes.

5.4 CRM Development

CRM Development & CRM Software Solutions – Companies rely heavily on Customer Relationship Management (CRM) technology tools to manage interactions with current and future customers. CRM software deploys technology to organize, automate, and synchronize sales, marketing, customer service, and technical support plus manage customers, records, and their surveys.

If the data is in one place, it will help the client service, sales or customer departments to improve the sales and the after sales service. It also helps to denote variables like changes in the market trend, changes in customers' preferences. CRM system is one of the best computer applications to manage the data in a concise and centralized way. Small or big, any type of organizational or business setup requires such a system for it synchronizes information in just a click.

5.5 Challenges in Implementing CRMChallenges

People Related Challenges in CRM Implementation

1. Lack of senior management sponsorship CRM activity exclusively determined by IT group without the board purchase in Business clients hazy or unconvinced on advantages of CRM. Management not willing to resolve to authorize CRM selection. Underestimating Change Management requested by CRM.
2. Lack of scope clarity & budget overruns Not submitting sufficient time and spending plan to necessity disclosure. Underestimating incorporation exertion. Not foreseeing amount and nature of information to be relocated to the new CRM. Underestimating end-client obstruction and preparing costs. Underestimating foundation costs. Belittling customization and usage costs.
3. Underestimating Change Management Active obstruction because of foreseen danger from CRM. Passive protection from reception because of inactivity of changing old propensities. CRM interface moderate or un-instinctive, making it unwieldy to utilize. CRM seen as 'something that benefits the board as it were'.
4. Changes in Key Stakeholders in Middle of Project Internal CRM champion(s) leaving the association or having change of job or office. Arrival of new IT Head or Business Head, who has an alternate vision for CRM. Changes in key staff from CRM merchant's side that move back the advancement made on seller's comprehension of hierarchical goals
5. Lack of Expertise of the CRM vendor Vendor does not have enough involvement with the CRM item being actualized. Vendor does not have innovation or process development of conveying CRM undertakings of comparable scale. Vendor not completely mindful of the difficulties in CRM usage and is poorly arranged to envision and manage them satisfactorily.

Technology Related Challenges in CRM Implementation

1. Lack of CRM Product Fit Product can't bolster different arrangement alternatives, to be specific – On Cloud, On-Premise, Private Cloud, and so forth. Product not sufficiently adaptable to consider further customizations to empower fit with association's developing and evolving needs. Product not keeping pace with current CRM patterns, for example, – Global, Social, Mobile, and so on. Product not natural or easy to understand, in this way thwarting client reception.

2. Integration Related Issues Existing legacy systems don't support modern, web-services based integration that is required with CRM. Lack of satisfactory help from different merchants of existing frameworks that should be incorporated with CRM. Data honesty issues and vulnerability over 'single wellspring of truth'.

Process Related Challenges in CRM Implementation

Impact on Existing Business Processes Considering CRM as only an innovation, rather than business change apparatus. Inflexibility to change existing method for getting things done, surrendering dug in (terrible) business rehearses and embracing best practices that CRM empowers. Implementation that is excessively troublesome of existing business rehearses. Complexities in re-architecting client confronting forms through CRM.

Other Challenges Unique to Large Organizations

1. Defining Clear Objectives An association must set up an unmistakable arrangement of goals that should be accomplished through client relationship the executive's usage. Guarantee the objectives are quantifiable. Thus, one can survey the advantages and difficulties of CRM while following the arrival on speculation.

2. Appointing a Core CRM Team One of the noteworthy issues in actualizing CRM is that numerous associations accept it to be an IT anticipate. One should preferably utilize a center CRM group that works with the organization's partners, senior administrators, client bolster experts, and end clients to comprehend the necessities. When the prerequisites and goals are clear, can permit the IT group to start the CRM usage process.

3. Defining the Processes The procedure to actualize a CRM ought to be characterized plainly so as to guarantee the accomplishment of your CRM venture. One great practice is to make a focal vault, available to all, which stores all the procedure definitions. This enables the report to be accessible for reference by anybody utilizing the framework.

4. Managing the Application When the CRM has been taken off, it is vital to re-adjust it to organization culture. Mapping business activities with the CRM application gives the end clients a chance to perform everyday tasks utilizing the CRM application of course while enabling to monitor everything through a solitary stage.

5. Finding a Right CRM Partner A privilege CRM improvement accomplice causes guarantee for the achievement of CRM venture. In a perfect world, one should choose an accomplice who can take into account all CRM prerequisites, for example, meeting, improvement, customization, mix, and upkeep. The accomplice should likewise mix with work culture while understanding the potential dangers and difficulties of the client relationship the board framework and the strategies to address them.

6. Heavy Work Load in Production Units The customary methodology centers around the floor generation and the other inner divisions get dissipated data. Absence of coordination between the creation units and the inner offices hamper the nature of the last item.

7. Lack of Communication Channels Whenever people or groups are in strife, communication between them will be general deteriorate and more terrible. As a contention heightens, the efficiency of the representatives lessens which thus prompts operational wasteful aspects.

8. No Coordination between Pre-sales and Post-sales Activities On the off chance that pre-deals and post-deals exercises are not very much organized, the client needs are misconstrued. Consequently, organizations are not ready to convey an astounding item on time bringing about business misfortunes and loss of aggressive edge.

9. Relationships with Customers Overseeing great associations with clients is an essential imperative all things considered. As per the Harvard Business Review, there is an immediate connection between a business' worker fulfillment,customer loyalty, and profitability. Organizations that neglect to fulfill workers and keep up great client connections need to experience the ill effects of decrease in brand esteem and diminished client steadfastness.

10. Creating a CRM strategy 18% of respondents revealed issues identifying with methodology, including insufficient arrangement procedures (40%), ineffectively characterized business necessities (25%) and an absence of arrangement on destinations (18%).

11. Re-architecting customer-facing processes over a quarter (27%) of the issues revealed identified with troubles with business process management, including technical/integration challenges in supporting organization forms (48%) and poor business process plan (31%).

12. Selecting technology 33% of issues were identified with innovation inadequacies, such as perceived shortcomings in vendor solutions (30%), a lack of skills needed to implement the solution (23%) and system performance shortfalls (19%).

13. Implementing customer-centric behavior's 22% of issues announced identified with 'individuals' issues, including moderate client selection (49%), poor change of the executives and preparing (36%) and troubles adjusting society to better approaches for working (15%).

14. Difficulty in conveying a single CRM system spreading over numerous geographic areas because of contrasts in business rehearses and the required restriction.

15. Artificial time pressures created due to end-of-contract situations with existing vendors. The urgency and impossible timelines can derail the change management efforts required for implementation & adoption of new CRM.

16. Change in business needs mid route through CRM usage, for example reallocation of CRM spending plan, moved spotlight on mergers and acquisitions, changes in administrative condition, and so forth.

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Different Organizations for CRM

The different organizations of CRM are
1. Sales force CRM
2. SAP AG
3. Oracle
4. Microsoft Dynamics.

Categories of CRM are
- Enterprise CRM Suite

- Midmarket CRM Suite
- Small-Business CRM Suite
- Sales force automation
- Incentive management
- Marketing solutions
- Business intelligence
- Data quality
- Consultancies

Different Ways to Maintain CRM

Call centres

Contact centre CRM providers are used for small and medium sized business. This systems act as the communication between company and customers by using analytics and key performance indicators to provide the user information on where to focus their customer service and marketing.

Contact-centre automation

Contact-centre automation is an integrated system that maintains contacts between an organization and the public, it is designed to reduce the repetitive parts of a contact centre agent's job. Automation reduces time by having pre-recorded audio messages that help customers solve their problems.

For example, an automated contact centre can re-route a customer through a series of commands asking them to select a certain number in order to speak with a particular contact centre agent who specializes in the field in which the customer has a question. This saves time on behalf of the employees.

Social media

Social CRM involves the use of social media and technology to learn from consumers and their views on the product, etc. The public, especially young people, are the most who uses social networking sites, companies use sites to gain attention towards their products, services and brands, with the aim of building up customer relationships to increase demand.

They are linked with social-media to track and communicate with customers. These customers share their own opinions and experiences with a company's products and services on their feeds, giving these firms more information. Therefore, these firms can both share their own opinions and also track the customers opinions.

Location-based services

CRM systems have technologies that create geographic marketing campaigns. The systems take in information based on a customer's physical location and sometimes integrates it with popular location-based GPS applications. It can be used for networking or contact management as well to help increase sales based on location. This helps for marketing certain products based on religion of the people who live in and across that area. (Geographic location).

Example 1

CRM in Volvo Europe

Volvo Construction Equipment (Volvo CE) one of the world's largest manufacturers of construction machines. The products Volvo CE sell includes articulated haulers, wheel loaders, wheeled and crawler excavators, motor graders, pavers, milling machines, compactors. According to Christopher Cassidy (Area Director Customer Support Europe), they have been using Microsoft Dynamics CRM (CRM software of the company Microsoft Dynamics) in Europe since 2003, integrated to their ERP system called SAS/AS400, which is a customized enterprise system and regarded as old and outdated. There is currently an ongoing project to change the enterprise system to Microsoft Dynamics AX in near future.

Volvo CE is also using SAP ERP enterprise system as well, mainly for accounting functions within the company. In Volvo CE, each dealer (Volvo-owned or independent) is regarded as a country, in other words each country is also a dealer regardless of the ownership. CRM in Volvo CE is not used centrally with unified structure; instead each dealer (country) has its own customer database and has responsibility over its own CRM management. The policy of Volvo CE top management is to recommend and promote usage of CRM rather than enforcement, and as of today, most Volvo owned dealers use Microsoft Dynamics CRM, while privately owned dealers have either tended to source another CRM or, in some cases, they do not have CRM at all. The main problem is the variety of efficiency and competence level between dealers. Due to decentralized CRM usage, it varies a lot from country to country and CRM is not monitored or coordinated from Volvo CE headquarters.

Cassidy states "We tend to judge each country separately." According to Cassidy, CRM is crucially important especially in Construction Equipment Industry for numerous reasons, thus Volvo CE had a CRM project going on even before 2002, but it failed. So, they had to start again on 2002, with Microsoft Dynamics chosen as CRM system. Their main intentions to implement CRM were to enable all dealers a good quality, reliable CRM system to operate on and to avoid the process of each dealer searching for their own CRM. They also wanted to have more coordination but still leaving final decision up to the dealer, due to business style and cultural differences between countries.

Example 2 CRM in OUTOKUMPU Worldwide

Outokumpu is a group of companies headquartered in Espoo, Finland, aimed at stainless steel and a global leader in steel production. The main products are hot and cold rolled stainless steel sheets, plates and strips that are used in numerous applications – such as the construction industry, the automotive industry and equipment for the process industry. Their customers include the processing and construction industries, the energy sector the transport sector, the food and electronics industries, and the producers of household and industrial machinery around the world. Outokumpu worldwide now at the stage of final CRM implementation phase to their whole sales company. After many, vendor research, test groups and trials, their choice of vendor is Super Office. Their main reason to choose Super Office software was its user-friendly and simple interface, and easy to customize aspects. Among their vendor try-outs included IBM CRM and SAP

CRM as well. In Outokumpu, SAP ERP is used as their main ERP system, but there are varieties of other ERP systems being used as well, depending on country. According to Löfgren, their CRM system will not be fully integrated with their ERP system SAP, so after implementation, the users will need to use both systems in their daily work. In Outokumpu, CRM will be mainly used in Marketing & Sales, and by some Accounting personal like credit controllers. Their main reason of CRM implementation was to have an open, completely visible, transparent and standardized system worldwide where all marketing & sales personal can benefit to increase their competitiveness and predictability.

Example 3
CRM in TELGE ENERGI Worldwide

TelgeEnergi is electricity trading company. The group is present in national and international market. TelgeEnergi does not have electricity production, but purchase electricity from Power Exchange NordPool. They sell only electricity produced from wind and water to their customers, which are households and private, public companies. Being a customer at TelgeEnergi, means having a freedom to contribute to the way electricity is distributed; customers are involved in development of electricity market, expansion of wind energy and displacement of coal power. TelgeEnergi has been using a customized CRM system (specifically built for them), for one year, purchased from company Microsoft Dynamics, according to the information received from Eva LendicEdlund (Sales Manager)

CRM Strategy

It is a business strategy that helps the organizations to maximize their profit, revenue as well as the customer satisfaction. They implement customer-centric processes for achieving the customer satisfaction. CRM strategy is not something that is developed separately but it must be developed in accordance with the corporate strategy.

CRM strategy helps in obtaining the following outcomes
- Needs and wants of individual customers can be understood better.
- Helps in reducing the customer churn, i.e. it reduces the number of customers breaking the relationship with the company.
- Revenue increases
- Consistent and satisfying experiences can be delivered all time.

    When developing CRM strategy, there are three things that need to be considered. They are people, processes and technology. All of these will have a great impact on the organisation. CRM strategy helps in identifying the current state of the organisation, analysing the capabilities and opportunities and then taking steps to achieve the organisational vision and goals to manage and maintain long-term customer relationship.

Steps in Developing a CRM Strategy
- Set a destination First step is to identify the goals and then determine the plan to reach those goals.

- Prioritize your customers Every organisation will have their own way of looking at the customers. Identify the customer's interests so that the company can segment the target customers to increase their revenue

- Communicate with the employees Employees are responsible for determining if the goals are met. Therefore, it is very important to ensure the participation of all the employees throughout the process.

- Stagger the changes Bringing changes all at once can have a drastic impact on the organization. Therefore, introduction of new policies and technologies should be done gradually.

- Start tracking the customers before first contact This will help in understanding and knowing what the customers really wants, what are their expectations and what are their future needs.

- Evaluate and improve It is very important to evaluate the approach. It is also very important to know what is ineffective as much as knowing what is effective.

To Do Activity
1. Identify the ways in which CRM strategy can be successfully implemented.
2. What are the reasons for the failure of a CRM strategy? Give an example of CRM strategy that failed.

CRM Strategy Cycle
It consists of three phases
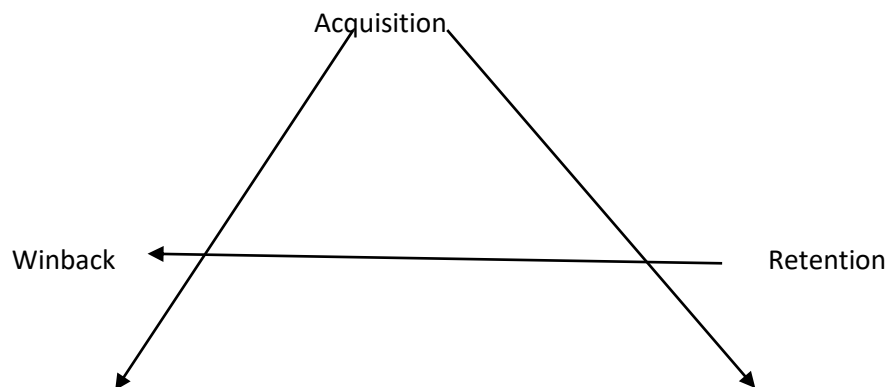
Fig 5.1 CRM Strategy Cycle

Acquisition
As the company lose around 2 to 40% of the customers, it is very important to fill the pipeline. Acquisition strategy helps the organisations to acquire and maintain the customers through various marketing programs. Mass media advertisement can help in acquiring many customers. The most important thing that needs to be taken care of is the choice of right acquisition channel. New customers can be acquired by integrating the existing base products so as to provide more improved products. New companies must focus more on the acquisition strategy.

To develop an effective acquisition strategy, marketing research has to be conducted as well as appropriate offers must be provided at the right time to the customers.

Example for acquisition strategy
Drobox's referral program (Invite a friend and earn free storage space) helped in acquiring more customers.

Retention
Retention strategy is used to maintain long term relationship with customers and to reduce the number for customers breaking the bond with the company. There are various ways through which the customer retention can be maintained. It can be achieved by providing offers, rewarding as well as bonding. By offering or providing benefits or free gifts to the regular customers helps the organization to help retain the customers. It also helps in improving the customer loyalty.

Frequent communication calendar such as events, phone calls, special offers, "thank you" messages will constantly keep the customers in touch with the company. Delivering the right product to the right customer without any defects in the product or delivering the services as promised to customers will help them in retaining the customer's long-term relationship.

Example Retention strategy of Starbucks
This company introduced various retention strategies that helped in increasing their revenue by retaining the old existing customers and by acquiring the new customers. They focused on providing excellent customer service. They introduced loyalty reward program as a retention tactics.

WinBack
This can also be termed as comeback strategies. This strategy ensures in regaining the lost customers or those customers that are about to end the relationship with the customers. Making use of some special promotions helps the organizations in winning back their customers. Due to increase in price, organization may lose the customers. In such cases, win back strategies are very useful.

> **To Do Activity**
> 1. List out the Win-back strategies developed by an organisation of your choice.
> 2. Identify the reasons for which the organisations are losing their customers

Why CRM?

CRM is a marketing strategy that aims at building client relationship, customer loyalty and brand value with the help of various principles and activities. Many companies today use the help of CRM in order to create long term relationship with established and novel customers along with benefiting streamline corporate conduct. CRM assimilate commercial and client-specific strategies via laborer training, marketing planning, relationship building and exposition. CRM's unique ability to extract insight from customer review so as to create enhanced, solid and focused marketing and brand recognition becomes its core strength. Web technologies and a fine global focus on customer act as the loyalty Key, motivating drivers for the evolution of more innovative CRM strategies.

For example, a business that is in actuality interested in its customers is rewarded with customer and brand loyalty. Also, the market share viability proceeds at a robust pace due to the mutual advantageous nature of CRM. It also provide scope for further cross-selling opportunities.

How does CRM work?

CRM is not merely a technology but more than that which require a proper strategy for its successful implementation and application. The following are the major roles played by CRM in company management

1. **Supports a customer-centric strategy**

   This concept puts forward the idea that customer remains the center of focus no matter whatever the company does. This idea is based on clear goals on what and how an ideal customer experience would be like. Every time a customer interacts with an organization, he is free to form an opinion about the organization- good or bad. The collective information that the customer collects from various sources creates a portrait in the customer's mind, thus deciding the brand value.

   Organizations that are thoughtful about CRM, design and maintain a quality customer experience because they become conscious that a poor customer experience is a step toward customer churn , whereas a good experience encourages trust.

2. **Centralizes all customer data**

   All customer sales and marketing relation information are stored in databases, thus reducing silos within the organization-providing complete customer centricity. This information can then be used to measure, manage and keep track of customer related sales and marketing actions. This enhances customer trust and judgment towards positivity.

3. **Automates customer-facing business processes**

   Business- facing processes include budgeting and planning which make business run more efficiently whereas customer facing processes sales and marketing and customer service. CRM keeps check of all lead-related actions and what's been said and done. It is well understood that each business process must be optimized in for the organization to get pleasing results.

Review question

1. How do you think CRM aids in the successful conduct of an organization?

2. There are 3 major types of CRM used extensively. They are the following

Operational CRM

Operational CRM contours business processes that include sales, marketing and service automation. This category of CRM mainly aims generating leads and converting them into contacts, capturing the required data and aim at providing complete service throughout customer life.

- Sales automation focuses on automating sales process. Main purpose of sales automation is to set standard within organization to achieve new customers and deal with prevailing customers. It organizes information in such a way that the business can meet customers' demands and increase sales more adroitly and effectively. It includes various CRM sales

modules like Lead Management, contact management, Quote-to-Order management, sales forecasting and more.

- Marketing automation is done to find out the best way to offer products and access potential customers. Major module in marketing automation is campaign management. It enables business to resolve effective channel/s (like emails, phone calls, face to face meeting, ads on social media) to reach up to potentials customers.

- Service automation helps business to retain customers by providing optimum quality of service and building secure relationship. It provides issue management to fix customers' dilemma, customer call management to handle incoming/outgoing calls, service label management to keep track of quality of service based on key performance guide.

Analytical CRM

Analytical CRM was better mode to serve customers. The main function of this type of CRM application is data analysis. It inspects customer data, arriving from various touch points, to get better perception about present status of an organization.

Collaborative CRM

It is called as the strategic CRM too; it helps organizations to share the customer information among other related business units in order to increase the working and output efficacy. For example, feedback from a support team could be used by marketing team to approach targeted customers with specific products or services. This mode also help to bring together all the groups and focus on a single goal- that is to use the available information to improve the customer services provided thus increasing the sales.

Review question

Using the example of an organization, explain the various CRM types and its importance.

The Role of CRM in India

Customer Relationship Management in Indian Banks

Introduction

In current times, Customer Relationship Management (CRM) is creating new buzz in the banking sector. Indian banking industry is one of the largest banking industries in the world and hence CRM plays a very important and strategic role in it. Practicing CRM will not only allow banks to enable and maintain long – lasting relationships with their customers. With the correct type of management system and use of customer focused strategies profits can be increased to great levels. CRM allows the establishment and optimization of long term symbiotically valuable relationships between consumer and the organizations.

Once by using the CRM, the needs and desires of the customers are obtained it can then be integrated in all the other strategies of the bank along with its people, its technology and all its business processes. CRM helps understand the present and future markets. This knowledge can be then used to serve and identify new services and make existing services better. This holistic CRM practices help the bank to become more customer oriented ensuring long lasting customer relationships and hence increasing bank profits. It helps in acquiring and retaining customer and also helps in growing customers by getting new ones. Thus, in this era of increased competition

banks use CRM to build long term relationships with customers by offering customized quality services. It helps the bank focus on three dimensions of product or service marketing. That is enhanced product quality, better relationship quality and improved service quality in any kind of industry especially the banking sector.

Customer relationship management (CRM) is a synchronized approach in any kind of business to maintain the relationship between the firm and its customers. This CRM practice helps to satisfy any firm's customers. It also allows better retainability of customers and attracts more customers. This is done by using different promotions as means of advertisements helping the firm to not only survive in the market but also giving great comfort for customers to conduct business with firm

CRM in any sector especially in the banking sector is all about conserving a sustainable and competitive advantage by serving existing customers and attracting new customers. This concept is very dynamic in nature. Hence, it's important to effectively implement it in the banking sector especially the Indian banking sector. CRM practices initiate strong bonding between the firms in this case the bank and its customers.

This kind of bonding allows the business to reach new levels of success. This kind of personal and emotional bond is important for any organization to identify the needs of its customers and to find better ways to serve those needs. Any CRM system consists of a set of software applications that helps the firm or the organization to determine the customers' needs and references by storing and managing all interactions that has taken place with the customer.

In the banking sector, the CRM system has to deal with a large number of individual retail customers. Hence these CRM systems should have the analytical capacity to manage large customer information to calculate their retention rates by the bank. This will also allow the bank to cross sell their product effectively to the same customer and along with that to other new customers. The primary idea of any CRM system is to use technology and human resources to obtain insight into customer behavior and their value in terms of their product buying and long-term loyalty with the bank. The longer the customers are retained by the banks the greater the number of business transactions, the greater the number of products and services bought and hence greater profit to the bank in long term.

If any bank is successful in establishing an effective CRM system it is able to provide better customer service, increase efficiency of call centers and cross sell more products. This will also allow sales staff close deals faster and make marketing and sales processes easier and simple. An effective CRM system allows the discovery of new customers by the bank and also increases the incoming revenues. But it is not as easy as it sounds. Meaning just buying and installation of a CRM software system won't do the job. CRM truly do its job to the bank first needs to decide what it should do with the retained customer information what kind of information it should save and how to use it to fulfill the objectives and get appropriate end results.

For example, many banks and financial institutions keep a record of customers life stages so that it can market or sell appropriate banking products and services like mortgages or IRAs to them at the right period of time to fulfill their respective needs.

Phenomenal growth has been observed in Indian Bank in the past decades and that has also given rise to economic reforms. Public and private sectors both have metamorphized into profit- oriented business organizations but have played important role in economy and its development. This

process has increased the competition in between these banks and also changed their orientation to more of customer-oriented. Therefore, different CRM program measurement and tools have been implemented in the different public and private sector banks of India. It can be concluded with help of a few case studies that the private sector has been able to implement these techniques in a better manner. Various banks adopted different forms of Information Technology which has led to rapid growth in the potential benefits and services to the customer.

Innovative services offered using CRM system in banks

- ATMs were introduced.
- Biometric ATMs came into use.
- Single window service
- Teller system
- Introduction of internet banking.
- The use of plastic money for example, credit card, debits card, smart card etc.
- Alerts on mobile and e-mails.
- Introduction of electronic cash.
- Introduction of two in one account.
- New loan schemes were introduced according to the customer needs, for example-education loans, marriage loans, housing loans, personal loans, vehicle loans, furniture loans, renovation loans and tourism loans etc.

Various case studies conclude that private banks have higher mean values of CRM than the public sector. It was also that in public sector SBI is taking initiative on the technological front by introducing e-lobbies etc., making the customer experience better. The private sector has applied CRM aggressively in order to set their base. In the same case study comparison of CRM implementation in public and private sectors was performed using student's t-test. It concluded that there is no difference in CRM implementation between both the sectors. Customer retention rate is directly impacted by CRM, therefore it can be concluded that they have a positive relationship.

In case of private sector banks, all the dimensions of service quality (reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding or knowing the customer and tangibles) have higher value than the public sector banks. Private sector banks therefore, can concluded as more customer oriented. Although, public sector banks have been rated more for reliability and assurance and for private sector banks it seem to be tangibility, reliability and assurance.

Benefits of using CRM system in Banking sector - CRM enables the bank to increase its interactions with its customers and with this increased customer value greater economic results can be obtained. In today's market the competition is very high with new banks joining frequently with better schemes and investments.

Therefore, it is better for any bank to achieve greater interaction with a customer. Various communication channels should be used to fulfill this objective. Like call a help line, asking a dealer or having face to face interactions or browsing web sites. It is important that the customer believes that he can communicate with the bank at any time place and communication channel convenient for him with the same high quality of output obtained from all communication channels. The

customer should be satisfied at all times and should not think of leaving. The products and services offered should be customized to fit the customers need wants and desires. The bank should be able to sell more products and services at any current point of time to the same customer. The product and services costs should be optimized and proper selection of marketing tools should be done. The business meaning any kind or transaction with the customer should be carried out trouble free. More time should be taken out for the customer and individual attention should be given to each.

Table 5.1 List of Public and Private sector banks following CRM practices

S.No.	Public Sector Banks	Private Sector Banks
1	State Bank of India	ICICI Bank
2	Punjab National Bank	HDFC Bank
3	Syndicate Bank	Axis Bank
4	Oriental Bank of Commerce	Kotak Mahindra Bank
5	Corporation Bank	J & K Bank

Review questions

1. Write some CRM practices observed in the banking sector?

2. What do you think is the role of CRM in banking?

3. What are some real life examples you can think of CRM practices in the banking sector?

To Do Activity
1. Which practices do you think are the best and most effective based on your observation.
2. Visit your nearest bank and find out the CRM practices followed by them.
3. Compare CRM practices of two or more banks.

4. What are the benefits of using CRM in banking sector?

CRM in Retail

- Retail refers to the selling of product in several outlet, which is directly accessible to the public in order to get their basic needs, wants etc. fulfilled. The persons who deal with the retailing process are known as retailers. Retailers are expected to satisfy demands by supplying goods.

- There is a great role of customer relationship management (CRM) in the retail industry as this provides the customers with increased satisfaction, able to understand what the

customer wants and also able to reduce cost and also to improve the company's performance in the market.

- CRM in a way acts as the mutual benefiter for both the individual and company. There is a software called the CRM software which is expected to manage the relationships of the company with the individuals.

The Roles of CRM in Segmentation

CRM can assist in getting information about each one of the customer who are linked to the company by looking as the choices, preferences, demographics etc. This information can be taken into account for undergoing the process of segmentation, i.e. breaking down the heterogeneous market into homogeneous segments. Example include if a segment consists of college students you can create a market having books, novels, pens, stationary etc. The effect of segmentation is based on the CRM data to adjust the retailing strategies that could suit more to the customer and in return gain more profit for the market.

Review Questions

1. What is your take on CRM in retail?
2. As an individual, you must have visited a lot of retail shops, so what do you think about the importance of CRM in your purchase?

Promotion

The data that is gathered within a CRM system is useful for not only to target a market segment but also to target individuals through promotions. The objective of sales promotion is to increase sales in the market through giving the customers several coupons, discounts etc.

Purchases

It comes in the duty of CRM to keep a track on the records of the customer purchases and service calls. CRM team can actually manage if the customers are satisfied with their purchase, any issue related to the purchase. This specific move by the company would understand the customer's point of views and preferences, as well as to give them special offers when they come to know when they reach the expiration of the products. This strategy keeps the products in close perspective of the customer when they might need them and also by giving special allowances and discounts on the specific product in order to make them purchase again.

Retention

- One of the prominent effects of customer relationship management (CRM) is to increase the retention of the customers. If the company is able to find its loyal customers, they should leave no stones unturned in making efforts so as to make them stay. If a company succeeds in retaining atleast additional 5% customers per year then the profit would go upto 25%.

- Loyalty programs could reward the customers those who all are loyal to the company for making multiple purchases. The main objective is to win the trust of the customers so as to make them contribute to the company, thus making a mutually beneficial relationship with the company. For example people who travel a lot, be it for work or refreshment, they could be given more offers and discounts on their travel and stay, thus in a way retaining the customers to invest in their company over and over again.

Review Questions

1. How does promotions influence purchase?
2. What is your take on CRM and customer's loyalty?

> **To Do Activity**
> Be part of a promotion campaign and get to know how the whole thing works.

Measures Taken to Improve Customer Relationship Management

- The customers should be exposed to exciting offers and coupons so as to make them glued to the respective market.
- To provide the customers with value added goods and not to bluff them by providing them with something which is not worth price.
- To be able to solve any issue of the products that is bought by the customer without any hassle.
- To maintain a database of the purchases made by the customers so as to know their priorities, interests, likes, dislikes etc.
- Retailers can engross the customers to indulge in their brands so as to keep them loyal for a longer period of time.

Developing Retail CRM

There are many ways encircling the ways for developing a retail CRM- retailers can ask the customers for their email ids, when purchase something in store, others can offer their discounts and offers through website. Database can be used to personalize products, making it evident what all is needed by the customers, thus being able to serve the customers according to their preferences. The first and foremost thing of CRM in retail is to help building loyalty to the customers, creating brand ambassadors who would happily popularize the products.

Review Questions

1. Have you ever come across of a retailer who asked you about your mail id or someone who has asked you to visit them online?

> **To Do Activity**
> 1. Make a list of the famous handbag brands, study about their respective CRM practices and also about their brand ambassadors.
> 2. Visit a retail market and try to understand its strategies for CRM.

Customer Relationship Management in Indian Insurance Sector

- The increase in number of insurance companies has led the need to implement CRM to survive in the market. The customers are aware of the different policies available in market. Therefore it is important to make a base of loyal customers as they would advocate the products better than the organization itself.

- Various insurance companies available in India Life Insurance Corporation of India, SBI Life

Insurance Co. Ltd, Tata AIG General Insurance, New India Assurance, Oriental Insurance, ING Vysya Life Insurance, Shriram Life Insurance, ICICI Prudential Life Insurance, HDFC Standard Life Insurance, Bajaj Allianz General Insurance, IFFCO TOKIO General Insurance, ICICI Lombard General Insurance, Birla Sun Life Insurance, Aviva Life Insurance, Max Life Insurance, MetLife India Insurance, Reliance Life Insurance, Sahara India Life Insurance, Om Kotak Mahindra Insurance Company, Agriculture Insurance Company of India Ltd, Amsure Insurance, ANZ Insurance, Cholamandalam General Insurance and Employee's State Insurance Corporation.

- In order to sustain in the insurance market, the CRM market in India has scope to grow. High spending initiatives have been taken and can be taken in future for the implementation of CRM solutions. According to G.N. Bajpai, then Chairman of LIC emphasised on the shift CRM to value-based client relationship.

Example of CRM strategies used by LIC

- Policy locator- this involves logging in, registering in, then getting to know the status and at last filling up a feedback form. It has been done in collaboration with WIPRO, IBM etc. for CRM project.

- Insurance selector- In case of life insurance and health insurance, human life value is calculated and then directly with help of insurance advisor the insurance policy is selected.

- Traditional strategies- Phone helpline, customer zone providing information on premium position, bonus, loan etc. Also provide assistance for filling forms and registration on the LIC portal.

- The organizations should constantly modify their CRM approach. The constant innovation according to customer needs would help in the development of a firm base for the company.

Customer Relationship Management in The Indian Retail Sector

- It is one of the most dynamic and fast changing industry with some growing rapidly with respect to infrastructure although the smaller organisations are facing problem in cities.

- Larger retailers like Food Bazaar, More and Hyercity etc. are making it difficult forth smaller retail stores. These offered targeted and attractive offers to retain the customers.

- Techniques adopted by Hero Motor Corp- The Hero MotoCorpGood Life Program is one such initiative undertaken by the largest seller of two wheelers in India. It provides an easy way to use privilege insta card along with special rewards and benefits. It also offers customer's free riders insurance worth 1 Lakh. Furthermore, the Hero MotoCorpGood Life Program membership rewards customers with points as per the three categories in the scheme

  - Gold - 1 Rupee spent = 1 Point earned
  - Platinum - 1 Rupee spent = 1.25 Point earned
  - Diamond - 1 Rupee spent = 1.50 Point earned

- This program has over 1 crore members. Based on the success of the program it has been extended for female riders and the program is named as Lady Rider Club.

- Techniques adopted by Maruti Suzuki Ltd- Maruti Auto Card were introduced, through which the customers are rewarded with high value auto points along with exchange option available through it.

Following are the factors affecting loyalty programs in India

- Communication gap- software can be used to integrate customer data.
- Quality and durability cards- retailers provide permanent card with bar codes or magnetic strips. These smart cards hold customer information and customers can check their card status online.
- Mismatch in expectations
- Privacy Issues
- Quality
- Value addition - This factor encompasses features where retail store offers supervised play area for children, shoppertainment for the regular shopper, drive up window for shopping groceries so that customer doesn't have to carry them, offers special ordering of products online, high value merchandise drawings or big pay-out cash sweepstakes on a monthly basis.

CRM for Insurance Sector

After the insurance companies faced problems from banks and the capitations due to the several acts of 1999 had to think for an alternative method for the survival. It became their prime importance to understand their customers. So as to overcome this problem situation the insurance groups had to make their costumer relations deeper and more made sure that they satisfy most of the needs with regards to their investments. They also made sure that they are providing the superior customer service. On considering the CRM, the major instruction falls into three categories which are

1. To take a collective business idea of customers
2. To provide the customer with the best services
3. To control the charge when there is an expansion

These above mentioned strategies will help to expand the sales along with deceasing operational rate, by which they can maximize the inflow and the profit.

To take a collective business idea of customers

The insurance company can segregate the customer data into different categories like policy, claims etc. for the purpose of elaborating the customer related details they can procure the data which can make it more sectioned. If the insurance starts to follow a particular, finishing, and more acceptable view, so as to satisfy and give the support in every angle to the customer. This type of comprehensive, customized service can hold back the loyal customers to the company, as getting hold on to new consumers can take time and also expensive.

To provide the customer with the best services

- It's very important to understand the real need of the customer rather than to just making

them believe that what they want a particular type of insurance, the company should have a exact idea about the situation and the financial capacity of the customer, depending on that info, the required advice is to be given to the person. Taking an example of a person who is a farmer who does not have a proper constructed house as such, it would be clueless to sell him the house insurance. So the most important thing is to have a clear cut idea about the customer so as to provide him with the best support , giving such kind of support for the customer can keep an assured customer of that company. This particular process can be divided into several steps which includes

- To have a described chart of the individual-That is all the basic info of the person is to be collected so as to have a clear cut idea regarding the financial stability, their transactions, their third party approaches and all the other minute details of that individual

- To have latest details of the individual being analysed -By using data analysis on the collected information, analytics can get the resent info of the customer segment being chosen. For example, the most important factor of customers who bought homeowners' insurance are gleaned from the profile via the data mining application. Such factors comprise the idea of customers most likely to buy homeowners' insurance in the future.

- Total result obtained Insurance companies use prognostic analytics to score existing customers by relating them to the existing info. Those most closely related the forms included in the info are most usual to show the expected behavior. Given the example above, an insurance company can rate its customers numerically to indicate how closely they match the model of the person most likely to buy homeowners' insurance.

- Customer review and character identification can also be used to identify life related issues and/or extended attachment, which can be very useful in improving advantages from individual customers. For example, life situations often recommend changes in insurance policies that can be foreseen and supported with the offering. One might detect health insurance holders who have nearly had their child and offer them an exciting life insurance policy. Using a unique, and full, real-time ideal view along with customer search and behavior decisions, you may be able to detect good drivers among your taxi policyholders who have kids. It's time for to add the family's new driver to the policy.

To control the charge when there is an expansion

- Business development presents many good sides to insurance companies, including expanding assets and larger regional reach to new consumer. The company must give the exact range of supreme service that its customers have come to receive—while compressing the functional costs that, critically, have the ability to spiral out of control, as the company start to give an augmented and growing customer base.

- The first key is to ensure your, representatives and brokers to detect and pay the right cost on each positive chance. A high-value, low-risk customer, who has policies over a long time and makes very low claims, is the perfect option for marketing and sales work targeted at maximizing his or her details. Call center workers or individual's agents and should have one to one contact to this business form, so they will know where to have more input on their efforts in the very less amount of time they have in getting the complete trust of the consumer. The second key is to use the most money saving path without keeping a hold on

a high level of customer service. Call center, workers, email, phone and self-help plans—how can an employee decide which path are the most useful and money valuing for different segmented audiences and desired behaviors? Again, using customer view and behavior decision, call center representatives, workers and helpers can focus marketing and sales efforts through different rout depending on the target audience in question.

- Going one steps closer and closer, new and improved email reply, E- chat and self help portal services are taking more and more consumers to the Web- day by day, enabling a regularly high level of customer help while attracting customers to a mingle more and more medium which is much more money saving manner than the phone. Particularly precious are E-based self-service plans, which can work as a first and last point of contact and remove precious time, spent assisting a consumer who can just as well help him or her. Finally, E-based communication tends to deliver on the holy grail of customer service—speed and convenience. The third key is self-functional of the more mundane insurance business processes. Given the particular systems in the insurance —claims, billing and policy systems, not to mention automobile, home, life and health insurance subsystems for each one—CRM systems in insurance will only improve another branch of difficult, labor and spending of money if they are not built before to connect with tradition systems and self help the mundane work of keeping these systems always improved.

- Automated,several step work view capacities are very important to reducing these and other potential restrictions, such as the processing of trailing documents help a policy application—documents like expert work, doctor's statements and/or proof of student status. By self-helping mundane work and changing the paper reviews, call center workers, helpers and brokers are loosened up to focus on the more planned activities—like servicing customers.

CRM in Waste Management Industry

Waste disposal and recycling companies face a high expectation from customer. They transform the waste into useful energy or other useful and less harmful product. Following are some example of waste management industries that follows CRM to optimize their business aspects and upgrade their product quality and business.

A) An example of waste management company-

First Mile recycling company uses CRM to help their customers to manage their waste material.

The First Mile success mantra is –to treat the customer as one would like to treat the Planet Earth with great care and appreciation.

Following this saying, this is a London – based business got started on a low cost recycling company that collects waste and then they expanded to a business serving more than 10,000 services. The distinguishing feature of First Mile is, it finds a place for the waste produced by customer and segregate them into recyclable and non-recyclable.

If the trash is not recyclable, then it is separated and is used for producing electricity, another way to recycle the waste and producing energy simultaneously. The catch here is, the company also tracks and supervise its customer's performance so they know how exactly – one is helping the environment and by which means.

The top priorities of the company are

- They make sure that their customers are happy. This is their main mantra or continuous success and or future growth plans.
- Their aim is to improve the CRM system, so that they can have a trusted group of customers who will serve them fantastically and can even exceed their expectations, by giving marvelous performance in recycling.
- By following this, they have a customer who is committed to First mile for lifetime and even recommends other people to participate in the company to make Earth a better place.

    The company aims for

- To make people understand what is recyclable and what is not this makes the people aware o the general process, and the segregation is faster and processing the waste further is straightforward.

    The key to first mile's success growth is going above and beyond to make sure that their customer's experience with them is a pleasant one.

    The other way the look or building the relationship is by CRM system and develop a platform to help their customer to the get more from the service.

The things to be learned from this company are

- One should experiment with different approaches to get accomplishment with one's aim.
- Trying out different methods, a couple of times and to identify the one with the best success rate. One has to drop the other methods and get the best way around.
- Don't follow the norm the company First mile has disrupted the industries hierarchical order with custom built green IT system that caters to all the businesses with different requirements.
- They have changed people's perceptions of the industry by knocking down traditional business model and have improvised themselves with innovative and creative thinking.

> **To Do Activity**
> While discarding the waste separate the biodegradable like vegetable peels, than the non - biodegradable like plastic.

B) Another example of waste management industry is

- Business management software specialist Prodware has offered a CRM solution for the firms in the waste and recycling industry.

- With the help of latest CRM technology the ProdwareUK offers companies opportunity to build on "extensive experience in waste and recycling" that will improve project management , collaboration, relationship with customer , bid management and sales processes.

- The firm's belief is that they view the solution of recycling, marketing and customer service tool to complement the existing users and Prodware adjust waste and recycling.

- The firm that is in collaboration with Prodware UK is Stafforshire –headquartered serious

waste management along with technical software specialist providing support for its Microsoft Dynamic CRM solution.

The company aims for

- Their aim for the partnership is to grow the solution and support business growth keeping in mind the areas and scope for waste management.

- They have charted out the plan for the demonstration how they will help to improve business productivity specifically within the waste and recycling sector.

  Another example of waste management company-

- SAP and their partners -provide comprehensive application or the improvement in the waste management business. The SITA Germany is in partnership with SAP - they manage their waste collection and recycle them with the help of SAP. It is an efficient method in waste collection and monitoring waste stream.

- This is followed by the process steps -like manufacturing and trading with the raw materials.

- SITA Deutschland GmbH headquartered in cologne is the fourth largest private waste disposal/ management company in Germany, it is based on the method that leads to a upgraded version of business, cost efficient and better customer service.

- As a complete service provider in the waste management field, the collect the rubbish then transport them and recycle at last exploit the waste.

The top priorities of the company are

- SITA also recommends customers on recycling and waste management issues throughout the country.

- The unique feature about SITA is - the planned landscape in the waste sector is very rigid but the SAP waste and recycled enhancement SAP order management helps to make the plan more flexible.

- SAP Mobile order management by PROLOGA allows paper reduced order processing and optimizes the cooperation between the dispatcher, recyclable, distribution and customer.

Review Question

- People always don't understand what is recyclable and what is not, what is the strangest thing you have seen people recycling?

- If you are a entrepreneur what are the plans you will have to recycle waste more efficiently with CRM ?

To Do Activity
Look for the recyclable material in your waste and try to reuse it as much possible.

Summary

Customer Relationship Management (CRM) is a term that refers to the practices, strategies, and technologies that organizations use to manage and analyse customer interactions and data throughout the customer's lifecycle, with the goal of improve customer service relationships, build customer loyalty and drive sales growth. Customer Relationship Management (CRM) covers the methods and technologies used by companies to manage their customer relationships. Information stored on existing customers (and potential customers) is analyzed and used for this purpose. Automated CRM processes are often used to generate automated custom marketing based on customer information stored in the system.

The ultimate goal of any customer relationship management process or software is to (1) initiate marketing, (2) process sales, including quotes and invoices, and (3) provide assistance. Marketing is one of the most important components of customer relationship management. It refers to promotional activities adopted by a company to promote its products. CRM Development & CRM Software Solutions – Companies rely heavily on Customer Relationship Management (CRM) technology tools to manage interactions with current and future customers. The different organizations of CRM are 1. Sales force CRM   2. SAP AG 3. Oracle 4. Microsoft Dynamics. Different Ways to Maintain CRM Call centres, Contact-centre automation. Social media, Location-based services. On considering the CRM, the major instruction falls into three categories which are 1. To take a collective business idea of customers 2. To provide the customer with the best services. 3.To control the charge when there is an expansion. CRM Strategy Cycle consists of three phases
1. Acquisition 2. Winback 3. Retention

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Editors' Profile

Dr W G Prasanna Kumar

Dr.W. G. Prasanna Kumar, PhD in Education with basic degree in Social Work and Master's Degrees in Sociology, Public Administration and Political Science has professional education in Environmental Economics, Public Relations, Communication and Training and Development. Presently Chairman, Mahatma Gandhi National Council of Rural Education (MGNCRE) under the Ministry of Human Resource Development, in Government of India strives to promote resilient rural India through Higher Education interventions. The national initiative of reviving Mahatma Gandhi's ideas of NaiTalim, spearheaded by Dr. W G Prasanna Kumar, has met unprecedented success at both national and state levels. The primary objective of this initiative is to promote Gandhiji's ideas on Experiential Learning, NaiTalim, Work Education and Community Engagement, and mainstreaming them in School Education and Teacher Education Curriculum & Pedagogy. As Professor and Head Centre for Climate Education and Disaster Management in Dr MCR HRD Institute, conducted several capacity building and action research programmes in climate education, disaster management and crowd management. He has handled many regional, national and international environmental education programmes and events including UN CoP11 to Convention on Biological Diversity and Media Information Management on Environmental Issues.

He was Director in National Green Corps in the State Government for over 11 years and Senior Social Scientist in State Pollution Control Board for 6 years. Conducted various curriculum and non-curriculum related training programmes in environmental education.He was a Resource Person for AP Judicial Academy, AP Police Academy, AP Forest Academy, EPTRI, Commissionerate of Higher Education and Intermediate Education, State Council for Educational Research and Training and National Council for Educational Research and Training New Delhi, CCRT, BharathiyaVidyapeet University Pune, CPR Environmental Education Centre Chennai and Centre for Environment Education Ahmedabad.Dr W G Prasanna Kumar was trained in Community Consultation for Developmental Projects in EPA Victoria Australia in 1997 trained as State Chief Information Officer by IIM Ahmedabad and MCRHRDI Government of Andhra Pradesh in 2004 and trained in Environmental Education and Waste Management Technique by JICA, Japan in 2011.

He was awarded Best State Nodal Officer of National Green Corps Award from Centre for Science and Environment, New Delhi, 2008, Jal Mithra Award from Earthwatch Institute of India and Water Aid New Delhi, 2014 and Certificate of Commendation for the services in UN Conference of Parties to Convention for Biodiversity conducted at Hyderabad from 1-20 October 2012 by the Government of Andhra Pradesh 2012.

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Dr K N Rekha, is a PhD Graduate from IIT Madras. She has 13 years of experience in training and education Industry. She works at Mahatma Gandhi National Council of Rural Education (MGNCRE), Hdyerabad as Academic Consutlant. She is involved in curriculum development on Rural Management and Waste Management.Prior to this, she worked as a Researcher at Indian School of Business, Hyderaba, and has a short stint at Centre for Organization Development (COD), Hyderabad. She has Co-authored a book on "Introduction to Mentoring", book chapters, Peer reviewed research papers, book reviews, casestudy, and caselets in the area of HR/OB. She also presented papers in various national and international conferences. Her research areas include Mentoring, Leadership, Change Management, Coaching, 360 Degree Feedback appraisal, etc. She was also invited as a guest speaker at proiminent institutions like IIT Hyderabad.

Authors' Profile

Dr Ananthavalli Ramesh

Dr. Ananthavalli Ramesh, is an alumnus of IIT Madras. Her research on 'Patient Engagement and Shared Medical Decision Making' brings out the essence of patient concerns in developing countries. Her research papers were presented in well renowned conferences like European Health Management Association, Netherlands and International Shared Decision Making conference at University of Sydney. She has published articles in Indian and International journals. Her research outcomes are based on contemporary qualitative analysis called, Interactive Qualitative Analysis (IQA).She coined the term 'concept exploration' as a part of her research work on NPD for her M.S by research. It is part of new of product development process that reduces the fuzziness during new product development. Her research identified the importance of concept exploration at the initial stage, which brings out the clarity in terms of product manufacturing, packaging, strategic alignment and most importantly knowledge management. For the purpose of research in NPD, she has collected 140 data points from multiple industries like FMCG, Medical and automotive. Her research of NPD stresses the importance of bringing out clarity in the 'Fuzzy Front End (FFE)' that works closely with all stakeholders.

Dr. Ananthavalli Ramesh is a trained six sigma black belt. She executed business development project applying the framework of DMAIC. She has totally 10 years of working experience in business development process, new product development and innovation management. She has associated with automobile companies like Caterpillar, Volvo, General Motors and Eicher. Her contribution on Royal Enfield bullet to introduce self-starter and development of 500 cc engine resulted in increased market share and product quality.

Dr Salil Seth

Dr. Salil Seth is a Ph.D. in Management from Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow and currently working in the capacity of Assistant Professor in the Department of Marketing and Supply Chain Management, Central University of Jammu in the state of Jammu & Kashmir. With a keen interest in Green (Environmental) Marketing he holds the degree of MBA & M. Tech (Integrated) in Biotechnology. He is UGC NET JRF in 'Management' and has also qualified UGC NET in two more subjects namely 'Commerce' and 'Tourism Management & Administration'. Having both academic & corporate work experience, he is a gold medalist in MBA and silver medalist in M. Tech (Integrated) program. He has authored more than 30 research papers and articles of national & international repute and presented papers in many conferences and seminars. With expertise in both management studies & biotechnology he aims to augment the managerial practices with the ecological environment and envisages to lay the foundation of a sustainable society through his knowledge as an academician.

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