

SPPU New Syllabus

A Book Of

MANAGEMENT INFORMATION SYSTEM

For B.C.A.(Science) : Semester - VI

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CBCS Pattern

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DR. PALLAWI BULAKH

M.Sc. M.Phil., Ph.D., NET with JRF
Asst. Professor

Department of Computer Science,
Modern College of Arts, Science and Commerce,
Ganeshkhind, Pune-16

Member - BOS, Computer Application,
Savitribai Phule Pune University

DR. DIPALI MEHER

MCS, M.Phil, NET, Ph.D.
Assistant Professor

Department of Computer Science,
Modern College of Arts, Science and Commerce,
Ganeshkhind, Pune 16
Member - BOS, Computer Science,
GVISHA, Amarawati

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1...

Introduction to MIS

Learning Objectives...

- To know the concept of MIS
- To learn Role and Impact of MIS
- To get information of MIS as a control system

1.1 INTRODUCTION TO MIS

- In this world of the internet and WWW, tremendous amounts of data are generated daily. We know that managing such a vast amount of data is a tedious task. We know that **Data** is nothing but raw figures and facts. When we process this raw data, we get information. Information is useful to us as we can use it for betterment of the organization and for further strategic planning of the organization. Hence, there is a need of managing and using this information with a wide angle and with the use of appropriate technology.

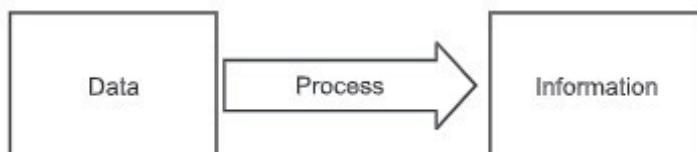


Fig. 1.1: Data and Information

- Here, the role of the information system comes into picture. This system collects the data, processes it, and distributes the information to the respective users. Every organization may have an information system according to its needs.
- Management information system is a type of information system that evaluates, analyses and processes the data of an organization according to its need and that information is further used for decision making in the organization.

1.1.1 Models/ Types of Management Information Systems

1. **Accounting Management Information Systems:** All levels of accounting managers share all accounting reports.

2. Financial Management Information Systems: It provides financial information to all financial managers within an organization including the chief financial officer. The chief financial officer analyzes historical and current financial activity.

3. Manufacturing Management Information Systems: More than any functional area, great advance in technology have impacted operations as a result manufacturing operations have changed. For instance, inventories are provided just in time so that great amounts of money are not spent for warehousing huge inventories. In some instance, raw materials are even proceeds on rail-load cars waiting to be sent directly to the factory thus there is no need for warehousing.

4. Marketing Management Information System: A marketing management information system support managerial activity in the area of product development, distribution, pricing decision, promotional effectiveness and sales forecasting more than any other functional area.

5. Human Resource Management Information System: It concerns with activity related workers, managers and other individuals employed by an organization because the personnel function relates to all other areas in business. This system plays a valuable role in ensuring organization systems include work-force analysis and planning, hiring, training, and job assignment.

6. Structure of Management Information System: The management information system has been described in terms of support for decision making management activity and organization functions.

7. Conceptual Structure: The conceptual structure of a management information system is defined as a federation of functional subsystem each of which is divided into four major information processing components transaction processing, operational control information system support, managerial control information system, managerial control information system and strategic planning information system which has some unique data files which are used by only that sub system.

8. Physical Structure: The physical structure of a management information system would be identical to the conceptual structure of all applications consisting of completely separate programs used by only one function. But this is frequently not the case substantial information can be achieved from Integrated processing and Use of common modules. Integrated processing is achieved by designing several related applications as a single system in order to simplify the interconnection and reduce the duplication of input. A good example is an order entry system. The recording of an order initiates a sequence of processing. Each step using new data but also most of the data from prior processing. In other words, an integrated order entry system crosses functional boundaries.

1.2 DEFINITION

- Following are some definitions of MIS:
 - "Information can be recorded as signs, or transmitted as signals. Information is any kind of event that affects the state of a dynamic system that can interpret the information."
 - "Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in the current or the prospective action or decision of the recipient."
 - "MIS is an integrated, user machine system for providing information to support operations, management and decision making functions in an organization. The system utilizes computer hardware and software , manual procedures, models for analysis, planning, control and decision making and a database "

1.2.1 Pyramid Structure of MIS

- Information is needed at all levels within a business organization. However, its scope, content, and presentation differ from one level to another. Based on the location at which information is used, it can be classified as operational, tactical, and strategic information. This has been depicted as a pyramid structure in diagram.
- In the pyramid structure, the bottom level consists of a Transaction Processing System (TPS). The next level is control of day to day operations and control. The next level consists of information resources required for tactical planning and decision making. The top level is information resources to support strategic planning and policy making by the higher authorities of the organizations.



Fig. 1.2 : Pyramid Structure of MIS

- MIS is a computer based system. With the help of advanced computing technologies, MIS is feasible and effective. It is basically a human- machine system, which implies

that some of the tasks are performed by human and some by machine. The human/user of MIS is a person who takes the responsibility of entering the input to the system, instructing the system and utilizing the output of the system.

1.2.2 Characteristics of MIS

- Following are the characteristics of MIS:
 1. MIS should provide a holistic and complete approach of the organization considering all the subsystems and their interconnectivity..
 2. MIS should be developed using a top-down approach and the overall business plan should be followed while designing the MIS.
 3. MIS should be based according to the need of strategic, operational and tactical information in hand. It should cater the needs of all the authorities including management.
 4. It should handle exceptional situations with appropriate planning.
 5. MIS should be able to visualize the forthcoming situations providing the competitive advantages.
 6. MIS should be an integrated and complete system.
 7. A well maintained database should support the MIS.

1.2.3 MIS vs Data Processing System

- MIS is an application which is a combination of computer related technology and programs. It makes use of information and helps in effective decision-making and also provides feedback on daily operations.
- On the other hand, Data processing is the manipulation of data by computers and related tools. It also looks after the collection, manipulation and storage of the data. Following table illustrates the difference between MIS and data processing systems.

Table 1.1: Difference between MIS and DPS

Sr. No.	MIS	DPS
1.	It uses an integrated database.	It does not use integrated databases.
2.	It provides greater flexibility to the management.	It provides no such flexibility.
3.	It integrates the information flow between functional areas.	It tends to support a single functional area.
4.	It focuses on information needs of all levels of management.	It focuses on departmental level support.
5.	Output is in the form of a graph.	Output is in the form of the table.
6.	Focuses on operational functionality.	It focuses on manipulation of the data

1.3 ROLE OF MIS

- MIS plays a very important role in any organization. It helps in gathering, controlling, processing and very importantly managing the information.
- Following are the important roles of MIS in organization:
 - a. **Decision Making:** MIS plays a very important role in decision making. MIS plays the role of information generation, communication problems and helps in the process of decision making.
 - b. **Coordination:** MIS helps in coordination of different departments within the organization so as to streamline the activities.
 - c. **Competitive Advantages:** All data in MIS can be used to analyse the performance of the organization and also to improve wherever necessary.

1.4 IMPACT OF MIS

- Use of MIS in an organization makes a great impact on the functions, performance and productivity of the organization. The efficiency in every aspect is increased with the use of MIS.
- Following are the major impact with the use of MIS in an organization:
 1. Information collection from various departments is made easy leading to efficient tracking and monitoring of the functional targets.
 2. The authorities can track the progress and shortfalls from time to time.
 3. This helps in forecasting and planning the activities in advance.
 4. With appropriate data organization and dissemination, MIS creates the systemization of the business for competitive advantage as well as progress.
 5. Information available can be used effectively saving time.
 6. The use of computers enables the authorities to make use of various tools available which were not possible manually.
 7. Automation with MIS makes a great impact on time, efficiency and productivity of the business.
 8. MIS provides a good understanding of the business.

1.5 MIS AS A CONTROL SYSTEM

- MIS can be viewed as a control system in following ways:
 1. MIS is a computer based user machine system which facilitates the working of the organization in a seamless manner.
 2. MIS provides the basis for the integration of organizational information processing.

- 3. MIS can also be used as Information Resource management.
- 4. It is used as a decision support system in the organization.
- 5. It is also used as a data processing system.
- 6. MIS has proved to affect positively on the structure and design of end user computing.
- 7. Financial and managerial accountings are supported by MIS to deal with finance matters. Thus MIS covers the financial aspect of the organization as well.
- So, MIS is working as a control system for the organization which controls all the tasks of the organization for data handling to financial management.

1.6 MIS : A SUPPORT TO MANAGEMENT

- Management process is executed through a variety of the decisions taken at each step of planning, organising, staffing and coordination. The main objective of MIS is to provide information for decision support in the process of management. It should help in such a way that the business goals are achieved in the most efficient manner.
- The decisions required to be taken in these steps are shown in the following table.

Table 1.2: Decisions in Management

Steps in Management	Decision
Planning	A selection from various alternatives - strategies, resources methods. etc.
Organization	A selection of a combination out of several combinations of the goals people, resources, method and authority.
Staffing	Providing a proper manpower complement.
Directing	Choosing a method from the various methods of directing the efforts in the organization.
Coordinating	Choice of the tools and the techniques for coordinating the efforts for optimum results.
Controlling	A selection of the exceptional conditions and the decision guidelines.

- Since the decision making is not restricted to a particular level, the MIS is expected to support all the levels of the management in conducting the business operations. Unless the MIS becomes a management aid, it is not useful to the organization.



Fig .1.3: MIS Support to Management Process

Summary

- MIS is an integrated, user machine system for providing information to support operations, management and decision-making functions in an organization. The system utilizes computer hardware and software, manual procedures, models for analysis, planning, control and decision making and a database.
- MIS is a computer-based system. With the help of advanced computing technologies, MIS is feasible and effective.
- It is basically a human- machine system, which implies that some of the tasks are performed by human and some by machine.
- MIS is an application which is a combination of computer related technology and programs. It makes use of information and helps in effective decision-making and also provides feedback on daily operations. On the other hand, Data processing is the manipulation of data by computers and related tools. It also looks after the collection, manipulation, and storage of the data.
- MIS plays a very important role in any organization. It helps in gathering, controlling, processing and very importantly managing the information.
- Use of MIS in an organization makes a great impact on the functions, performance, and productivity of the organization.
- MIS is working as a control system for the organization which controls all the tasks of the organization for data handling to financial management.
- The MIS is expected to support all the levels of the management in conducting the business operations.

Check Your Understanding

1. The information of MIS comes from the _____.
 - (a) Internal source
 - (b) External source
 - (c) Both internal and external source
 - (d) None of the above.
2. The backbone of any organization is _____.
 - (a) information
 - (b) employee
 - (c) management
 - (d) capital
3. The flow of information through MIS is _____.
 - (a) need dependent
 - (b) organization dependent
 - (c) information dependent
 - (d) management dependent
4. In an information system which one is not a technology driver for an information system?
 - (a) Knowledge Asset Management
 - (B) Networks and the Internet
 - (C) Object Technologies
 - (D) Enterprise Applications
5. Management Information Systems (MIS) _____.
 - (a) Develop and share documents that support day-to-day office activities.
 - (b) Process business transactions (e.g., time cards, payments, orders, recapture and reproduce the knowledge of an expert problem solver
 - (c) Use the transaction data to produce information needed by managers to run the business
 - (d) None of the above
6. A key role of Management Information Systems is _____.
 - (a) To develop and share documents that support day-to-day organizational activities.
 - (b) To process business information

- (c) To materialize the business transaction data and produce insightful information which assists managers in decision making
 (d) None of the above
7. Which one of the following is not a prerequisite for a good MIS?
 (a) Database
 (b) Support from Staff
 (c) Control and maintenance of MIS
 (d) MIS executives
8. What amongst the followings are the primary characteristics which must be processed by information?
 (a) Availability
 (b) Timeliness
 (c) Accuracy
 (d) All of these
9. It is a necessity of the data to be ___ before it can be converted into information.
 (a) Processed
 (b) Transformed
 (c) Edited
 (d) None of these
10. Which of the following is not an objective of MIS?
 (a) Supports in decision-making
 (b) Provides insightful information
 (c) Assist management people
 (d) Recruit people for system
11. Which one is an internal source of information for MIS?
 (a) Customers care department
 (b) HR department
 (c) Marketing department
 (d) All of these

Answers

1. (c)	2. (a)	3. (a)	4. (a)	5. (c)	6. (c)	7. (b)
8. (d)	9. (a)	10. (d)	11. (d)			

Practice Questions

Q.I. Answer the following questions in short.

1. Define and Explain the term MIS. State its objectives.
2. What are the characteristics of MIS?
3. List the impact of MIS on organization.
4. Which are levels in the Pyramid Structure of MIS?

Q.II. Answer the following questions.

1. Differentiate between MIS and DPS.
2. Explain MIS as a control system.
3. Explain role of MIS in organization.
4. Explain in detail the characteristics of MIS.
5. Describe types of MIS.

Q.III. Define the terms.

1. Data
2. Information
3. Data Processing System
4. Financial Management Information System

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2...

Decision Making and Information

Learning Objectives...

- To understand the concept of Decision Analysis.
- To study of the Decision Making Process and Models.
- To know behavioural concepts of Decision Making.
- To get information about Information Management.
- To learn methods of Data and Information collection.

2.1 INTRODUCTION -DECISION MAKING

- In day-to-day life, we need to make decisions. We need to choose some plan of action to make something happen. These decisions eventually either proves the efficiency of the action taken at a certain point of time or it gives the consequences of the decision.
- Decision making is a process which enables the user to come to a conclusion on a certain aspect by analysing and assessing the information in hand. The information in hand is collected from various resources that might be external or internal. The conclusion based on this information will decide the future of the organization. This decision will make profit for the organization or can also lead to losses. This implies that the decision making process affects the organizational future. Therefore, the decision making process is a crucial task.
- Let's discuss the decision making process in detail.

2.2 DECISION MAKING PROCESS AND MODELS

2.2.1 Decision Making Process

- Decision making is the process where one chooses the right alternative from available multiple options. Therefore, it is very important to take the decision wisely. Wrong

decisions can lead to severe losses to the organizations whereas right decisions make the profits. Since, corporate decision making is not a one man process. It is a multilevel process. It always involves the key stakeholders and hence may involve some dissatisfaction as well.

Phases of Decision Making Process:

- Decision making process involves some important phases.
- According to the model of decision making proposed by Herbert A Simon, there are three major phases of decision making.
 1. **Intelligence:** Searching the environment for conditions calling for decisions, data inputs are obtained, processed, and examined for clues that may identify problems or opportunities.
 2. **Design:** Inventing, developing and analysing possible courses of action. This involves processes to understand problems, to generate solutions and to test solutions for feasibility.
 3. **Choice:** Selecting an alternative or course of action from those available. A choice is made and implemented.

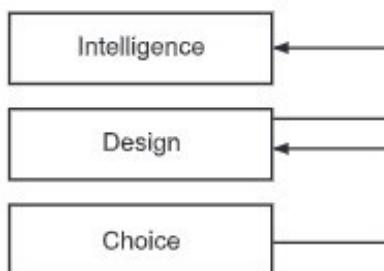


Fig. 2.1: Herbert Simon Model of Decision Making

- There is a flow from one activity to another. That means, there is flow from intelligence to design and design to choice phase. But at any phase, there may be a return to the previous phase.
- The objective of the design phase is to define and construct a model to represent a system. Here, the relationships between the objects are specified by defining relationships between collected variables. After the defined model is validated, the criteria of choice and search for several possible solutions for the defined problems are defined (Opportunity). The design phase is ended by predicting the future outcomes for each alternative.

2.2.2 Decision Analysis by Analytical Models

- Decision analysis is the process where the evaluation and analysis of the choices made by the business authorities is done. The concept was introduced by Ronald A

Howard. The concept is used to make the analysis of the various types of the decisions that are taken in an organization.

- Some important points about Decision Analysis are:

- Decision making is a systematic, quantitative method. It focuses on the visual approach of the aspect.
- Decision analysis uses a variety of tools in conjunction with management techniques, psychology and economics.
- Decision analysis can be applied in the area of risk, capital investments. The main area where the decision analysis is applied is strategic decision making.
- Decision analysis makes use of visual approaches like decision trees and influence diagrams. These visual approaches help in the analysis process.
- The decision analysis makes use of models that help in the process of decision analysis.

Decision Analysis Models:

- A decision-making model is a process used to guide teams to make decisions that can benefit their companies. Each model uses different methods to help to analyze and overcome a challenge. They offer different ways to think about a problem and identify potential solutions.
- The model is analyzed in four ways:
 1. **What - if Analysis:** In every situation of organisational processing, decisions are to be made. These decisions are made in such a way that satisfy the maximum constraints and maximize the profit of the organizations. The 'What - if analysis' is the method which helps to make the right decisions and make predictions about its consequences. This method of decision making is all inclusive method wherein no single person can make the decisions but a number of people are involved in the process of decision making. This analysis is the way to plug into different scenarios and values to determine the maximum possible solutions of a problem. A what-if scenario is developed for a number of values and then assessment of risk for each value is done. Finally, the best solution with maximum recommendations is chosen as the outcome of decision making.
 2. **Sensitivity Analysis:** Decision making is a very crucial process. The future depends upon the decisions taken in the present. Therefore each and every decision is to be taken carefully with a systematic analysis of the present scenario. It is a special case of "what if analysis". In sensitivity analysis, one variable is changed and rest variables are kept as it is. It helps to understand the significance of variables in the decision making and it improves the quality of the decision making.
 3. **Goal Achieving Analysis:** This process is the reverse of what if analysis or sensitivity analysis. Here, the goal is fixed and accordingly the values or variables

are changed to satisfy that fixed goal. This strategy is the process of goal achievement where variables are changed to achieve the fixed target.

4. **Goal Seeking Analysis:** In this process, the goal is not fixed. The decision maker tries to seek a goal of an optimum value which is achieved after satisfying all the constraints operating in the problem. This decision making process works on constraints and resources and improves the solution to seek the highest goal.

2.3 BEHAVIORAL CONCEPTS IN DECISION MAKING

- In the process of decision making, the manager has to handle a number of things at a time. Also, the decisions are to be taken considering the different conditions and situations. In this scenario, the behavioural aspects of the manager play an important role.
- Following are the models for decision making :
 1. Classical Economic Model of Decision Maker.
 2. Administrative Model of Decision Maker.
- 1. **Classical Economic Model of Decision Maker:**
 - Classical approach is also known as the Prescriptive, Rational or Normative model. It specifies how decisions should be made to achieve the desired outcome.
 - The normative model of the decision maker in an organization is described by the Classical Economic Model.
 - This model has the following assumptions:
 1. All alternatives and all outcomes are completely known. This can also be called decision making under certainty.
 2. The decision maker seeks to maximise the profit or utility.
 3. The decision maker is infinitely sensitive to differences in utility among outcomes.
 - This model is a prescriptive model of the decision maker. This model has complete information and hence it is completely rational.

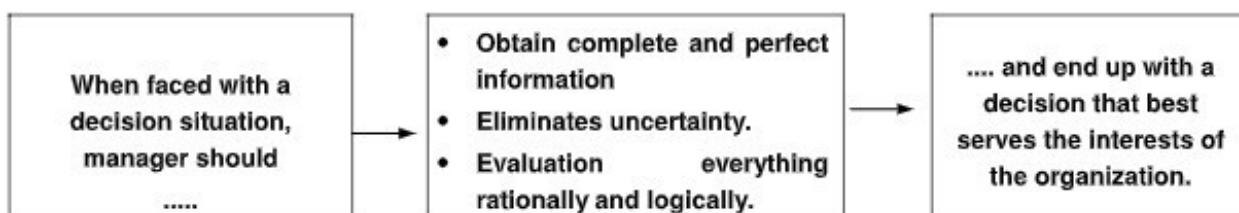


Fig. 2.2: Classical Model of Decision Making

2. Administrative Model of Decision Maker:

- Administrative model of decision making is descriptive. It explains the actual process of decision making. According to Simon, the administrative model assumes the decision as taking place in a complex and partially unknown environment.

- In the administrative model, the following assumptions are made:
 1. All alternatives and all outcomes are not known.
 2. Make a limited search to discover a few satisfactory alternatives.
 3. Make a decision which satisfies his or her aspiration level.

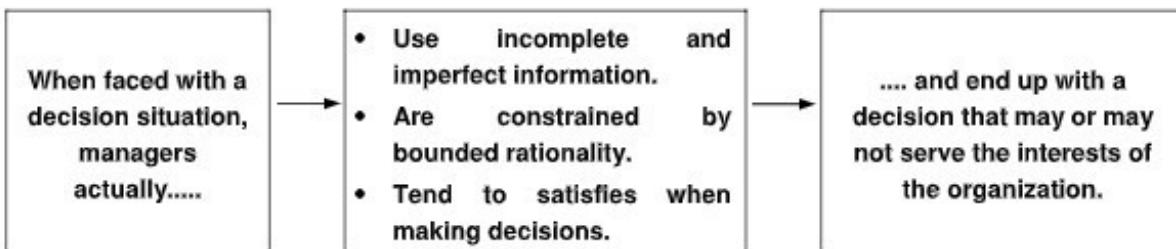


Fig 2.3: Administrative Model of Decision Making

- According to Simon, most problem solving strategies for satisfaction are based on heuristics or thumb rules.

2.4 ORGANISATIONAL DECISION MAKING

- Organisational decision making begins with the assumptions of the administrative model of the decision making and explains the behavior of decision makers in an organisational context.
 - The main concepts used to explain organisational decision making are Quasi Resolution of Conflict, Uncertainty Avoidance, Problemistic Search, Organisational Learning and Incremental Decision Making.
1. **Quasi Resolution of Conflict:**
 - An organization is an association of members having different targets and different power which has a significant impact on the objectives of the organization. The objectives of any organization change with the change in the team of the organization. These members do have conflicts among them as far as goals of the organization are concerned.
 - There are many conflicts as the team or subunits of organization may have different targets/ objectives. These conflicts can be solved using following three methods:
 - a. **Local rationality:** Subunits are allowed to set their own goals.
 - b. **Acceptable level decision rules:** In this method, units are allowed to make their own decisions using agreed upon decision rules and procedures.
 - c. **Sequential attention to goals:** In this method, the organization responds firstly to one goal, then to another, so that each conflicting goal has a chance to influence the organizational behavior. In this method, some conflicting goals are never resolved because conflicting goals are never handled at the same time.

2. Uncertainty Avoidance:

- Each organisation has a certain level of uncertainty associated with it. This uncertainty is due to the uncertainty involved in the factors like market, supplier or the government itself. Organisational decision making assumes that the organisation will seek to avoid risk and uncertainty at the expense of expected value.
- There are some methods used to reduce the number of uncertainties:
 - a. **Short run feedback and reaction cycle:** This allows frequent new decisions and it reduces the need to be concerned about future uncertainty.
 - b. **Negotiated Environment:** The organisation controls its environment with the conventional industry-wide practices by using long terms for sale contracts.

3. Problemistic Search:

- This method uses the problem stimulator solution. The solution for the problem is based on simple rules.

4. Organisational Learning:

- Every organisation learns behaviour /adaptive behaviour over time. They change their goals and revise the procedures based on their experience. Organizational learning is the process by which an organization improves itself over time through gaining experience and using that experience to create knowledge. The knowledge created is then transferred within the organization. The three main factors involved in organisational learning are Knowledge Creation, Knowledge Retention and Knowledge Transfer.

5. Incremental Decision Making:

- This model is also called muddling through a model where the decision making process is broken down into smaller steps instead of a huge leap towards solving the problem. Every small step suggests a small change in the process. Therefore, the cost of decision-making is minimised. The decisions are based on a trial and error approach. This approach is suitable where the goals are fixed but the procedures are unclear.

2.5 INFORMATION MANAGEMENT

- Management information systems deal with information. There is used information available but there is no adequate method for measuring the information from an information system. The information management concept is related to the meaning of information, value of information and various attributes of information.
- The resource for information is data. This data is reusable. Data or raw material for information can be defined as a group of non-random symbols which represents quantities, actions or objects.
- Basically, in MIS, the information term is used to denote the processed data. This process data can be used in the process of Planning and controlling the operations involved in an organisation.

- **General definition of information for Information Systems:** "Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective actions or decisions."
- The relation of data to information is that of raw material to finished product. The value of information can be judged as most meaningful in the context of decision making. Therefore any information has value if it contributes to decision making.

Tasks of Information Management:

- Information Management includes the task of:
 1. Collection of information
 2. Curation of information
 3. Presentation of information
 4. Quality of information
 5. Value of information
- 1. **Collection of Information:** The main purpose of the information system is to collect the information and transfer it to the intended recipient. The detailed methods of information collection are discussed in section 2.6.
- 2. **Curation of information:** The important feature of information is that it reduces uncertainty. Information does not eliminate the uncertainty. But, there are many redundant elements associated with information received. Redundancy reduces the efficiency of information. Therefore, care should be taken while using the information in hand for decision making.
- 3. **Presentation of information:** The presentation of information deals with the content of the information according to the recipient and the stakeholder of the information. The information presentation is supposed to take care of efficient transmission of information as well as effective interpretation of information.
- 4. **Quality of information:** The quality of information is determined by how it motivates the human action and contributes to effective decision making. The quality of information may be evaluated in terms of utilities that facilitate its use. Another factor that affects the quality of information is information satisfaction. It is defined as the degree to which the decision maker is satisfied with the output of the formal information system. The quality of information also gets affected by the bias in information or erroneous information.
- 5. **Value of information:** The value of information is the value of change in decision behavior caused by information minus the cost of obtaining that information. That means, if the new information causes a change in the earlier decision, the value of the new information is the difference between the outcome of the old decision and the outcome of the new decision.

2.6 METHODS OF DATA AND INFORMATION COLLECTION

- For the collection of data, different methods are available. The choice of method will have an effect on the quality of information. Similarly, the design of data collection method also decides the quality of data and information. The methods of data collection and processing become a part of the MIS.

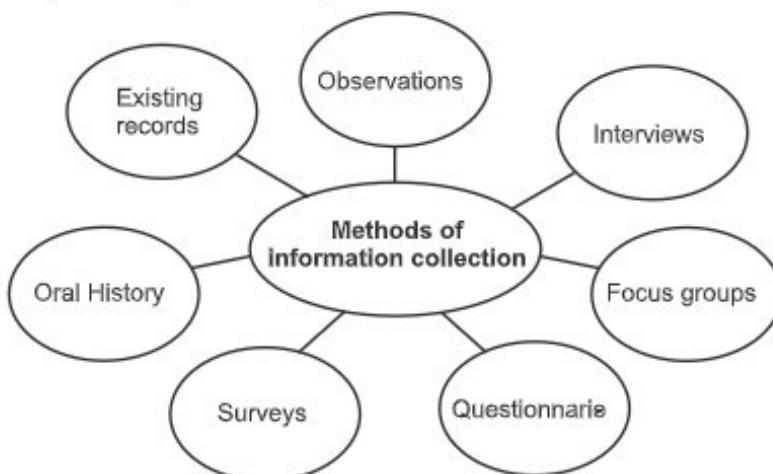


Fig. 2.4: Methods of Data and Information Collection

- There are many methods for data and information collection. Some of them include:
 - Observation:** The process of observation includes observing and recording the real life situations of some required phenomenon. This collected information is then used to depict the behavior of the system in a controlled or uncontrolled manner.
 - Documents and Records:** Here, the data is collected through existing records or secondary storage materials like magazines, websites. Attendance records, meeting minutes, and financial records are a few examples of this type of method.
 - Questionnaire:** This method collects the data by a set of questions given to the intended respondents and then collecting the answers and in turn reaching a particular decision.
 - Interviews:** In this method, data is collected from the recipient with the help of predesigned questions designed in a rigid manner in the personal interview context.
 - Surveys:** A survey is a set of questions for participants to answer. Surveys can be administered in person, through the mail, telephone or electronically.
 - Focus groups:** A focus group is a combination of interviewing, surveying, and observing. A focus group study can ask participants to watch a presentation, and then discuss the content before answering survey or interview-style questions.

7. **Oral History:** An oral history is defined as the recording, preservation, and interpretation of historical information based on the opinions and personal experiences of people who were involved in the events. Unlike interviews and surveys, oral histories are linked to a single phenomenon.

Qualitative vs Quantitative Data Collection Methods:

- Some of the methods covered here are quantitative, dealing with something that can be counted. Others are qualitative, meaning that they consider factors other than numerical values.
- In general, questionnaires, surveys, and documents and records are quantitative, while interviews, focus groups, observations, and oral histories are qualitative.

Summary

- Decision making is a process which enables the user to come to a conclusion on a certain aspect by analysing and assessing the information in hand.
- Decision making is the process where one chooses the right alternative from available multiple options.
- Decision making process involves some important phases: Intelligence, design and choice.
- Decision analysis is the process where the evaluation and analysis of the choices made by the business authorities is done. The concept was introduced by Ronald A Howard.
- Decision analysis models : What - if analysis, Sensitivity analysis, Goal Achieving analysis, Goal seeking analysis.
- Following are the models for decision making :
 - Classical Economic Model of decision maker.
 - Administrative model of decision maker.
- The main concepts used to explain organisational decision making are quasi resolution of conflict, uncertainty avoidance, problemistic search, organisational learning and incremental decision making.
- The information Management concept is related to the meaning of information, value of information and various attributes of information.
- Definition of information: "*Information is data that has been processed into a form that is meaningful to the recipient and is of real or perceived value in current or prospective actions or decisions.*"
- Information management includes the tasks of Collection of information, Curation of information, Presentation of information, Quality of information, Value of information.
- Methods of information collection include interviews, observations, questionnaires, surveys and existing records.

Check Your Understanding

1. The first step in decision making is _____.
(a) Choice
(b) Design
(c) Implementation
(d) Intelligence
2. In which of the following function, Decision-making is involved?
(a) Planning
(b) Organising
(c) Controlling
(d) All of above
3. Decision making is the exclusive right for which of the following people?
(a) Top management
(b) Middle management
(c) Lower level management
(d) Operatives
4. The selection of best alternative from many alternatives is known as _____.
(a) Selection
(b) Decision-making
(c) Organizing
(d) Budgeting
5. Methods of information collection include _____.
(a) Interviews
(b) Observations
(c) Questionnaires
(d) All of the above
6. The _____ analysis helps to make the right decisions and make predictions about its consequences.
(a) What - if
(b) Sensitivity
(c) Goal achieving
(d) Goal Seeking
7. _____ model is also called *muddling through* a model.
(a) Organisational Learning

- (b) Problemistic Search
 (c) Incremental Decision Making
 (d) Uncertainty Avoidance
8. The concept was introduced by _____.
 (a) Ronald A Howard
 (b) Robert A Simon
 (c) Herbert A Simon
 (d) Herbert A Howard
9. The main factors involved in organisational learning are Knowledge Creation, Knowledge Retention and _____.
 (a) Information Transfer
 (b) Data Transfer
 (c) Knowledge Transfer
 (d) Knowledge Analysis
10. ____ is a prescriptive model of the decision maker.
 (a) Classical Economic Model
 (b) Administrative Model
 (c) Organisational Model
 (d) Decision Model

Answers

1. (b)	2. (d)	3. (a)	4. (b)	5. (d)	6. (a)	7. (c)
8. (a)	9. (c)	10. (a)				

Practice Questions

Q.1. Answer the following questions in short.

1. Which are phases of decision making process?
2. What is decision analysis Model?
3. What is goal-achieving analysis?
4. Write the definition of information?
5. What is the quasi model of conflict resolution?
6. What is the problem finding process in the intelligence phase?

Q.2. Answer the following questions.

1. Describe the decision making process (Simon's Model).
2. Write a note on Information Management.

3. Explain the Classical Economic Model of Decision Maker.
4. Describe Administrative Model of Decision Maker.
5. Which methods are used to collect data and information in MIS?

Q.3. Define the terms.

1. Decision Making
2. Decision Analysis
3. Goal Seeking Analysis
4. Interviews
5. Questionnaire

❖❖❖

3...

Business Process Re-engineering (BPR)

Learning Objectives...

- To understand the concept of Business Process Re-engineering (BPR).
- To know the phases of BPR, its advantages and limitations.
- To understand the process model of organization.
- To understand the value stream model of organization.
- To view the BPR in accordance with information technology.
- To discuss the Management Information System with reference to BPR.

3.1 INTRODUCTION TO BPR AND BUSINESS PROCESS

- Business Process Re-engineering (BPR) is the process of absolute redesign in the business processes to achieve dramatic improvements in productivity, time and quality of the business product.
- It is the process where all the processes are revisited to deliver more value to the customer. In short, it is the process of improving cost, quality and time.
- It involves analysis of existing workflows, finding the processes that are not satisfactory and suggesting the solutions to improve or remove them.

3.1.1 Definition

- According to Dr. Michael Hammer,
“Business Process Re-engineering is the fundamental rethinking and radical design of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed.”
- Business Process Re-engineering is overall change done with the intention of dramatic improvements. These changes are achieved with the use of Information Technology.

- The main objective of business process re-engineering is to cut down the redundant processes and to improve cost cutting in an enterprise. BPR also helps in streamlining the business processes. It plays an important role in giving the competitive advantage to the organisation.

3.1.2 Phases of BPR



Fig. 3.1: Business Process Re-engineering

- Understand the existing process:** In this phase, the processes which are currently there in an organisation are closely observed and understood also the inter relation between the processes is clearly taken into consideration.
- Identify the process for re-engineering:** Once the processes are systematically understood, the gap between these processes is taken into consideration and the processes which need to be improved are identified.
- Identify change incorporated:** In this step, the identified gap is given a theoretical solution to be implemented. For example, replacing a manual process with a robot for a machine. This phase provides one or more alternatives to the current processes.
- Implement the new process:** In this phase, the new processes are implemented which were suggested in the previous step.

5. **Make new processes operational:** In this phase, the new processes which were implemented are making operational.
6. **Evaluate new process:** This phase evaluates the new operational processes for the expected outcome.
7. **Work for continuous improvement:** Any process cannot be Re-engineered overnight. There is no need to continuously monitor and improve the existing processes for better outcomes.
- There are many challenges faced by Business Process re-engineering. The main challenges include resistance from toughened processes. Submarine engineering process also requires extra time and cost for implementation but there are always advantages of BPR.

3.1.3 Advantages of BPR

- Following are the advantages of BPR:
 1. BPR revolves around customer needs and hence it directly focuses on customer satisfaction.
 2. It eliminates or produces redundant or repetitive activities which are time and cost consuming.
 3. It provides better coordination among all the processes in an organisation.
 4. It improves the functioning of the organisation.
 5. BPR is expandable.

3.1.4 Disadvantages of BPR

- Following are the disadvantages of BPR :
 1. It depends on various factors like size and availability of resources. So, it will not fit for every business.
 2. It is not capable of providing an immediate resolution.

3.2 PROCESS MODEL OF THE ORGANIZATION

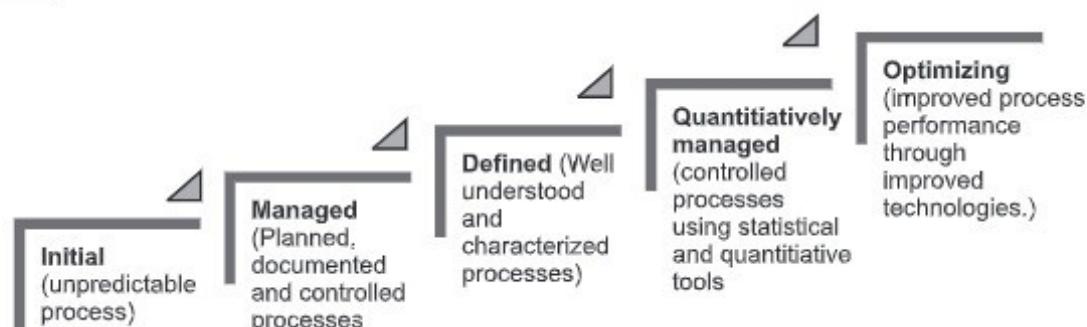
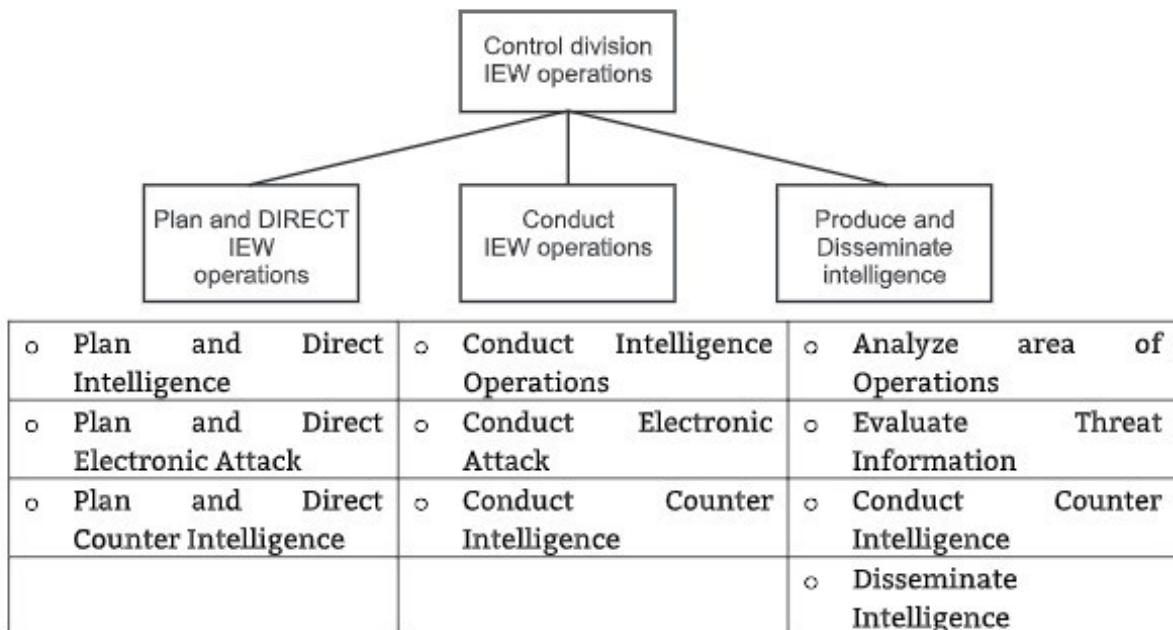


Fig. 3.2: Process Model of the Organization

- A process is any task that has been undertaken to reach a certain goal or objective of any organization. Each process has an individual purpose. Many such processes combine together to achieve the target of the organization.
- The graphical representation of each process is called a Process Model. The objective of the process model is to describe various business activities and their relationships with each other. These processes are represented graphically and depict the actual scenario for what functions are performed and how these functions interact with each other. Process model facilitates the information needed in the organization.
- A completed Process Model graphically shows the specific steps, operations, and information needed to perform a process. Process models help to define the scope of the project. The process model is also used for data discovery and validation.
- The main benefit of using the process model is that it improves the efficiency for any work process in the organization. It also provides a clear view of the processes involved in the activity. It ensures transparency and best practises among these activities.

3.2.1 Components of a Process Model

- Components of a Process Model are typically represented by three different types of process diagrams: Node trees, Context diagram and decomposition diagram.
 - a. **Node trees** which show the activities in a hierarchical format.



*IEW: Intelligence and Electronic Warfare (IEW) Process

Fig. 3.3: Sample Node Tree

- o The root or top node of the tree is the context process and its component activities are listed below in the diagram. A line connects the context process with its

component ones. The component activities are further decomposed into their components.

- o Each node consists of the name of the process it represents and a label consisting of a letter followed by one or more numerals. A Node Tree Diagram is a convenient table of contents to the Decomposition Diagrams.
- b. **Context diagram** shows the activities with their input, output and control mechanisms.

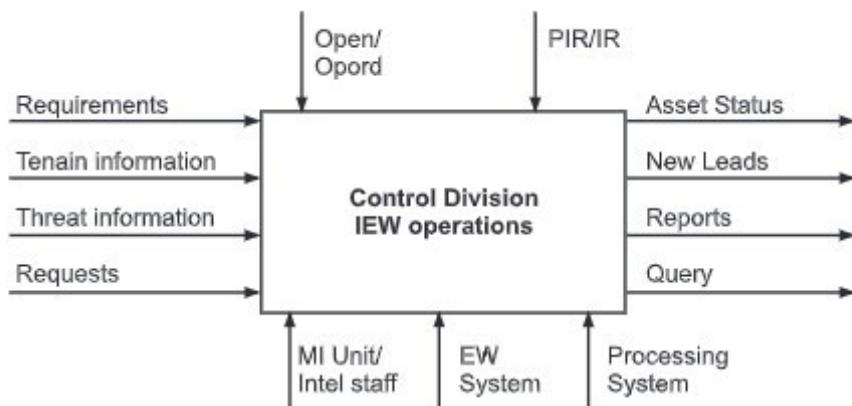


Fig. 3.4: Sample Context Diagram

- c. **Decomposition diagrams** represent the refined definition of the process and show the sub-activities and the relationships among them.

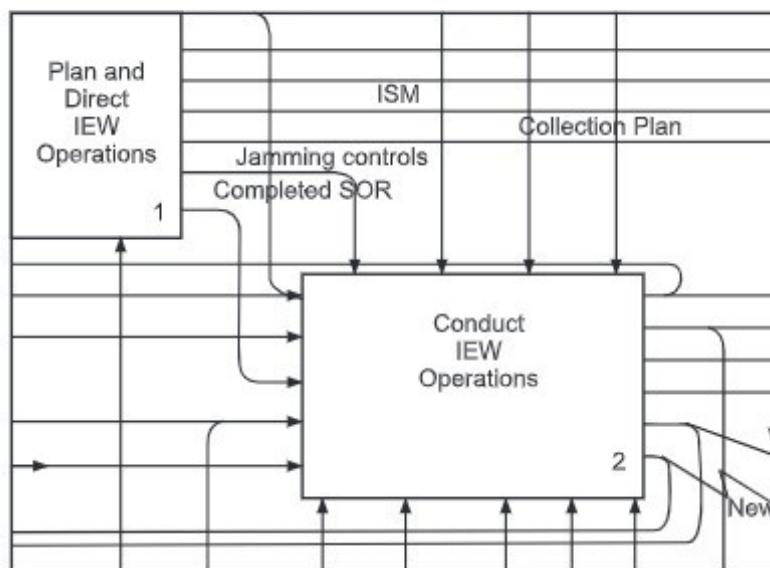


Fig. 3.5: Sample Decomposition Diagram

3.3 VALUE STREAM MODEL OF ORGANIZATION

- Value stream model /mapping is a tool that used to analyse, design and manage the flow of materials and information required to bring a product to a customer. This is a business process which is used to transform the input to more valuable output. It starts the journey with:

Supplier → Input → Process → Output → Customer

- Basically, a value stream is a series of steps that occur to provide the product or service that their customers want or need.
- Value Stream Mapping (VSM) provides us with a structured visualization of the key steps and corresponding data needed to understand and intelligently make improvements that optimize the entire process.
- Definition:** Value stream mapping is a lean manufacturing or lean enterprise technique used to document, analyze and improve the flow of information or materials required to produce a product or service for a customer.

Purpose of value stream model:

- To reduce or remove the non-usable value streams.
- To increase the efficiency of the value stream.

Types of VSM:

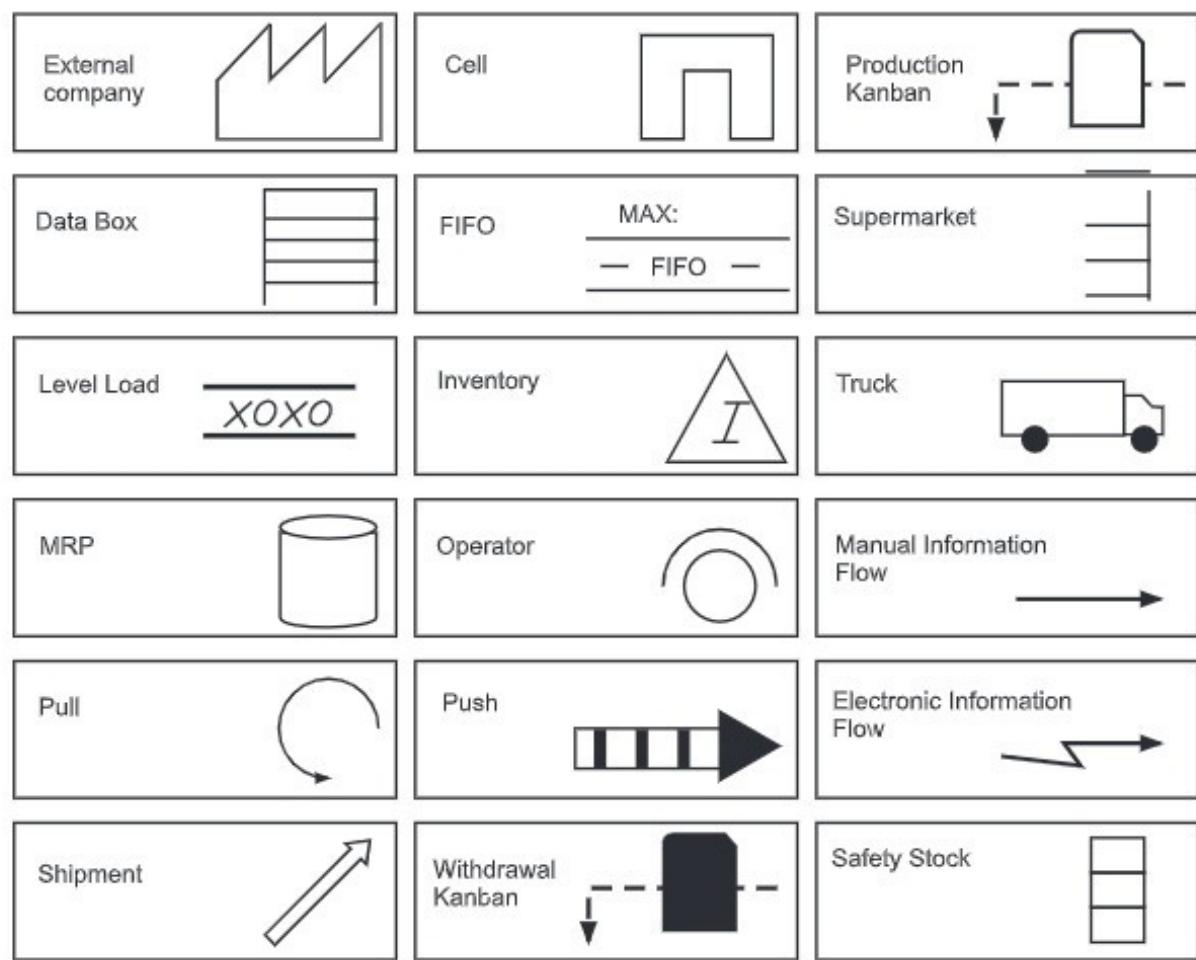
- There are two types of value stream maps:
 - Current state:** The current state value stream map is used to determine what the process currently looks like
 - Future state:** The future state value stream map focuses on what the process will ideally look like after process improvements have occurred to the value stream.
- The current state value stream map must be created before the future state map and is created by observing the process and tracking the information and material flow.

How to create a value stream map?

- The method to create a value stream Map as follows:
 - Outline the scope of the value stream map.
 - Map out each step of the process.
 - Add inventory and wait times to the map.
 - Draw information flow.
 - Create a timeline.

Symbols used in VSM:

- Value stream maps use a series of standardized symbols to ensure everyone is on the same page and speaking the same language.
- Here are the common value stream mapping symbols :

**Fig. 3.6: Symbols used in VSM****Example 1: Manufacturing VSM.**

- This is a typical manufacturing VSM. Information flow is across the top, product flow along the bottom and inventory triangles in between processes.
- This classic VSM shows:
 - The suppliers on the left of the map.
 - Product flow at the bottom, from left to right.

- The customer on the right.
- Information flow at the top of the map.

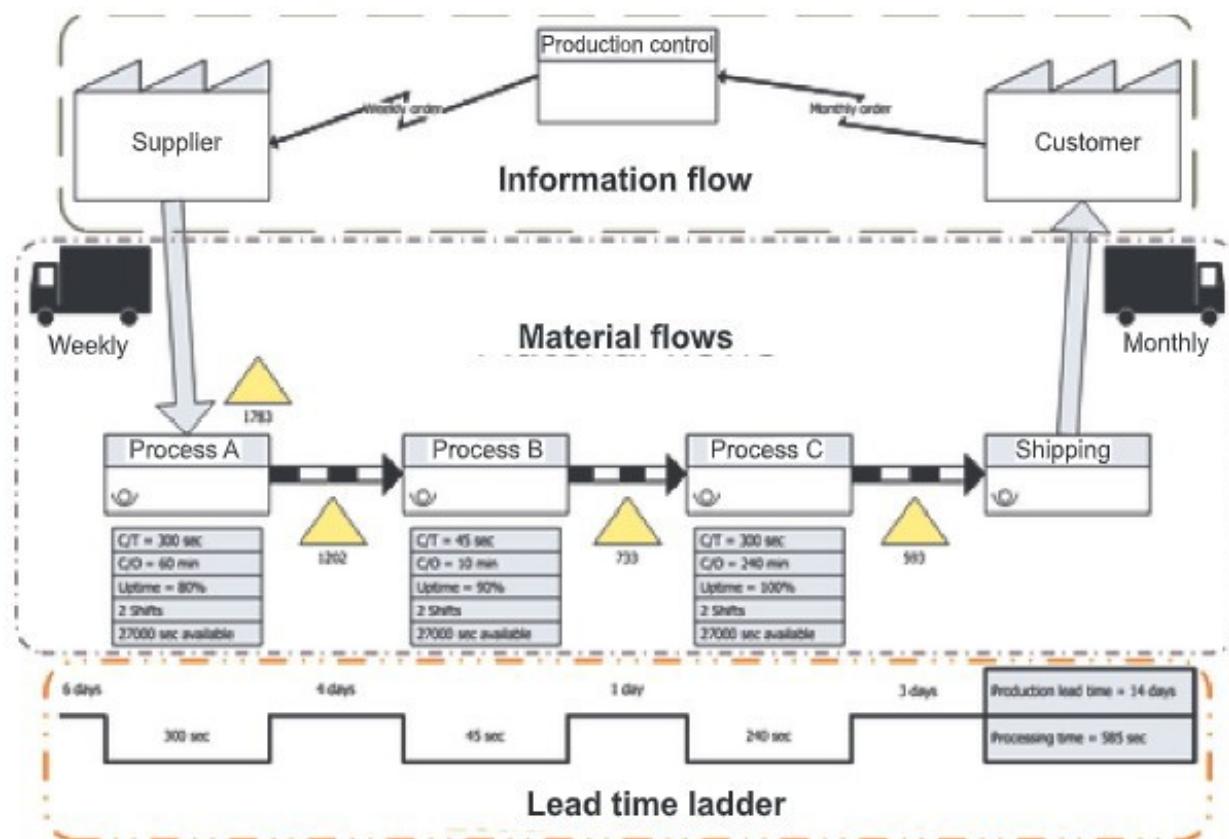


Fig. 3.7: Value Stream Map/Model

Example 2: Employee Value Streams

- The simple and most common example of value stream model is Employee Value Streams.
- It includes the following steps:
 - Recruiting
 - Hiring
 - On-boarding
 - Compensation
 - Benefits
 - Performance Management
 - Development
 - Off boarding.

Applications of VSM:

- VSM is used in following different fields:
 - **Manufacturing:** To find waste in the production process by analysing each step of material handling and information flow.
 - **Supply Chain and Logistics:** To find and remove waste and costly delays at the various points on the supply chain leading to finished product.
 - **Software Engineering or Development:** To find inefficiencies in software development, from idea to implementation, including feedback loops and rework. It can help reduce the number of steps and rework.
 - **Service Industries:** To improve the value and find waste in the activities required to carry out any service for external customers.
 - **Healthcare:** To improve the steps required to treat patients in the most effective, timely, cost-efficient, high-quality way possible.
 - **Office and Administrative:** To find wasteful steps and improve the service provided within a business to internal customers.

3.4 RELEVANCE OF INFORMATION TECHNOLOGY

- Many organisations in the world opt for BPR to improve the performance and throughput of the organizations in turn improving the quality and service to the customers.
- In the process of BPR, Information Technology plays an important role throughout the journey of each and every process under the umbrella of BPR. BPR needs some tools to conduct the total process and these tools are called *enablers*. According to Scott-Mortan, the major enabler for BPR is Information technology. Information technology helps in setting up and redesigning the processes.
- Business processes are made powerful with the use of information technologies in the following ways:
 - **Shared databases**, making information available at many places.
 - **Expert systems**, allowing generalists to perform specialist tasks.
 - **Telecommunication networks**, allowing organisations to be centralised and decentralised at the same time.
 - **Decision-support tools**, allowing decision-making to be a part of everybody's job.
 - **Wireless data communication and portable computers**, allowing field personnel to work office independent.
 - **Interactive videodisc**, to get in immediate contact with potential buyers.
 - **Automatic identification and tracking**, allowing things to tell where they are, instead of requiring to be found.
 - **High performance computing**, allowing on-the-fly planning and revisioning.

3.5 MIS AND BPR

- While building the management information system for any organisation, Business process re-engineering is also taken into consideration. MIS building is a long term process. Therefore, it is very important to take a look at the processes which need to be redesigned or replaced.
- Information technology and related tools help the BPR in decision making which makes BPR a more powerful and strong system. So the BPR success is based on information technology. The role of information technology in the organisation is to make effective strategy according to the business requirement. Information is the main key of any business organisation.
- The BPR process firstly identifies the business processes that do not have information technology tools and then applies the IT practises on to these processes. To adopt these steps the IS expert provides the understanding of the information and technology in the business processes.
- The IS professionals have played an important role in the business process re-engineering.
- Following activities will be performed by MIS for supporting the BPR:
 - Control of process cycle time.
 - Work group efficiency.
 - Customer satisfaction index.
 - Process efficiency and effectiveness.
 - Effectiveness of the Management in enterprise management and not in enterprise resource.
 - The strength of the organisation in terms of knowledge, learning and strategic effectiveness.

Summary

- Business Process Re-engineering (BPR) is the process of absolute redesign in the business processes to achieve dramatic improvements in productivity, time and quality of the business product.
- The graphical representation of each process is called a Process Model. The objective of the process model is to describe various business activities and their relationships with each other.
- Value stream mapping is a lean manufacturing or lean enterprise technique used to document, analyze and improve the flow of information or materials required to produce a product or service for a customer.
- In the process of BPR, Information Technology plays an important role throughout the journey of each and every process under the umbrella of BPR.

Check Your Understanding

1. Which of the following is the best explanation of Business Process Re-engineering?
 - (a) Redesigning the organizational structure of a business.
 - (b) Redesigning workflow.
 - (c) Redesigning products.
 - (d) Transformation of business processes for more effective achievement of business goals.
2. Business Process Reengineering is also known as _____.
 - (a) Business process change management.
 - (b) Business redevelopment
 - (c) Business design
 - (d) Business improvement
3. BPR stands for _____.
 - (a) Business Process Re-engineering
 - (B) Business Product Re-engineering
 - (C) Business Process Requirements
 - (d) None of the mentioned
4. What is the term for a radical rethinking of the nature of the business?
 - (a) Transformational change
 - (b) Revolutionary change
 - (c) Strategic manoeuvre
 - (d) Paradigm shift
5. Which of the following is not true of BPR?
 - (a) Sometimes BPR is needed to lower costs.
 - (b) Sometimes BPR is needed to increase quality.
 - (c) Information technology can be the enabler for radical change.
 - (d) BPR tends to focus on incremental and gradual improvement.
6. Which of the following are the key components of Business Process Re-engineering?
 - (a) Product development
 - (b) Service Delivery
 - (c) Customer satisfaction
 - (d) All of above

7. If you are focusing on what your organization is supposed to accomplish, what stage of the BPR process are you working on?
 - (a) Analysis of current processes
 - (b) Mission statement
 - (c) Aspirational state
 - (d) Identification stage
8. If you are researching processes for improvement, what stage of BPR are you working on?
 - (a) Identification
 - (b) Analysis of current processes
 - (c) Find or create ways to improve
 - (d) Implementation
9. The main lever(s) for change and process management in business organizations is _____.
 - (a) Organizational culture and structure
 - (b) Technological innovation
 - (c) Both (a) and (b)
 - (d) None of the above
10. A component of Process Model is _____.
 - (a) Node tree
 - (b) Binary tree
 - (c) Spanning tree
 - (d) Sparse tree

Answers

1. (d)	2. (a)	3. (a)	4. (a)	5. (d)	6. (d)	7. (c)
8. (b)	9. (c)	10. (a)				

Practice Questions**Q.I. Answer the following questions in short.**

1. List the processes involved in BPR.
2. Write any two advantages of BPR.
3. Write any two disadvantages of BPR.
4. Which are the objectives of BPR?
5. List the components of the process model.

Q.II. Answer the following questions.

1. Describe the Business Process Re-engineering in detail.
2. Explain the phases involved in BPR in detail.
3. Describe the process model of organisation.
4. Discuss the value stream model of organisation.
5. Explain the business process re-engineering in context of Information Technology.
6. Compare MIS and BPR.
7. Explain the role of information technology in BPR.
8. Describe the process model of organization.
9. Describe the role of IT in BPR.

Q.III. Define the terms.

1. Enablers
2. Node tree
3. Context diagram
4. Process Model
5. BPR



4...

Enterprise Management Systems (EMS)

Learning Objectives...

- To learn and understand the concepts of Enterprise Management System, Customer relationship Management system and Enterprise Resource Planning System.
- To know the difference between ERP, CRM and EMS.
- To get information about ERP Product Evaluation and Implementation.
- To study the core concepts of Supply Chain Management and EMS systems.

4.1 INTRODUCTION TO EMS AND ERP

- Enterprise Management System is a system which is implemented in an integrated manner. It has aim to coordinate and bring about cooperation within a function of an enterprise. Enterprise Management System (EMS) is made up of integrated Enterprise Resource Planning. (ERP), Supply Chain Management (SCM), and Customer Relationship Management (CRM).

4.1.1 EMS (Enterprise Management System)

- Large organizations have many different kinds of information systems that support many different functions, organization levels, and many different business processes which are used to increase business growth. Many small subsystems integrated to form a large system known as Enterprise Management System.
- EMS always integrates key business processes of an entire organization into a single software system that allows information flow without any interruption throughout any process of organization. These systems are sometimes known as **Enterprise Systems (ES)**.
- **Enterprise Systems (ES)** are large-scale, integrated application-software packages. These systems use the computational, data storage, and data transmission power of

modern Information Technology (IT) to support business processes, information flows, reporting, and data analytics and data analysis within and between complex organizations.

- Following Figure 4.1 will give a clear idea about EMS.

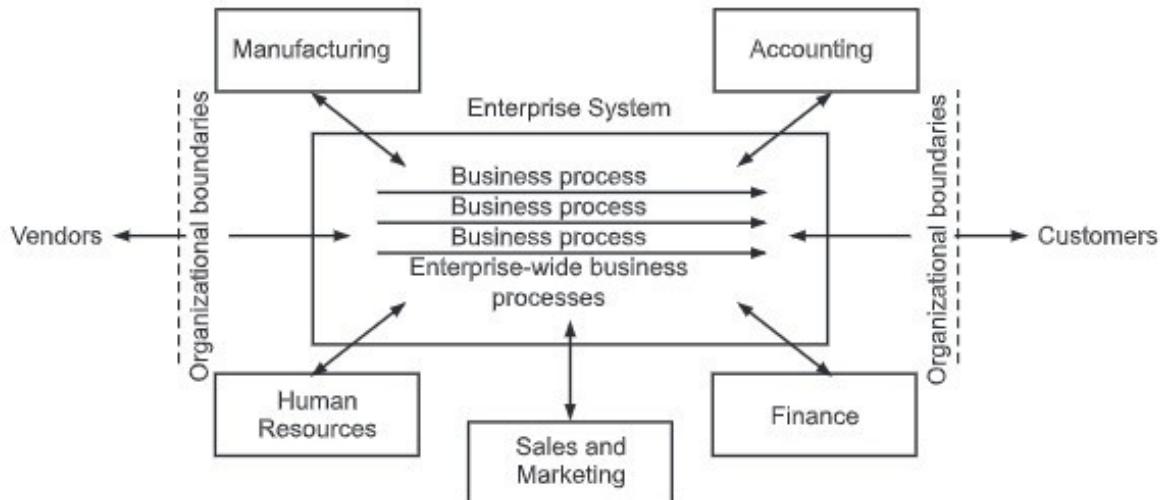


Fig. 4.1: Enterprise Management System

- Adjectives such as "packaged", "enterprise" and "application" are clearly combined in words as Packaged Enterprise Application Software (PEAS). So, EMS is also known as the larger set of all large organization wide packaged applications with a process accommodation with ERP, CRM and SCM together.
- ERP does not include only platforms such as SAP, Relational databases but also includes data warehousing, business intelligence systems.
- The crucial component of EMS is the ERP which controls the support systems like:
 1. EDI - Electronic Data Interchange.
 2. AMS - Attendance Management System.
 3. DMS - Document Management System.
 4. CMS - Communication Management System.
 5. SMS - Security Management System.

4.1.1.1 Components of EMS

- The components of EMS are as follows:
 1. **ERP (Enterprise Resource Planning) System:** In EMS, ERP system plays front role. Major part of decision making and execution takes place through ERP. ERP works as operations system in EMS. Information from internal as well as external sources will be taken to take strategic planning and provides control and data to top management.

- 2. EDI (Electronic Data Interchange) System:** This system used for commerce communication and action. EDI (Electronic Data Exchange) system assists EMS through E-mail, Document transfer, data transfer etc. business functions like e-commerce are handled through EDI. EDI also acts as gateway between different stakeholders of business, vendors, and customers.

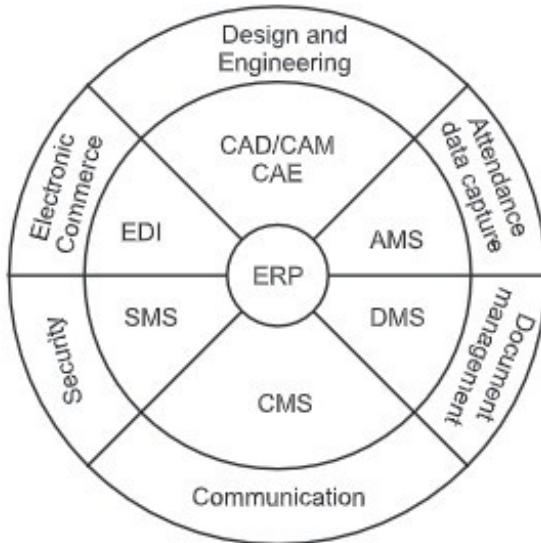


Fig. 4.2 Components of EMS

- 3. CAD/CAM/CAE (Computer Aided Design, Manufacturing, and Engineering System):** This system used for production management. This system in EMS handles design, manufacturing and engineering functions. The output of CAD/CAM /CAE provides engineering designs as input to ERP which then equipped into DBMS to keep employee information database as well as used for backup of all data.
- 4. AMS (Alternative Management System):** This is employee attendance system. The AMS keeps track of all employee related information in both static and dynamic way.
- 5. DMS (Document Management System):** This system contains all methods of capturing storing and retrieval of all kinds of documents. The DMS is designed to keep important documents in database for all kinds of communication and report generation. This system is having text editor facility to generate the documents. Document work such as creation, scanning, mixing, editing, copying, work flow automation will be done with the help of Database Management system.
- 6. CMS (Communication Management System):** This system includes all types of communication management audio and video. It is used for tracking vital resources for action.

7. **SMS (Security Management System):** This system includes close circuit television, alarm systems, movement tracing systems etc. The SMS system handles security, entry access requirements within all business operations and processes. It may be person, machine, materialized thing used for security and safety.
- All above systems should work in hand in hand. It might possible that the output of one system may be input to another system. So, all the systems are part and parcel of ERP systems network. Therefore, the EMS can be defined as Network System, comprising the ERP, EDI, CAD/CAM/CAE, CMS, SMS, and DMS.

4.1.2 ERP (Enterprise Resource Planning) System

- ERP deals with planning and use of resources used in the business and all its operations and processes. Resources such as finance, materials, manufacturing capacity and human resource etc. ERP provides methodology of assessing the resource needs for a given business plan to achieve certain business objectives.
- It also helps to execute the strategies, plans , decisions and actions in a time bound manner. ERP is also viewed as package of encompassing all major functions of the business.
- Due to package products of ERP are customized per customer requirement.
- The ERP packages builds information base and provide knowledge base for planning and control of the business through the business function management.
- ERPs can be Client/Server, RDBMS-oriented, Object-oriented with data integrity and security systems.

Modules of ERP Solutions:

- ERP solutions are also available in UNIX and Windows platforms. A typical ERP solution has following modules:
 1. Sales , Marketing Distribution
 2. Manufacturing
 3. Stores Management
 4. Finance
 5. Personnel
 6. Maintenance
 7. Purchase, Inventory
 8. Planning and Control

Features of ERP:

- There are many features of ERP such as
 1. Authorization
 2. Referencing
 3. Business Management

4. Accounting
5. Material Management
6. Transaction Management
7. Provision of all kinds of technologies for business.
8. Intelligent support provision.

4.2 ERP MODEL, MODULES, BENEFITS OF ERP

4.2.1 ERP Model

- The general ERP package shows the commonly operated business model of the organization. Functions such as Finance, Materials, Marketing, Sales and Personnel with their sub modules are included with ERP. Data consistency, integration and concurrency are measured in all these functions.

4.2.2 Modules

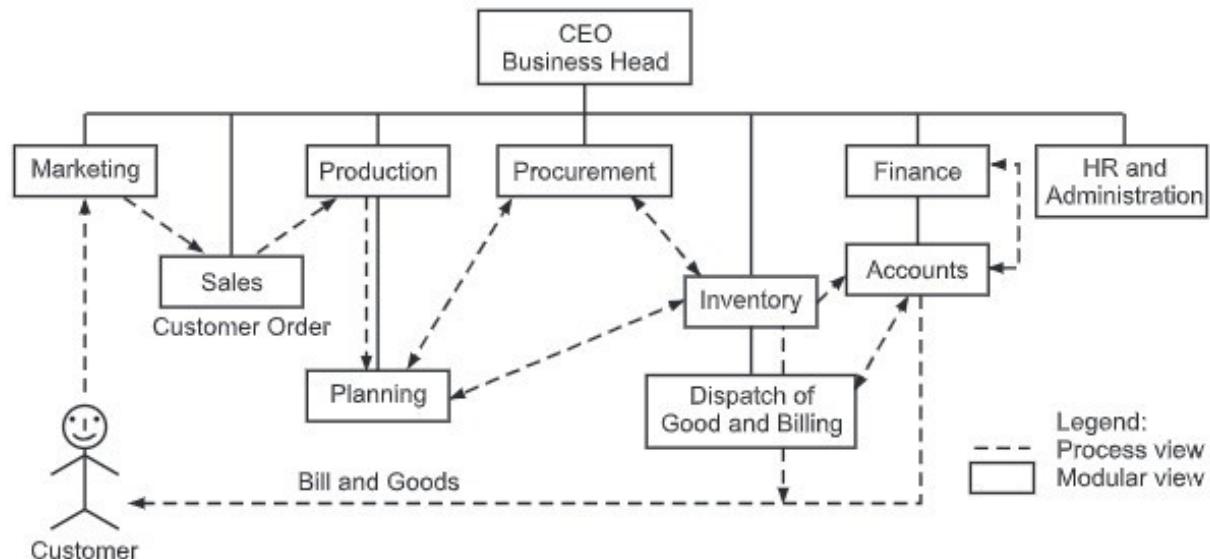
- Seamless integration of all modules is done to provide micro and macro level view. A typical ERP system is having following modules:
 1. Business Forecasting, Planning and Control
 2. Sales distribution, Invoicing
 3. Production Planning and Control
 4. Materials Management
 5. Finance and Accounting
 6. Personnel Management
- Following figure shows sub-modules of each module.

Business	Sales	Production	Materials	Finance	Personnel
Forecasting	Forecasting	Planning	Purchase	Accounting	Human Resource Payroll
Planning	Planning	Order Control	Inventory	Funds Management	Accounting
Goals	Sales Budget	WIP	Stores	Balance sheet processing	Attendance
Objectives	Order Processing	Quality	Valuation	Schedules	Inventory
Targets	Order Execution	Scheduling	Analysis	Analysis Control	Analysis
Strategy control	Delivery Invoicing	Dispatch	Control	Management Accounting	Control
Fixed Assets	Maintenance	Quality Control	Cost Accounting		Consolidation of business operations

Fig. 4.3: Modules and Sub-modules of ERP

Business Organization Model of ERP:

- Following figure shows Business Organization Model of ERP with modular and process view of enterprise.

**Fig. 4.4: Business Organization Model of ERP**

- ERP model deals with business functions, business process needs across all functions of business and integration of them through information processing.
- A detailed Modular structure of ERP consists of :
 - Marketing/ Promotions/ Advertising
 - Sales order Management
 - Procurement and Inventory Management
 - Warehousing and Logistics
 - Production Management
 - Shop Floor Management
 - Finance
 - Accounts
 - Fixed Assets Management
 - Facilities Management and Maintenance
 - HR and Personnel Management, Payroll
- As you can see all above modules work in network to carry out business functions.

4.2.3 Benefits of ERP

1. Operation cost is reduced as resources are managed in better way.
2. Rise in business productivity.
3. Better management of resources of reducing the cost of operations.

- 4. Planning at function and process level increase in the productivity of the business.
 - 5. Simultaneous activation of decision centers to take rapid decisions.
 - 6. Maintaining transparency in business operations to all business stakeholders.
 - 7. Downloading of intelligent ERP for decision making at lower level.
 - 8. Due to SQL and faster processing speed, different views of business can be taken.
 - 9. Provides strong inference capabilities to all human resources.
 - 10. Providing proactive decisions.
 - 11. Provides work flow automation to faster business process.
 - 12. Provides support technologies like EDI,E-mail, office automations, paperless office work.
 - 13. Provides valid solution for expansion of business.
 - 14. Provides Object-oriented and Client/ Server technologies in business which carry out changes in business at faster speed.
 - 15. Provides use of best business procedures in the world of business.
 - 16. With use of data warehousing, data marts, mining knowledge from business can be driven and organization can become learned one.
 - 17. Provides use of Internet, Intranet scope of business can be enlarged.
 - 18. Provides improved quality of decision making due to availability of different authorized customized tools and techniques.
- All above benefits can be categorized in 3 different classes such as:
 - 1) **Operational:**
 - Reduced Processing Cycle.
 - Access to multidimensional information.
 - Empowerment of employees to become decision maker.
 - Effective cost control through use of cost data for business decisions.
 - Increase in resource productivity.
 - 2) **Business:**
 - Higher profits and improved ROI due to cost savings.
 - Improved working capital management due to reduced inventory and receivables.
 - Higher utilization of resources reducing the cost of production per unit.
 - Higher customer satisfaction due to prompt deliveries and services.
 - 3) **Management:**
 - Change Management is easy due to configurable feature of the ERP product.
 - Strategic information about all business operations and activities.
 - Secured information access to authorized users.
 - Cost of business reduced and performance is increased due to use of technology.

4.3 ERP PRODUCT EVALUATION AND IMPLEMENTATION

4.3.1 ERP Product Evaluation

- There are many ERP products in Market consists of many functions, features, and costs. While ERP product is evaluated as following factors:

Factors for ERP Product Evaluation:

- ERP should be fit for the business in terms of all its functions, processes and its scope should be evaluated with application scope.
- The degree of deviation from the standard ERP products.
- It should easy to use, learn, implement and train.
- It should contain the ability to migrate ERP environment from present status.
- Its design should be flexible.
- It should contain help messages, error messages and different dictionaries (product description).
- It should have ability on quick start on implementation.
- Versatility of solutions should be available.
- It should contain rating on performance, response and integration.
- It should give high quality of products, security and reliability with precision in results.
- It should provide documentation for system handling and administration.
- It should have high product rating.
- It should provide solution architecture and wide use of technology with up gradation facility.
- It should provide product growth history, support and Maintenance
- ERP products should change the business strategy and its management. It is very important to find out whether ERP product will fit for the business or not with its success factor.
- Implementation of ERP product is two or three years projects but once implemented it will sustain for current and future business needs and may become a platform for future expansion and growth.
- In any organization, one committee should be specially designated for selection of ERP with CEO as head. This committee should prepare require documents with business goals, objectives, critical functions, processes with all stakeholder needs.
- When such document is ready selected ERP vendors are called for seeking an offer. The document is given to vendors. The vendors should study the documents and they are asked to submit technical proposals explaining the fit for ERP.
- Then all submissions should be inspected by the committee for short listing. The short listed vendors are asked to give their ERP presentation in front of committee and decision makers in the organization to give opinion about their product.

- After presentation of product demonstration should be arranged with detailed information and for evaluation. Now committee will confirm all the critical requirements of business with all its functions, processes, facilities which features are available or which are not available. Work out on unavailable features of ERP to achieve results.
- Now second evaluation note should be made for comparative analysis of ERP products with choice list. Meanwhile organization should collect information about experience of ERP from outside organization where and which vendors have implemented ERPs. The information should contain how successful the ERP and its vendor with its strengths and weakness.
- Though all above process is not possible to carry out then committee should tradeoff involvement in the selection. It should not possible that organization issue dominates the choice of the ERP and best ERP product will get rejected.
- Once committee will take the final decision, the vendor should be asked to resubmit the technical and commercial proposal with price and the terms of offer. The ERP proposal should have the following details:
 1. Scope of supply
 2. Objectives
 3. Modules and deliverables
 4. Implementation methodology
 5. Plan and schedules of hardware and software implementation
 6. Resource allocation
 7. Responsibility division between the organization and the vendor.
 8. Process of implementation
 9. Organization of implementation
 10. Progress monitoring and control of the important events
 11. Process of resolving the issue at all levels
 12. The official product literature
 13. Association with the other vendor its purpose
 14. Commercial submission
 - a. Price by module and number of users
 - b. Payment terms
 15. Process of acceptance of the ERP by stages and linking with the payments.
- After decision is finalized, legal contract between the vendor and organization is made. The success of ERP lies in its implementation with commitment.

4.3.2 ERP Implementation

- ERP implementation follows Waterfall Model approach. When order is confirmed, implementation of ERP starts with frequent meeting between vendor and the

organization. In all such meetings, organization issues will be discussed and all its care will be taken in ERP. For such long term activity, preliminary planning is done to start the implementation of ERP.

4.3.2.1 Requirement Definition and Description (RDD)

- Initially study about ERP is varying out at preliminary stage and then after legal contract in depth study is jointly carry out by vendor and in-charge of the organization.
- All users of ERP are contacted to collect their requirement specifications. Requirements in terms of data, information, function, features, processes and reports. All such information is studied and with evaluation of ERP information.
- ERP is always designed as standard package so it often requires changes and modifications to suit all business requirements, processes and functions.
- A new document named Deviation RDD is prepared to cross check requirements of the facilities provided by ERP and system requirements. This process is called as **Gap Analysis**. It will be arrived after product mapping with RDD.
- When derivation RDD is made, it should be approved be the authorized person in the organization. The purpose of such document is to freeze any requirement to carry out further changes in the ERP package.
- In RDD evaluation, two changes were emerged as :
 1. **Major:** It deals with changes with ERP design. It is time consuming.
 2. **Minor:** It does not deal with changes with ERP design. They are related with cosmetic and or presentation. For e.g. field change, report format modifications, computing process and so on.

Advantages of RDD:

- 1. It provides clear revised specifications to designer and developer to bring out changes in ERP.
- 2. Workload assessment due to changes in ERP.
- 3. Users will get committed solution from ERP.
- After preparation of new RDD, the process designers start implementation of changes. All the design, coding, testing of ERP will be changed. All such changes are tested on sample data unit testing then module testing then integration testing will be performed.
- After RDD (Requirement Definition and Description) preparation it will map with standard RDD of ERP then DRDD (Derivation RDD) is prepared.

4.3.2.2 DRDD implementation of ERP

- According to DRDD implementation of ERP steps are as follows:
 1. A user meeting is arranged to explain ERP and process of implementation.
 2. The RDD and DRDD are explained to all users and approval from them is taken.

3. All the changes should be carried out by development teams which are business and customer specific.
 4. The DERP (Derivation) solution is tested and loaded on recommended platform.
 5. The DREP solution is tested on sample data.
 6. All DREP solutions are then explained to user for their understanding.
 7. Users are trained to run the solution and resolve the difficulties in handling ERP operations.
 8. Accurately planning of change from manual to ERP(one ERP to another) is done with utmost care.
 9. A logbook is maintained to note down problems.
 10. Standard reports like checklists, ledger, trial balance and any analysis are integrated into ERP system.
 11. Standard documentation is maintained from change to changed version of ERP.
 12. ERP system performance is checked.
 13. Review meeting is conducted for purpose of improvement.
- Following figure shows the nine steps of approach to ERP implementation.

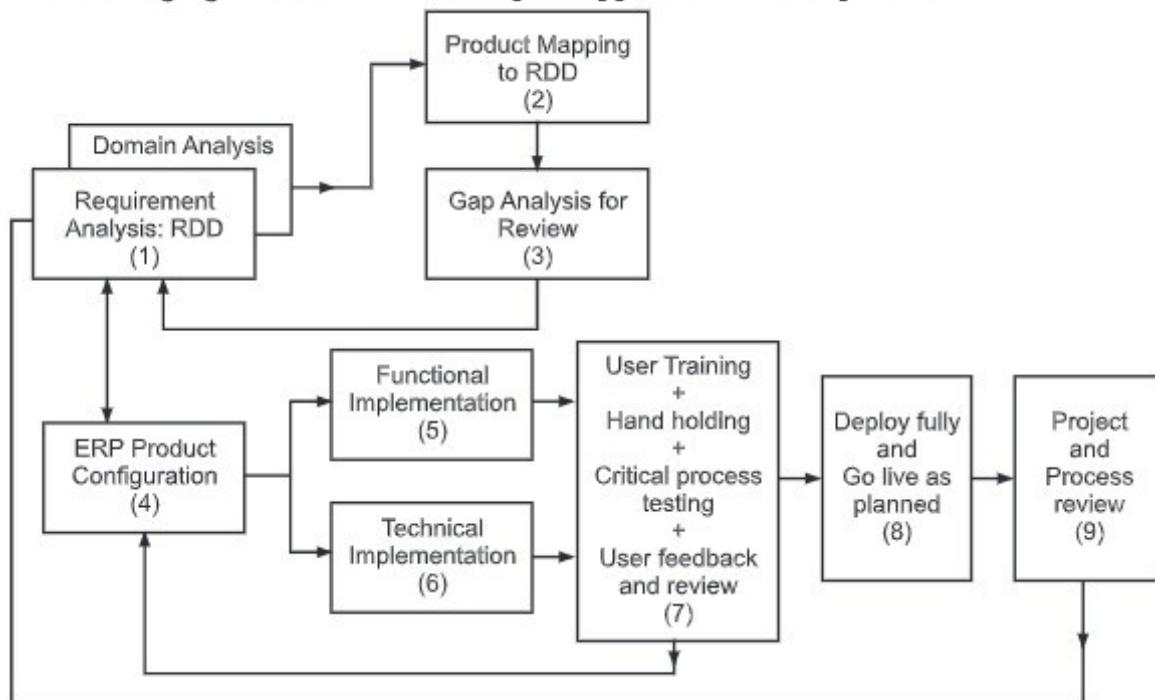


Fig. 4.5: Approach to ERP Implementation

- The ERP model is built for three reviews:
 1. Product vs RDD results into Gap analysis.
 2. ERP Configuration Review to confirm configured ERP is customer specific.
 3. After 6 months usage to confirm RDD is fully implemented and solution meets to all requirements.

4.4 INTRODUCTION TO SUPPLY CHAIN MANAGEMENT (SCM) AND CRM (CUSTOMER RELATIONSHIP MANAGEMENT)

4.4.1 Supply Chain Management (SCM)

- SCM consists of all stages involved in servicing the customer to fulfil all its expectations.
- This is management of the flow/movement of goods and services and includes all processes that transform raw materials into final products.
- It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace.
- By managing the supply chain, companies can cut extra costs and deliver products to the customer faster. This is done by keeping tighter control of internal inventories, internal production, distribution, sales, and the inventories of company vendors.
- Good supply chain management keeps companies out of the headlines and away from expensive recalls and lawsuits.

Supply Chain:

- A supply chain is a network between a company and its suppliers to produce and distribute a specific product to the final buyer. This network includes different activities, people, entities, information, and resources.
- The supply chain also represents the steps it takes to get the product or service from its original state to the customer.
- Supply chains cover everything from production to product development to the information systems needed to direct these undertakings.
- It centrally controls or links the production, shipment, and distribution of a product.
- Supply chains have existed for ages, most companies have newly paid attention to them as a value-add to their operations.

4.4.1.1 Process of SCM

- Various steps of supply chain are as follows: (These are also 5 key elements of supply chain)



Fig. 4.6: SCM Process

1. **Planning:** Planning the inventory and manufacturing processes to ensure supply and demand are effectively balanced.
2. **Manufacturing:** Manufacturing or sourcing materials needed to create the final product.
3. **Assembling:** Assembling parts and testing the product.

4. **Packaging:** Packaging the product for shipment (or holding in inventory until a later date).
5. **Transport:** Transporting and delivering the finished product to the distributor, retailer, or consumer.
6. **Support:** Providing customer service support for returned items.

4.4.1.2 Types of Supply Chain Model

- Different types of Supply Chain Model are as follows:

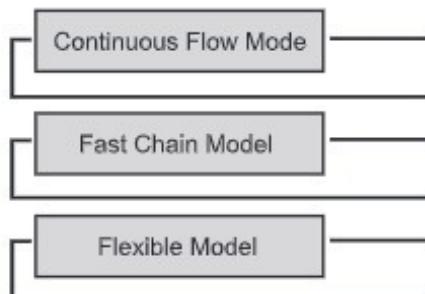


Fig 4.7 : Types of Supply Chain Model

1. **Continuous Flow Model:** This is the traditional supply chain model. This model works with companies that produce or invent same products with small variations. Such products are always on high demand. In this model, managers can streamline the production and keeps tight control over inventory. In this model, managers will need to continuously replenish (reload) raw materials in order to prevent production bottlenecks.
 2. **Fast Chain Model:** This model works best for organizations that sell products based on trends that may have a limited time appeal. Businesses that use this model need to get their products to market quickly to take advantage of the usual trend. They need to move rapidly move from idea to prototype to production to customer. Fast fashion is an example of an industry that uses this supply chain model.
 3. **Flexible Model:** Companies that manufacture seasonal or holiday merchandise uses the flexible model. These companies experience flows of high demand for their products followed by long periods of little to no demand. The flexible model ensures they are able to gear up quickly to begin production and shut down efficiently as soon as demand tapers off. In order to be profitable, they must be accurate in forecasting their raw materials, inventory, and labour costs.
- Following table shows participants involved in Supply Chain Models from Manufacturing, Trading and service business.

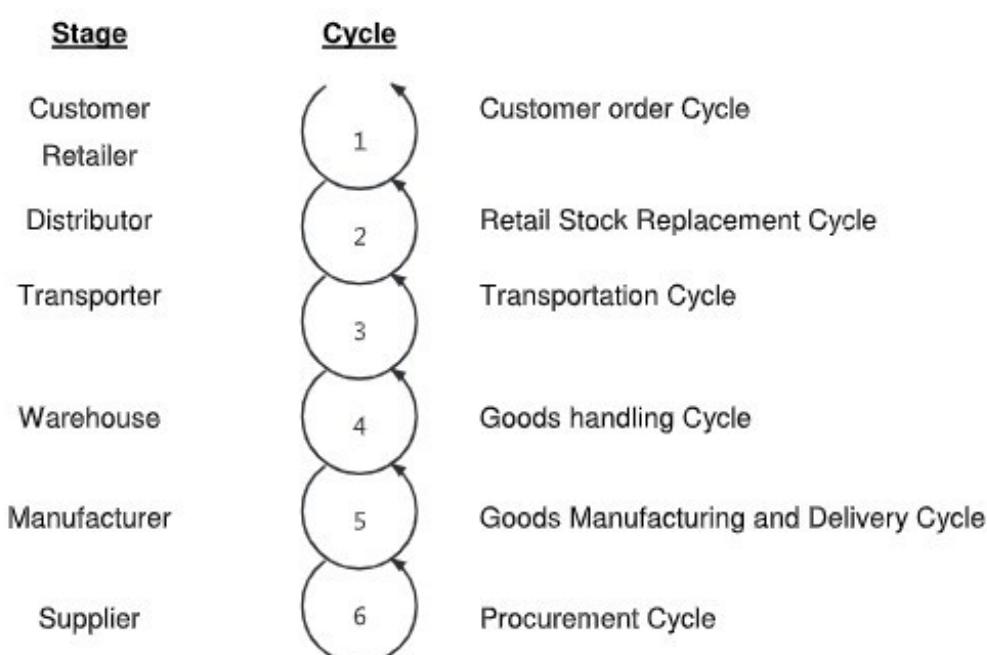
Table 4.1: Participants involved in Supply Chain Model

Manufacturing Business	Trading	Service
Customer	Customer	Customer
Retailer	Retailer	Consultant
Distributed Transporter	Transporter	Service Provider
Transporter	Warehouse	
Warehouse	Supplier	
Supplier		

- Marketing, Manufacturing, Procurement, Operations, Inventory, Warehousing, Distribution and Customer service are the main function of supply chain. Participants involved in supply chain manage these functions. Supply chain profit is the profit earned by all its participants.
- Three major inputs drive the supply chain namely Information, Funds and Goods. These inputs flow between all participation involved in the supply chain. The cost of supply chain depends on the service level set by administrator and facilities built in chain.

4.4.1.3 Process View of Supply Chain

- Process view of supply chain is as shown in the following figure:

**Fig 4.8: Process view of Supply Chain**

- SCM means management of above cycles effectively and efficiently maximizing the value of chain.
- Following diagram shows integrated flow of information, Material/Goods and money/funds in SCM.

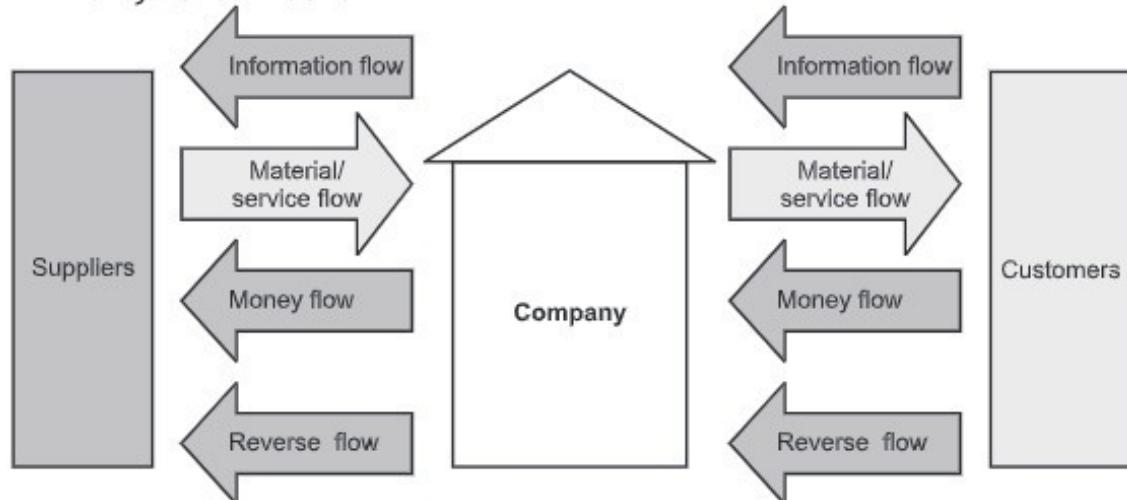


Fig 4.9: Integrated flow of Information, Money and Material flows in SCM

4.4.1.4 Principles of designing Supply Chain

- There should be minimum number of stages between customer and goods.
- Information technology is used to support for fast information processing and decisions. Such IT infrastructures with security should be created that uses B2C or B2B models.
- There should be capable information flow network to provide information about stocks, stock movement, orders, order deliveries, funds received and spent.
- All decisions regarding distance between two components to minimize cost of SC operations and maximize the value through SC.
- It can be integrated with ERP system.

4.4.2 Customer Relationship Management (CRM)

- Customer Relationship Management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle.
- The goal of CRM is to improve customer service relationships and assist in customer retention and drive sales growth. Through different systems like companies' websites, telephone, live chat, blogs, handbooks, e-mails, product rating systems, marketing systems, surveys, questionnaires, and through social networking systems data is accepted from customers and compiled.

- Different types of data such as personal information, purchase history, customers buying preferences, sequence discovery, product concerns are collected through CRM.

4.4.2.1 Purpose of CRM

- The focus of CRM is to create and increase value for the customer and organization/ company will continue to run longer.
- When customer will get value from suppliers, he will not look for alternative suppliers.
- CRM give competitive advantage to all suppliers.

4.4.2.2 Three phases of CRM

1. **Acquire:** CRM tools and techniques are used to acquire new customers by improving efficiency in all management like sales, marketing.
2. **Enhance:** Superior service is provided to customers from sales and service specialists.
3. **Retain:** CRM helps to retain the customers and expand their business using targeted marketing.

4.4.2.3 Approaches of CRM

1. **'Customer intelligence' driven approach:** This is the main approach of CRM and based on following systems:
 - **Sales force Automation:**
 - Lead tracking
 - Opportunity management
 - Contact management
 - Order booking and follow up delivery
 - **Customer Service:**
 - Call center management
 - Online help
 - Internal help desk
 - Knowledge-based expert systems
 - **Marketing Automation System:**
 - E-mail response system
 - E-commerce
 - Web enabled ordering systems
 - Information sharing with internal and external customers
- The above approach is also called as '**Data Driven Approach**' as it relies on past data and customer intelligence.
- Following figure shows data driven CRM Model. This model is reactive.

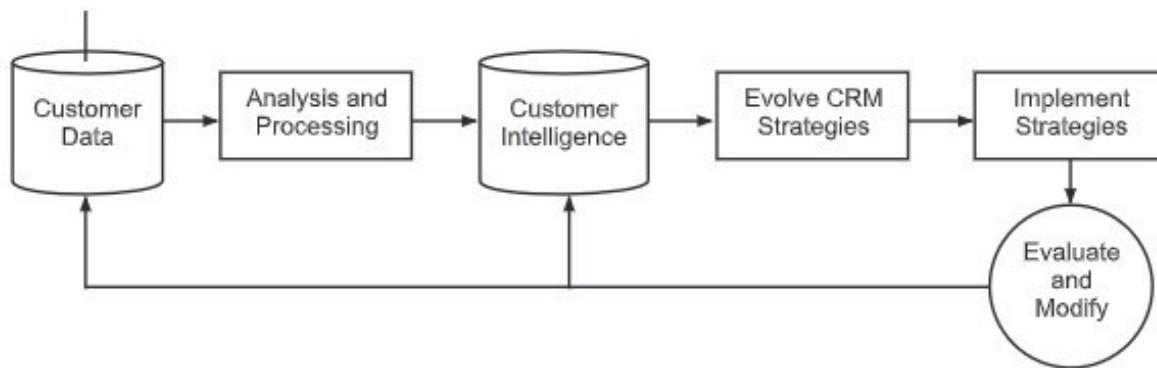


Fig. 4.10: Data driven CRM Model

2. Dynamic Process driven approach:

- This approach uses different processes to understand customer behaviour to formulate CRM strategies. Customer behaviour is sensed and action can be taken to deliver the service. CRM process cycle is managed online and in real time.
- This Process Driven cycle has following phases:
 - Initiation of Service
 - Transaction of Service
 - Pre-Service
 - Service
 - Post Service
- Following figure shows process driven CRM model. This model is proactive.

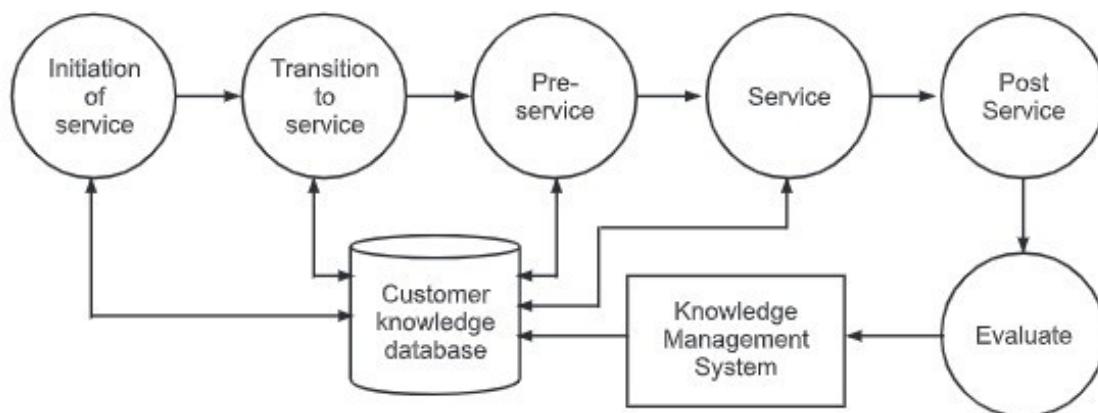


Fig. 4.11: Process driven CRM Model

4.4.2.4 Benefits of CRM in business

- CRM can provide several benefits to any business, from organizing contacts to automating key tasks. It can also be a centralized, organized hub that enables consistent communication both with customers and within the organization. This is especially important as more organizations shift to remote work.



Fig 4.12: Use of CRM in Business

1. Reliable reporting:

- An advantage that CRM platforms have over other customer relationship management systems is that you can see who interacts with your company and how. For example, a lead successfully filled out a form on a landing page after seeing a particular ad on social media.
- You can also run reports to see where the opportunities are, how well you are interacting with leads and customers, trends in your sales and customer service efforts, and more.
- Actionable data allows you to more effectively communicate with the current audience. It also makes easier to reach out to those who have shown interest in the past. These reports guide the decision-making process and are invaluable.

2. Dashboards that visually showcase data:

- Your team can easily collect and organize data about prospective and current customers using the CRM software's dashboard and reporting features. This allows employees to automate and manage their pipelines and processes.
- The CRM can also help team members evaluate their performance, track their quotas and goals, and check their progress on each of their projects at a glance.

3. Improved messaging with automation:

- This capability is a benefit of many CRMs. It lets you set up a series of automated emails that speak to that audience specifically and are triggered by specific actions.

4. Proactive service:

- The data in CRM platform can help automate more personalised outreach throughout the marketing funnel. It can improve a sales team's outreach efforts or customer service's ability to help customers.
- If a sales team has the knowledge of what interests a particular customer most, then they or a support representative can meet the customer's needs and solve problems more proactively.
- This is a major advantage for a customer service team. With relevant data available in their dashboards and in cases, there's no need to dig for information, so a representative can get right down to what matters.
- It saves time and makes your potential and current customers feel important when sales and customer service are proactive and knowledgeable. It gives higher customer satisfaction and reduced time to resolution.

5. Efficiency enhanced by automation:

- Automation features in CRM helps you work more efficiently.
- Marketing can spend more time creating campaigns that resonate with their audience, analysing data, and testing different strategies based on analytics.
- Sales can focus on selling the right product or service to customers. Customer service agents can dedicate their time to working with customers who have questions, problems, or more complex needs.

6. Simplified Collaboration:

- Your CRM serves as a record of conversations, interactions, needs, notes, and contact information. And if it's cloud-based, your teammates can easily look at its records to make decisions.
- Some CRM platforms have built-in collaboration tools that allow multiple people to work on one file simultaneously or follow the progress of a document.
- Everyone who has access to the CRM can work together through this shared record. For example, when a salesperson speaks with a customer and learns more about them, they can fill in certain fields in that person's record or make notes on their file. This helps make sure the rest of the team is working with the latest details and to the best of their ability.
- Marketing, Sales, and Customer service work together effortlessly.

4.4.2.5 e-CRM

- With the help of electronic technologies it is possible to make roads in every business process. Now a day, all CRM processes give rise to e-CRM solutions. These e-CRM solutions give personalized interaction and communication with all customers in online and real time mode.

Features:

- Main features of e-CRM are as follows:
 - Driven by online data mining tools.
 - Real time assessment of customer interaction, satisfaction.
 - Initiatives taken to build relationships with customer.

4.6 EMS AND MIS

- There is qualitative change in MIS due to increase in business process operations and risks.
- Management requires information support in process management not the function management.
- An integrated system enterprise system containing ERP, SCM, and CRM hence called EMS.
- Top management requires beyond reports generated by normal MIS processes where critical success factors and processes are considered. In such situations, EMS works as integrated solution regardless of hardware and software platform.
- The EMS solutions provides various tools that enables strategic management and decision making such as data replication, work flow automation, EDI, e-mail, data warehousing, EIS, data mining. MIS is now embedded in ERP. ERP provides transparency to all users and stakeholders information.
- ERP allows work group management efficiently and effectively.
- Many times ERP solutions use client server architecture for its implementation. This gives freedom to client as user to define a problem and its solution is processed at server side.
- Modern MIS systems are built as super structure on ERP, SCM and CRM systems. This structure includes:
 - Data warehousing and Data mining
 - Executive Information Systems
 - OLAP and Query processing
 - Decision Support Systems
 - Knowledge Management Systems
- Use of web technologies in all MIS, ERP and EMS gives accessibility to information at any given point of time.

Summary

- Many small subsystems integrated to form a large system known as Enterprise Management System.
- EMS always integrates key business processes of an entire organization into a single software system that allows information flow without any interruption throughout

any process of organization. These systems are sometimes known as Enterprise Systems (ES).

- There are ERP, EDI, CAD/CAM, CAE, AMS, DMS, CMS, SMS components of EMS.
- Enterprise Resource Planning System deals with planning and use of resources used in the business and all its operations and processes
- The general ERP package shows the commonly operated business model of the organization. Functions such as Finance, Materials, Marketing, Sales and Personnel with their sub modules are included with ERP. Data consistency, Integration and Concurrency are measured in all these functions.
- ERP provides operational, business and management benefits.
- Supply Chain Management consists of all stages involved in servicing the customer to fulfil all its expectations.
- Customer relationship management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle.

Check Your Understanding

1. The most important step of ERP implementation is _____ phase.
 - (a) installing.
 - (b) training.
 - (c) Gap analysis.
 - (d) testing.
2. The CRM system consists of ____ components.
 - (a) 2
 - (b) 3
 - (c) 5
 - (d) many
3. The transportation of finished goods, raw materials, or supplies is _____.
 - (a) Procurement.
 - (b) Marketing.
 - (c) Production.
 - (d) Logistics.
4. ERP can be used in _____.
 - (a) Manufacturing company.
 - (b) Non-manufacturing company.
 - (c) Both manufacturing and non-manufacturing companies.
 - (d) Anywhere.

5. Customer Relationship Management is about ____.
 - (a) Acquiring the right customer
 - (b) Establishing the best processes
 - (c) Motivating employees
 - (d) All of the above
6. Which is the CRM Phase?
 - (a) Acquire
 - (b) Enhance
 - (c) Retain
 - (d) All of these
7. Which is the first step in SCM process?
 - (a) Planning
 - (b) Assembling
 - (c) Packing
 - (d) Manufacturing
8. EMS stands for____.
 - (a) Enterprise Management System
 - (b) Enterprise Meaningful System
 - (c) Enterprise Data Management System
 - (d) Entry Management System
9. CMS stands for____.
 - (a) Critical Management System
 - (b) Call Management System
 - (c) Caution Management System.
 - (d) Communication Management System.
10. ____ keeps track of all employee related information in both static and dynamic way.
 - (a) Communication Management System
 - (b) Attendance Management System
 - (c) Business Management System
 - (d) Call Management System

Answers

1. (c)	2. (b)	3. (d)	4. (c)	5. (d)	6. (d)	7. (a)
8. (a)	9. (d)	10. (b)				

Practice Questions

Q.I. Answer the following questions in short.

1. What is Enterprise System?
2. What is ERP?
3. Which type of systems controlled by ERP?
4. List the different modules in a typical ERP solution.
5. Which is the main approach of CRM?
6. Write the phases of CRM?
7. What is the use of CMS system?
8. Write any two benefits of CRM.

Q.II. Answer the following questions.

1. What is EMS? State its components.
2. What are the characteristics of ERP system?
3. Explain various steps of supply chain?
4. Describe the concept of CRM.
5. Which are different benefits of ERP?
6. What are different approaches of CRM?
7. Explain Data driven approach of CRM
8. Explain process driven approach of CRM
9. Write a note on EMS vs MIS.
10. What are different types of supply chains?

Q.III. Define the terms.

1. e-CRM
2. EMS
3. Fast chain model
4. Supply chain
5. EDI system
6. RDD



5...

Decision Support Systems & Knowledge Management

Learning Objectives...

- To learn the importance of Decision Support Systems (DSS) in MIS.
- To learn different types and components of DSS.
- To differentiate Business Analytics and Business Intelligence.
- To learn knowledge, its types, characteristics of Knowledge Management.
- To learn and describe different modes of knowledge in business.
- To describe the technologies that can be used in a Knowledge Management System.

5.1 INTRODUCTION TO DECISION SUPPORT SYSTEMS (DSS)

- A Decision Support System (DSS) is an information system that supports business or organizational decision-making activities.
- DSSs serve the management, operations and planning levels of an organization (usually mid and higher management) and help people make decisions about unstructured and semi-structured decision problems that may be rapidly changing and not easily stated in advance.
- The decision makers compile useful information from raw data, documents, personal knowledge and/or business models to identify, solve problems and make decisions.
- In this chapter, we are going to introduce DSS and its types, its components with its advantages and disadvantages. When such DSS are used by a group of people then it is known as GDSS. Artificial Intelligence is the main GDSS system.

- The importance of MIS and DSS business intelligence is to achieve business goals in specified time. DSS cannot be completed without Enterprise Support System (ESS) and Enterprise Information System (EIS). There are various types of knowledge exists in an organization and can transform from one form to another form. Organizations have to manage this knowledge to achieve maximum profit. There are various knowledge management systems exists that deals with definition, acquisition, construction, storage, delivery and application of knowledge.

5.1.1 Reasons to use DSS

- The impact of technology on taking decisions is increasing day by day as interactions between computers and people are also increasing. Computer applications are moving from transaction processing towards NoSQL technology. The reason for using these computer applications for DSS is as follows:
 - Speedy Computations:** Use of computers in decision making will perform a large number of computations at rapid speed at low cost which will be helpful for decision makers to take speedy decisions.
 - Increased Productivity:** Coming together with a group of people i.e. decision makers at one place may become costly. But with the use of computers and technology with networking concepts all decision makers can meet at one platform and can share their views.
 - Technical Support:** Computers are used for data storages, computations, graphics, and search from distinct locations quickly and economically.
 - Quality Support:** Computers can improve quality of decisions as data will be represented with different graphical tools and software so that risks can be identified at remote locations. Hence, quality support can be given.
 - Competitive Edge:** In case of competitive pressures, computers give advantages to business process reengineering and empowerment.
 - Overcoming cognitive limits in processing and storage:** Human brain has limitations for storage capacity and memorization, while computers can do it at vast and rapid speed.
- In 1970's Scott Morton first articulated the major concepts of DSS.
- The Herbert Simon Model shows three phases of problem solving. These are Intelligence, Design and Choice. Decision support systems are applications of Herbert Simons Model. In the intelligence phase of the information system, the DSD system works.
- The objective of the intelligence phase is to identify the basic problem under study and then go into the design phase for searching/finding a solution. All the phases of Herbert Simon's Model are scanned through until the desired and rational solution is to be found out.

- The DSS system helps in decision making and performance evaluation. Such systems are also used to validate the decisions taken by doing sensitivity analysis on numerous parameters of the problem under study.
- Decision making consists of two types of decisions:
 - 1) **Programmable:** The characteristics are as follows:
 - Rule based structure
 - Computerised
 - Taking inputs
 - Contains processing Methods and Methodology
 - Analysis
 - Decision making choices are re-determined.
 - 2) **Non-Programmable:**
 - Rules are not fixed / predetermined.
 - User interaction needed every time for the decision making cycle.

5.1.2 Definitions of DSS

- A Decision Support System (DSS) is a computerized program used to support determinations, judgments, findings and courses of action in an organization or a business.
- A DSS examines through and analyses, huge amounts of unstructured data, compiling comprehensive information that can be used to solve problems and in decision-making.
- Decision support systems can be fully computerized or human-powered, or a combination of both. A decision support system helps in decision-making but does not necessarily give a decision itself.
- There is always a risk in the decision-making process which changes the scope of information to be collected to solve the problem. Higher is the risk more information may be collected.

Sprague (1980) defines a DSS (characteristics) as:

- Sprague observed and pointed out some common characteristics in DSS, which are:
 1. DSS tends to be aimed at the less well structured, underspecified problems that upper level managers typically face.
 2. DSS attempts to combine the use of models or analytic techniques with traditional data access and retrieval functions.
 3. DSS specifically focuses on features which make them easy to use by non-computer-proficient people in an interactive mode.
 4. DSS emphasizes flexibility and adaptability to accommodate changes in the environment and the decision-making approach of the user.

Scott Morton (1970) defines DSS as:

- “Interactive computer-based systems help decision makers to utilize data and models to solve unstructured problems”.

Keen and Scott Morton defines DSS as:

- “DSSs couple the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. It is a computer-based support system for management decision makers who deal with semi-structured problems.”

5.1.3 Types of Decision Support System

- There are various types of Decision Support Systems.

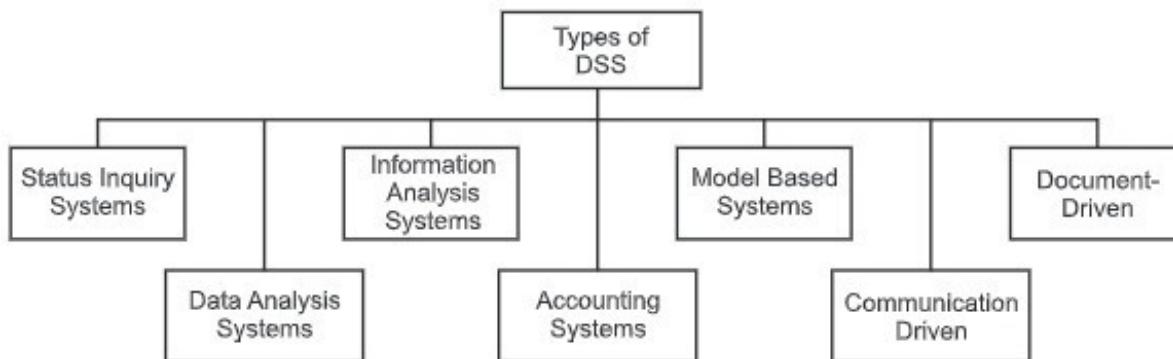


Fig. 5.1: Types of DSS

- Status Inquiry Systems:** These systems do not involve computations, analysis. The decision is based on the status of the system i.e. there is a unique relationship between status of system and solution of problem.
- Data Analysis Systems (Knowledge-Driven):** These systems are based on comparative analysis. These systems use formulas or an algorithm to decide. Simple data processing tools and business rules are used to develop these types of systems. Example: Cash flow analysis, Inventory analysis, Personal inventory systems.
- Information Analysis Systems (Data-Driven):** Data analysis is done and information reports are generated in these types of systems. These reports are used by decision makers for deciding. Example: Sales analysis, Accounts receivable systems, Market research analysis, MRP systems.
- Accounting Systems:** These are not decision-making systems but used to keep track of business or function. These systems involve more data processing tasks.
- Model-based Systems (Model-Driven):** These systems involve simulation models or optimisation models. These systems are one time, infrequent and provide general guidelines for actual product working. These systems include the management of financial, organizational, and statistical models. Data is collected, and parameters are determined using the information provided by users. The

information is created into a decision-making model to analyse situations. For example, Dicodess which is an open-source model-driven DSS. This category includes job scheduling rules, mixing of products in case of colour given to wall, simulation of Metro projects or any building.

- 6. **Communication-driven:** In these types of systems, people work in groups. It uses tools such as Microsoft SharePoint Workspace and Google Docs.
- 7. **Document-driven:** It manages unstructured information in different electronic formats. Examples are policies and procedures, product specifications, catalogues and corporate historical documents. A search engine is a powerful decision-aiding tool associated with a Document-Driven DSS.
- DSS can be further analysed in terms of Input Source, System, Hardware and Type of user as follows:

Table 5.1: Types of DSS

System	Input Source	System	Hardware	User
Inquiry	Database Conventional files	Query Systems (SQL/NoSQL)	PC, Servers and clients	Clerks, Assistants
Data Analysis	Databases and other file systems	Packages of DP systems	Mainframe, Servers, PCs	Operation Managers
Information Analysis	Processed data files	Analysis programmes and use of simple models	Mainframe, Mini, Super mini, Servers, Client PCs	Middle level Managers
Accounting ROI	Transactions master files and database	Transactions processing system	Mainframe, Mini, Client/Server	Middle and Top Management
Model-based Control	Inventory Database and external data	Development or business models	Mainframe, Mini, Client/Server	Middle and Top Management

5.1.4 Components of DSS

- Any DSS application consists of following subsystem as shown in Fig. 5.2:
 1. **Data Management Subsystem:** It includes DBMS software and can connect to Data warehouse.
 2. **Model-based Management Subsystem:** Software that includes statistical, management science, quantitative models and analytical capabilities.

3. **Knowledge-based Management Subsystem:** This system supports any of other subsystems and connected to organizations knowledge repository (i.e. organizations knowledge base).
4. **User interface Subsystem:** User can communicate with system and command DSS. This component can be connected to intranet, extranet and internet.

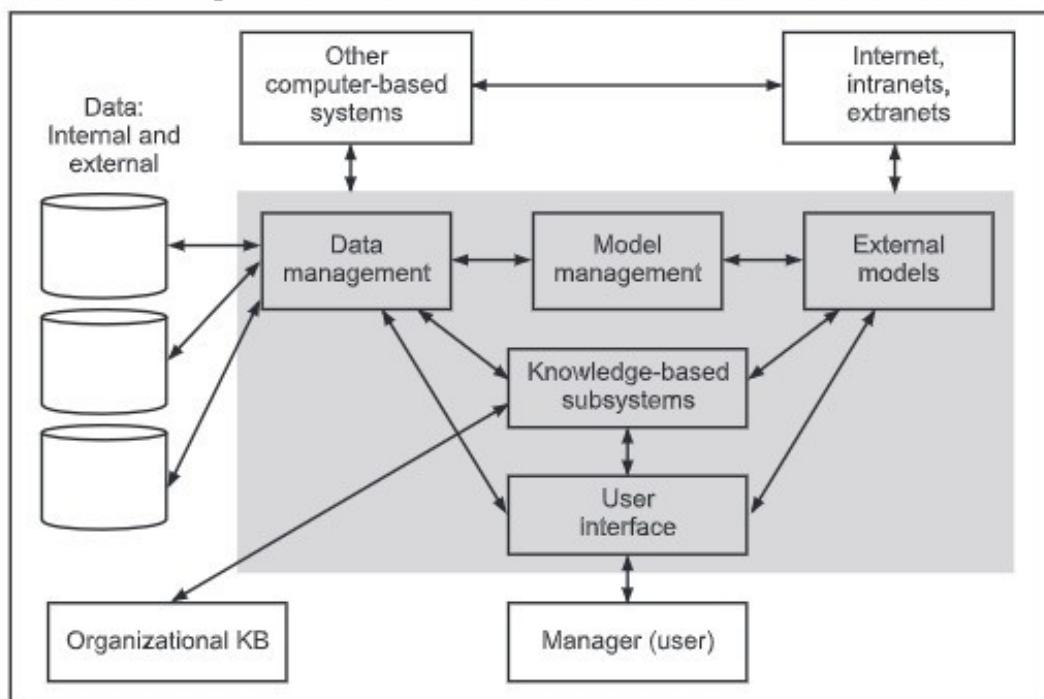


Fig. 5.2: Components of DSS

5.1.5 Reasons to develop DSS

- Reasons to develop DSS are as follows (According to survey conducted in 1980s):
 1. Companies work in an unstable economy.
 2. There are difficulties in tracking the numerous business operations.
 3. Competition has increased.
 4. Electronic commerce has emerged.
 5. Existing systems do not support decision making.
 6. The IS department is too busy and cannot address all management inquiries.
 7. Special analysis of profitability and efficiency is needed.
 8. Accurate information is needed.
 9. DSS is viewed as an organizational winner.
 10. New up to date information is always needed.
 11. Management mandates a DSS.
 12. Timely information is provided.
 13. Cost reduction is achieved.
 14. End user computing movement.

5.1.6 Characteristics / Capabilities of DSS

- DSS provides support for decision makers for all situations like semi structured, unstructured data with human computer interaction.
- DSS provides support for various tasks such as:
 1. Management tasks
 2. Levels
 3. Groups
 4. All stakeholders
 5. Sequential decisions
 6. All phases of decision-making process
 7. Adaptable for changing conditions
 8. Users
 9. Modification tasks
 10. Model utilizations

5.1.7 Advantages and Disadvantages of DSS

Advantages of DSS:

1. DSS increases the speed and efficiency of decision-making activities. It can collect and analyse real-time data.
2. It helps training within the organization, as specific skills must be developed among people to implement and run a DSS within an organization.
3. It automates monotonous managerial processes, which means more of the manager's time can be spent on decision-making.
4. It improves interpersonal communication within the organization.

Disadvantages of a DSS:

1. Cost to develop and implement a DSS is a huge capital investment, which makes it less accessible to smaller organizations.
2. DSS can be integrated into daily decision-making processes to improve efficiency and speed. Managers tend to rely on the DSS, which takes away the subjectivity aspect of decision-making.
3. A DSS may lead to information overload because an information system tends to consider all aspects of a problem. It creates a dilemma for end-users, as they are left with multiple choices.
4. Implementation of a DSS can cause fear and backlash from lower-level employees. Many of them are not comfortable with new technology and are afraid of losing their jobs to technology.

5.2 GROUP DECISION SUPPORT SYSTEMS (GDSS)

- Decision support systems like Cost Accounting Systems, Period Cost System, Job Order Cost System, Pert Techniques, Project Planning and Control Models, Return on Investment are designed for managers. These managers will work as decision makers.
- There are many decision-making systems which involve many persons which also contribute towards the decision-making process. Information technology supports such systems where a group of people are involved known as Group Decision Support Systems.

5.2.1 Components of GDSS

- Components of GDSS are as follows:
 - Database
 - Models
 - DSS tools like Query, OLAP, and Spreadsheet.
 - Different statistical analysis tools like SPSS, R.
 - Platform to conduct all processes in group (platform may be virtual also).

Combinations of groups in GDSS:

- In GDSS, there will be four combinations of groups as listed below:
 - Group members in one room operating on a network will share a display screen to share the display for all members. GDSS process is transparent.
 - Group members are at respective locations (in the same company) and use the internet to interact with each other. In this situation also GDSS is transparent.
 - Group members are at different cities and communicate with each other through teleconferencing or video conferencing with prior planning
 - Group members are in different countries and communicate with each other through long distance networks.
- In b, c, d combinations, group members can be at remote locations and share a common platform for GDSS discussion over a network.

5.2.2 Common Activities of GDSS

- All people in group will do following common activities:
 - Sending and receiving information in all types forms across networks.
 - Displaying notes, graphs, drawings, pictures in any format.
 - Sharing ideas, choices with references.
 - Participation of each person in the decision-making process with their own input.

5.2.3 Example of GDSS

- One of the main GDSS systems will be AI systems. AI known as **Artificial Intelligence system**.

Artificial Intelligence System:

- Human intelligence will be used with knowledge and reasoning abilities known as AI. Packing of AI with databases is known as SI systems.

- AI is software technique applied to the non-numeric data expressed in terms of symbols, statements and patterns.
- For problem solving, AI uses:
 - Human intelligence
 - Knowledge base
 - Database
 - Methods for symbol processing
 - Social reasoning
 - Scientific reasoning
 - Conceptual modelling
- AI systems don't replace people. They liberate experts for different problem-solving techniques in case of complex problems avoiding mistakes and allowing quick response to new problems or any new situation that comes while problem solving.
- Various fields like Computer Science, Biology, Psychology, Mathematics, Statistics, Engineering are blended together to form an AI system.

Categories of AI systems:

- There are three basic categories of AI systems such as:
 - a) **Expert Systems:** Knowledge based systems.
 - b) **Natural Language Systems:** Native language is used for processing.
 - c) **Perception Systems:** In terms of vision, speech and touch.

Goal of AI:

- To develop computerized systems close to human intelligence skills such as describing, reasoning, thinking, learning, problem solving, exhibiting creativity, responding quickly, and quick sorting of unstructured data.

Application areas of AI:

- Application of AI is wide in business and industry.

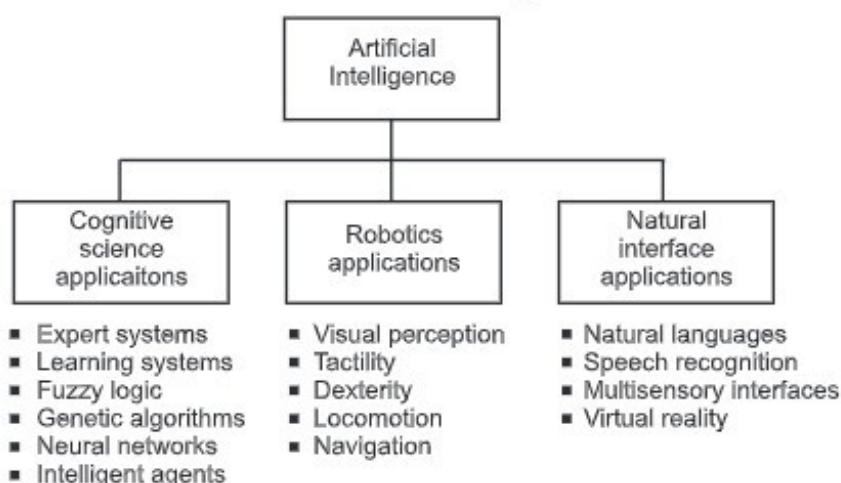


Fig. 5.3: Application Areas of Artificial Intelligence

5.3 BUSINESS INTELLIGENCE AND ANALYTICS

- Business Intelligence and Analytics are data management solutions implemented in companies and enterprises to collect historical and present data, while using statistics and software to analyse raw information, and deliver insights for making better future decisions.
- Organizations private and public data need to be integrated continuously to fulfil business needs. Due to Client/Server architecture, organizations face connectivity and incompatibility issues. In such situations business intelligence and data warehousing will be used.
- The data needed for MIS and DSS will be extracted from several sources and organized in data warehouses. End users access data using different tools and techniques like OLAP tools, data mining tools, etc. the accessed data must be analysed and presented to the users. Tools for data analysis, visualization and presentation are available at various steps of the process known as business intelligence.
- Business intelligence systems combine operational data with analytical tools to present complex and competitive information to planners and decision makers.
- The objective is to improve the timeliness and quality of inputs to the decision process.
- BI uses both structured and semi-structured data. The former is much easier to search but the latter contains the information needed for analysis and decision making. Structured and semi-structured data types can be further segmented by looking at the internal and external data sources of the organization.
- Business intelligence is the process of collecting, storing and analysing data from business operations. BI provides comprehensive business metrics in near-real time to support better decision making. You can create performance benchmarks, spot market trends, increase compliance, and improve almost every aspect of your business with better business intelligence.
- Business Analytics gathers and analyses data, uses prediction Modelling, and produces thoroughly visualized reports on custom dashboards, as well as business intelligence. These features are intended to contribute to finding and resolving the weak points of an organization. The comparisons between business intelligence and business analytics end here. Software for business intelligence is used for historical and current data discovery and interpretation. It uses predictive analysis, data extraction, and quantitative analysis to assess existing market patterns.

Table 5.2 Difference between Business Intelligence and Business Analytics

Sr. No.	Business Intelligence (BI)	Business Analytics
1.	BI uses both past and present knowledge.	Business Analytics uses past data to obtain insights and perform business practices that stimulate consumer desires and increase productivity.
2.	It primarily focuses on reporting the analysed results.	Tools used for business analysis focuses on various techniques that are used to execute different operating applications.
3.	Business Intelligence uses mathematical, quantitative, and predictive analyses to identify existing patterns and identify explanations for recent performance and events.	The data are retrieved, analysed, reported, and released under the supervision of Business Analytics.
4.	Business Intelligence means more to analyse and execute the processes than user interface dashboards.	Business Analytics has a lot to deal with and includes some understanding of software systems to perform the tasks.
5.	Business Intelligence offers insights or data knowledge instead of making additional transformations or conversions to give data insights.	Business Analytics means how to solve challenges by enabling technology and converting raw data type into a practical way to conveniently deliver the solution.
6.	The information can be created for Business Intelligence as dashboards, reports, or pivot tables for multiple users, such as executives, managers, and research firms	Business Analytics uses historical information and business intelligence tools to help consumers get their work done in a highly efficient manner.
7.	Business Intelligence is used in the efficient management of businesses.	Business Analytics is the means to transform business effectively.

- Decision Support Systems and Business Intelligence (BI) are often conflated. Some experts consider BI a successor to DSS. Decision support systems are generally recognized as one element of business intelligence systems, along with data warehousing and data mining.

5.4 EXECUTIVE INFORMATION SYSTEMS & EXECUTIVE SUPPORT SYSTEMS

- Executive Information System (EIS) and Executive Support System (ESS) systems were designed in the late 1900s for serving the needs of top-level people i.e. Managers. Most large companies used these systems as it is designed for top level executives.
- Now days, these (EIS) systems serve other peoples in the company so they are cost effective. Such systems are called Enterprise Information Systems.
- The main goal of EIS is to increase the quality and quantity of available information to executives.
- An Executive Information System (EIS), also known as an Executive Support System (ESS).
- The term Executive Information System and Executive Support System mean different things to different people, though they are sometimes used interchangeably. Rockart and DeLong give the following definitions for EIS, ESS.

Definition of EIS:

- An EIS is a computer-based system that serves the information needs of top executives. This provides rapid access to timely information and direct access to management reports. It is user friendly, supports graphics, reports, and drill down capabilities. It can be connected to intranet, internet, and extranet.

Definition of ESS:

- It is a comprehensive support system that goes beyond EIS and includes communication, office automation, analysis, business intelligence etc. These systems provide tools for enterprise management.

Types of ESSs:

- There are two types of ESSs:
 1. The system supports top executives.
 2. The system intended to serve a wider community of users.
- It is also known as everybody's information system. Many users do not use the term Enterprise support system instead they use the name as Business Intelligence.

Benefits of EIS:

1. It facilitates the attainment of organizational objectives.
2. It allows users to access information at any given point of time.
3. It allows users to be more productive.
4. It increases the quality and capacity of communication.
5. It allows better planning and execution.
6. It is a time saving system.
7. It improves the quality of decision making.
8. It helps to find out the root cause of a problem.
9. These systems give better control in organization.

Why ESS known as BI?

- BI includes Data warehousing. Data warehouses can provide data in easy to use, graphics intensive query systems, subject oriented, time variant, non-volatile data capable of slicing, docking and providing OLAP(Online Analytical Processing) analysis.

Characteristics/Capabilities of ESS:

1. **Drill Down:** ESS provides details of any summarized information. In case of problematic situations/ regions in data, executives may want to see further details. In such cases the drill down process may be used. Drills down paths are manually constructed and use hypertext style instead of menus which speed up the process and avoid additional mouse movements.
2. **Critical Success Factors:** Factors used in reaching organization goals are called Critical Success Factors. Factors such as strategic, managerial, operational are critical factors and they are derived from organizational, industrial, environmental sources. When critical success factors are identified, they are monitored according to five types of information factors such as key problem narratives, highlight charts, top level financials and Key performance indicators and detailed KPI responsibility reports.
3. **Status Access:** Using networks current data/reports can be accessed on status of key indicators at any given point of time. Daily or hourly operations tracking can be done to find out the relevance of information. Typical key indicators will be addressed such as profitability, financial marketing, human resources, planning, economic analysis and consumer trends etc.
4. **Analysis:** Instead of only using data ESS systems can perform analysis in following ways as follows:
 - a) **Using built-in functions:** Many EIS systems are having built-in functions for analysis. Many tools are available that convert table data and display it in charts, graphics formats such as OLAP tools, Informix's MetaCube Product suite, Cognos's Powerplay etc.
 - b) **Integration with DSS products:** Many EIS systems are having interfaces to DSS tools. Example: Comshare's Decision Web.
 - c) **Analysis by intelligent Agents:** Many simple calculations can be done automatically such as ratio, sum, trends and many derivations using intelligent agents.
5. **Exception Reporting:** Management by exception concept will be used here.
6. **Use of Colours and Audio:** To explain critical items and their boundaries different shades of colours are used which requires immediate attention. Audio techniques will also be used as signals to alert the user for information arrival.

7. **Navigation of Information:** Quick and easy exploration of large amounts of data using different tools and techniques as hypermedia and intelligent agents known as Navigation of information.
8. **Communication:** Email tool is very effectively and frequently used by executives for communication with other peoples in the company. Other techniques such as Lotus Notes, Netscape Communicator, Microsoft Teams Meeting Tool, Chat rooms, bulletin boards, Webex, TCBWorks, Novell groupware and other web support tools will also be used.

Examples:

- **Example of EIS:** LightShip and Forest & Trees are examples of EIS software that popularized the concept.
- **Example of ESS:** An example of an industry that uses this would be the banking industry. Barclays is an organisation that found this system particularly useful as they were able to use it to deal with information.

Future of Executive and Enterprise support systems:

- Computers are used in every process of business. Business requirements are real time systems with quick response based on decisions that can be taken. So, EIS/ESS are linked with the Data warehouses as they provide a good capability of OLAP. EIS/ESS should be easy to learn, adapt and navigate. As executives are having individual work styles, the current system is unable to provide this. So, many tools and techniques are using AI systems to work as per individuals' needs. EIS/ESS should be social as it should have high communication capabilities.
- In the future, EIS/ESS will work in groups using network technologies.
- Following are some characteristics that EIS/ESS will provide in future or some already have been started.
 - They provide a toolbox for customization as per individual needs with graphical support.
 - They provide a feature with multimedia oriented geographic information.
 - Virtual reality mark-up language will be used to examine megabytes of data.
 - They will merge analytic systems with desktop publishing for report preparation.
 - Web enabled support systems are used for internet publishing purposes.
 - Automated support will be given and intelligent assistance will be given with the help of BI and AI.
 - EIS will be integrated with GSS.
 - As organizations will become global in nature, Global support systems are created.
 - Almost all ERP products will be integrated with ESS//EIS.

- **Comparison of EIS and DSS:**

Table 5.3: Difference between EIS and DSS

Dimension	EIS	DSS
Focus	Status access, Drill-down	Analysis, Decision support
Typical Users	Senior executives	Professionals, Managers
Principal Use	Tracking and control, opportunity identification	Planning, Organizing, Staffing and Controlling
Model base	Limited built in functions	Core of DSS
Hardware	Mainframe, Workstations, LANS or distributed systems	Mainframe, Workstations, PCs, Distributed systems.
Software	Interactive with DBMS capabilities	Large computational capabilities, Simulations of various applications
Type of information	News items, external information of all stakeholders, internal operations	Information support for specific situations
Motivation	Convenience	Effectiveness

5.5 INTRODUCTION TO KNOWLEDGE MANAGEMENT

5.5.1 Concept of Knowledge

- Knowledge is present in thoughts, ideas, experience, judgments, talents, root causes, observations, structure, dimension, relationships, perspectives, explanations, and decisions related to every individual. It is used in an organization's processes, products, services, systems and outcomes and resides in the brain of an individual. Knowledge is a result of learning. It comes after data and information. Knowledge is authenticated information and thought to be true. For knowledge to have value it should be tested, focused, shared, used, and maintained.

Definition:

- A precise definition of Knowledge is given in the Oxford English Dictionary as follows:

"KNOWLEDGE is defined variously as facts, information, and skills obtained by a person through experience or education; the theoretical or practical understanding of a subject, what is known in a particular field or in total; facts and information or awareness or familiarity gained by experience of a fact or situation."

5.5.1.1 DIKW Pyramid

- The sequence **Data → Information → Knowledge → Wisdom** represents developing sequence as shown in Figure 5.4

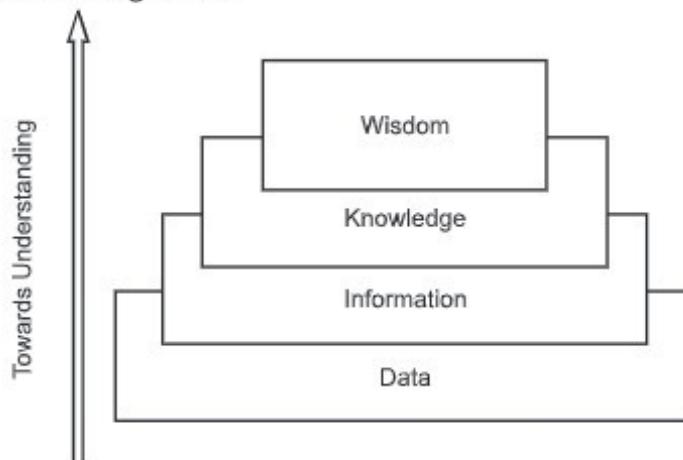


Fig. 5.4 : Data, Information, Knowledge and Wisdom (DIKW) Pyramid

- Following are components of DIKW Pyramid:
 - Data:** Data is unprocessed. Data can exist in any form; symbols, facts or figures obtained from experiments or surveys, used as a basis for making calculations or drawing conclusions. In computer science, a spreadsheet generally starts by holding data.
 - Information:** This is that kind of data that provides relational connection and it gives answers to "who", "what", and "when" questions. In computer science a relational database generates information from the data stored within it.
 - Knowledge:** Application of data and information; answers "how" questions. Knowledge is a deterministic process. When someone "memorizes" information then they have acquired information. For example, elementary school students memorize tables. They know table of 1 to 30, but if you ask them what is 823×3 , then they cannot answer. When they learn the rules of multiplying numbers from 1 to 10 and the rules for extending it to large numbers, they will not only be able to generate multiplication tables up to 30 but also give the result of multiplying any two numbers however large. This is possible because they have acquired the knowledge of multiplication. In computer science, we use Modelling and simulation methods. These methods use some kind of knowledge.
 - Wisdom:** It means evaluated understanding. It is an analytical and non-deterministic, non-probabilistic process. It is the process by which we also distinguish, or judge.

5.5.1.2 Types of Knowledge

- Though the famous saying goes that what is knowable is expressible, the process and the effort required differs depending on types of knowledge. In the literature, there are two types of knowledge which have been widely discussed, tacit and explicit knowledge.

1. Tacit Knowledge:

- Tacit knowledge is the knowledge that people hold in their minds and therefore, it is hard to access. Often, people are not aware of the knowledge they possess or how it can be valuable to others.
- Tacit knowledge must be documented, made formal, in order to become an organizational resource and not just individual proficiency. What is internal must be articulated and made explicit.
- The identifying attributes of **tacit knowledge** can be summarized as follows:
 - Subjective, cognitive, experiential learning.
 - Hard to document.
 - Hard to transfer / teach / learn.
 - Involves a lot of human interpretation.
 - Individual Expertise, Memories, Values, Beliefs and Viewpoints.

2. Explicit Knowledge:

- Explicit knowledge is represented by some work of art, such as a document or a video, which has typically been created with the goal of communicating with another person. To make it explicit requires considerable effort and may not be easily expressible in ordinary language.
- The identifying attributes of **explicit knowledge** and the ones that clearly distinguish it from tacit knowledge are summarized below:
 - Objective, rational, technical.
 - Easily documented.
 - Easily transferred / taught / learned.
 - Process of communication from one place to another in an organized way is more formal and codified.
- Fig. 5.5 shows two types of knowledge and their existing percentage share.

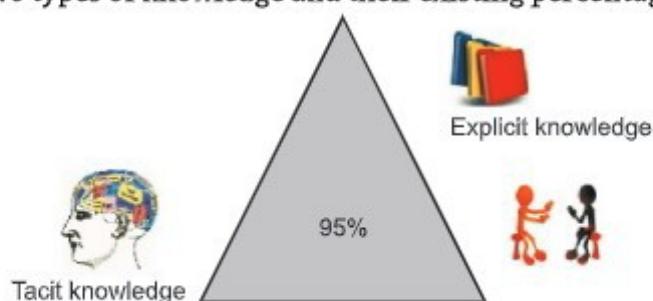


Fig. 5.5: Types of Knowledge

5.5.2 Knowledge Management (KM)

- Knowledge management should be seen as a management philosophy, which can be successfully imbibed into the organizational culture by appropriately training the people. Knowledge management is introduced to help organizations create, share and use knowledge efficiently. It is explicit and systematic management of essential knowledge. So, it is a process of capturing knowledge, understanding knowledge by using information technology systems in order to reuse, maintain and deploy that knowledge to achieve organization's goals.
- Knowledge is our most valuable resource and knowledge management (KM) ensures that it is preserved and made available at the right time and in the right form.
- The term knowledge management was first initiated in a 1986 keynote address to a European Management Conference.
- Knowledge management is the name of a concept in which an enterprise consciously and comprehensively gathers, organizes, shares, and analyses its knowledge in terms of resources, documents, and people skills.
- KM comprises a range of practices used by organizations to identify, create, represent, and distribute knowledge for reuse, awareness and learning.
- Bill Gates of Microsoft defined KM as "nothing more than managing information flow, getting the right information to the people who need it so that they can act on it quickly".

5.5.2.1 Process of KM

- KM includes the following processes:
 - Define, Capture, manipulate, store and develop.
 - Develop information systems for knowledge creation.
 - Design applications for improving organizations effectiveness.
 - Create a knowledge set i.e. intellectual capital to increase economic value of the organization.
 - Keep IC continuously on upgrade to use it as a central resource.
 - Distribute and share concerns.

5.5.2.2 Different Modes of Knowledge Conversion

- Assuming that knowledge is created through the interaction between tacit and explicit knowledge, four different modes of knowledge conversion can be postulated:
 - From tacit knowledge to tacit knowledge, or socialization.
 - From tacit knowledge to explicit knowledge, or externalization.
 - From explicit knowledge to explicit knowledge, or combination.
 - From explicit knowledge to tacit knowledge, or internalization.

- Four Modes of Knowledge Conversion in detail as follows:
 - Socialization (Tacit to Tacit):** Socialization is a process of sharing knowledge, including observation, imitation, and practice through apprenticeship. Socialization is about capturing knowledge by physical proximity, wherein direct interaction is a supported method to acquire knowledge. Socialization comes from sharing experience with others. For example, brainstorming with colleagues. The tacit knowledge is transferred by common activity in the organizations, such as being together and living in the same environment.
 - Externalization (Tacit to Explicit):** Externalization is the process of making tacit knowledge explicit, wherein knowledge is preserved and is thus able to be shared by others, becoming the basis of new knowledge. This includes publishing or articulating knowledge. For example, Concepts, images, and written documents can support this kind of interaction.
 - Combination (Explicit to Explicit):** Combination involves organizing and integrating knowledge, whereby different types of explicit knowledge are merged (for example, in building prototypes). Explicit knowledge is collected from inside or outside the organization and then combined, edited, or processed to form new knowledge. The new explicit knowledge is then distributed among the members of the organization.
 - Internalization (Explicit to Tacit):** Internalization involves the receiving and application of knowledge by an individual, enclosed by learning-by-doing. On the other hand, explicit knowledge becomes part of an individual's knowledge and will be assets for an organization. It refers to the capacity to make sense between fields, ideas, and concepts.

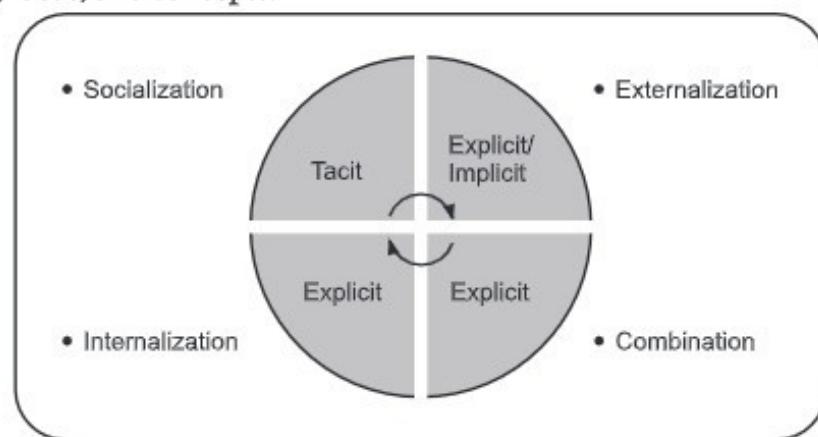


Fig. 5.6: Modes of Knowledge Conversion

5.5.2.3 A Knowledge Management Methodology

- Implementing a knowledge management methodology follows seven steps:
 - Identify the problem:** Problem and its knowledge segments should be identified.

- 2. Prepare for change:** Way of business operations has to be changed.
- 3. Create the team:** Team of people is created and one of them is appointed as chief knowledge officer.
- 4. Map out the knowledge:** Identify sources, need of knowledge and implement KMS.
- 5. Create a feedback mechanism:** It indicates to management the use of system and reports.
- 6. Define the building blocks:** KMS building blocks are defined with its base structures as knowledge repository, collection, storage and retrieval process.
- 7. Integrate existing information systems:** Existing systems are used to capture, contribute knowledge in an appropriate format.

5.6 KNOWLEDGE MANAGEMENT SYSTEMS

- There should be one system in the organization to manage the knowledge created in the process of running that organization. Knowledge Management System (KM System/KMS) refers to a (generally IT based) system for managing knowledge in organizations, supporting creation, capture, storage and dissemination of information.
- Objectives of Knowledge Management Systems include:
 1. Create knowledge repositories.
 2. Improve knowledge access.
 3. Enhance the knowledge environment.
 4. Manage knowledge as an asset.

5.6.1 Views of KMS

- There are two types of KMS views: Conceptual and Physical.
- Following Fig. 5.7 shows a Conceptual view of KMS.

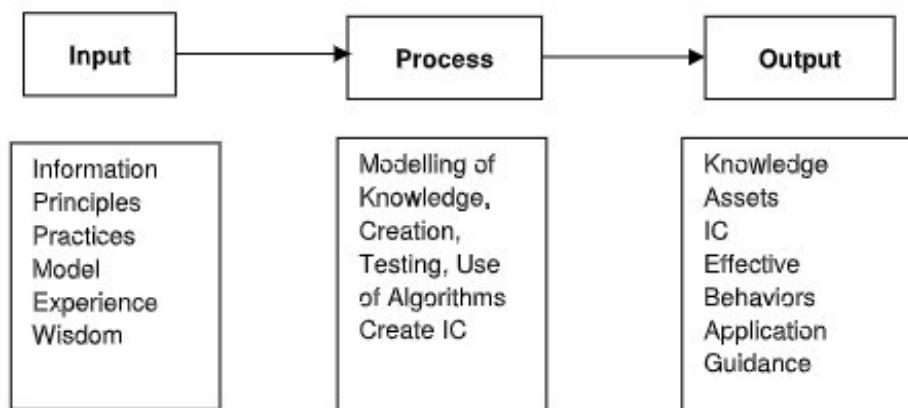


Fig. 5.7: Conceptual view of KM system

- Following Fig. 5.8 shows Physical view of KMS.

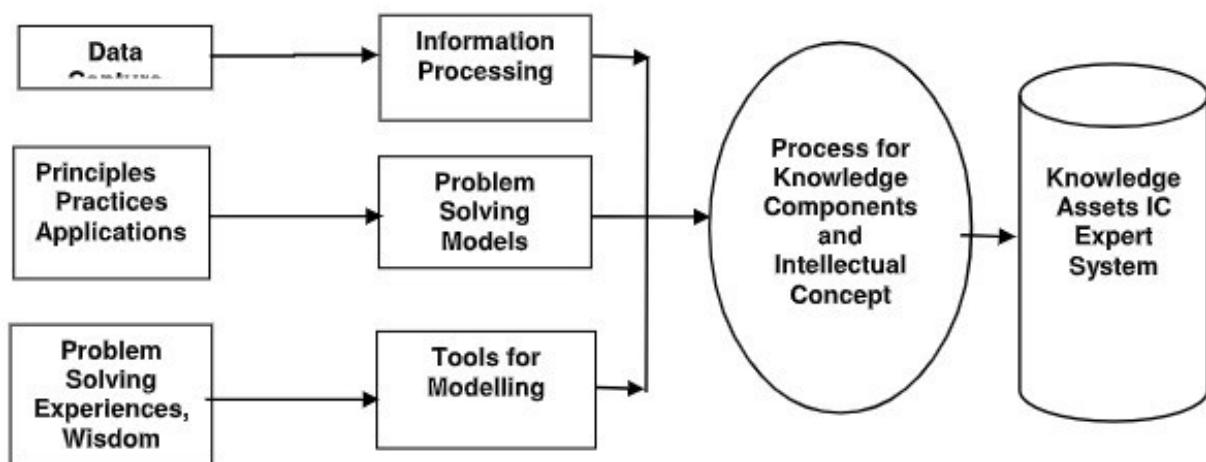


Fig. 5.8: Physical view of KM system

- Knowledge Management system deals with definition, acquisition, construction, storage, delivery and application of knowledge. KM handles two types of knowledge: Tacit and Explicit. We have seen these types in Section 5.5. Examples of tacit and explicit knowledge will be explained in the following Table 5.3.

Table 5.4: Types of Knowledge

Knowledge Type	Nature
Skills	Tacit
Capability	Tacit
Knowhow	Tacit
Information	Explicit
Organized information	Explicit
Facts	Explicit
Process	Explicit
Proprietary(patent)	Explicit

5.6.2 Knowledge Management System Architecture

- KMS architecture deals with Knowledge Identification, Generation and Delivery for application in business.

1. Identification of Knowledge:

- Knowledge needs to be defined and identified for further processing in a current business scenario.
- On identification of knowledge in terms of scope, the next step is to survey for locating the valid source for such knowledge in the organisation.
- Then it is essential to put it into picture for understanding and application.

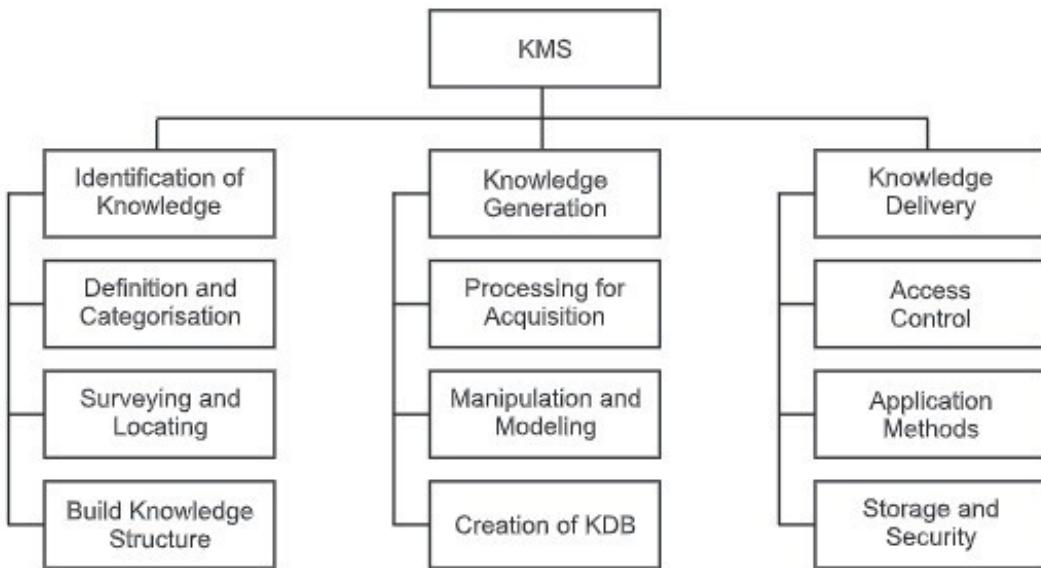


Fig. 5.9: KMS Architecture

2. Knowledge Generation:

- After identification, definition and structuring, the knowledge process must be set for acquisition of knowledge.
- On acquisition, knowledge needs to be manipulated for understanding, presentation and usage.
- The next step is to integrate knowledge sets to build knowledge databases for access and distribution. The hardest job is to give meaningful definition and presentation to tacit knowledge for ease of use or application.
- Many decision scenarios call for simultaneous application of tacit and explicit knowledge. Its generation as a set is difficult. Though it can be done through training of concerned personnel in the organisation.

3. Knowledge Delivery:

- One may create knowledge and place it in knowledge database, but owing to its nature, it needs to be protected and secured. At the same time, it also made available to users for viewing, manipulating and application.
- The system for access control, authorisation and authentication of knowledge for the purpose of update, alter, delete, etc. are necessary. Developing systems for packaging knowledge and for delivery for ready to use are also necessary.

5.7 KNOWLEDGE BASED EXPERT SYSTEMS (KBES)

- Decision Making and Problem Solving are the two main situations where uncertainty comes into picture. In such situations, flexible systems with two methods such as Generalized or Knowledge based expert systems are needed to overcome uncertainty.

5.7.1 Approaches of KBES

1. **Generalized Approach:**
 - o It considers the generally applicable constraints.
 - o It scrutinizes/examines all possible solutions.
 - o It selects one alternative on a trial and error basis with reference to goal.
 - o There is no guarantee for solution whether solution is optimum or best
 - o This approach is dominated by procedure or method.
 2. **KBES Approach:**
 - o It considers specific constraints within the domain.
 - o It scrutinizes/examines limited possible solutions.
 - o It selects one alternative with knowledge-based reasoning with reference to goal.
 - o There is guarantee for optimum solution.
 - o This approach is dominated by a reasoning process based on knowledge.
- Questions like what and which and where, the knowledge has to be considered as it will be the base for KBES.

5.7.2 Knowledge Bottleneck Problem

- In KBES systems, many times experts are difficult to find. Though if found they are having limited knowledge or no knowledge. So, it becomes difficult to solve a problem and find its solution. Such a problem is known as the Knowledge Bottleneck problem.
- In the KBES system, experienced people with required knowledge are taken. Such people provide a path to solve the problem. So, the knowledge bottleneck problem can be overcome.
- Prerequisites required to build KBES:
 - o A person with the ability to solve a problem with knowledge base reasoning.
 - o An expert should articulate the knowledge to the specific problem characteristic.

5.7.3 Components of KBES Model

- There are three components of the KBES model. Following figure 5.10 will give a clear idea about the KBES model.

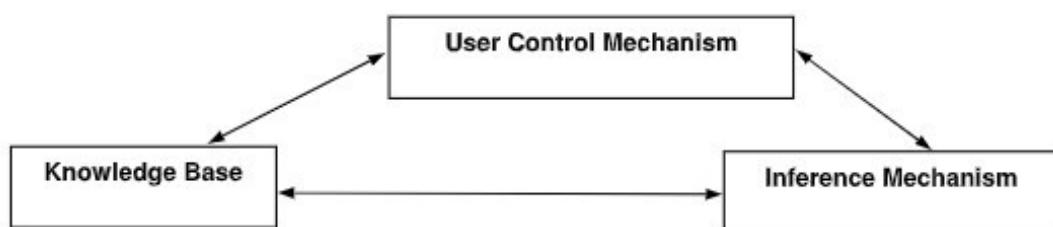


Fig. 5.10: Physical View of Knowledge Management System

1. Knowledge Base:

- It is a database of knowledge. It contains theoretical foundations, facts, judgements, rules, formulate, intuition, experience etc. It is systematic storage for knowledge and retrieval systems are also there.

Methods of Knowledge Base:

- Knowledge Base in KBES uses different methods for representation of knowledge. They are Semantic networks, Frames and Rules.
 - Semantic Networks:** Knowledge is represented on the principle of predicate functions and the symbolic data structures which have a meaning built into it are known as semantic. A network of nodes and arcs where nodes represent an entity and arcs represent association with true and false meaning built into it is known as Semantic Network. Inheritance concepts will be used by association and meaning. For example, all animals with four legs will have a tail and a dog has four legs hence dog has tail. i.e. dog has four legs hence dog is animal so dog may have tail or not.
 - Frames:** Knowledge can be put into frames also. All relevant knowledge is gathered together into frame. This originated the data structure of knowledge. One frame can be related with other frames. Every frame has a slot. This slot represents knowledge in terms of data, information, process and rules.
 - Rules:** A rule is a conditional statement of action that takes place under certain conditions. Rules can be constructed in the form of an 'If-Then' statement. For example,
 - IF an ITEM is Book THEN read it.
 - IF an ITEM is Notebook THEN Write it.

2. Inference Mechanism: It is a tool to interpret the knowledge available and to perform logical deductions in a given simulation. Inference mechanism is based on the principle of reasoning. There are two types of reasoning:

- Backward Chaining:** If reasoning is goal driven.
 - Forward Chaining:** If reasoning is data driven.
 - KBES used both methods of reasoning. The success of KBES depends on knowledge, confidence in the knowledge and quality of the inference mechanism.
- 3. User control Mechanism:**
- It is a tool applied to inference mechanisms to select, interpret and deduct. It guides the inference mechanism by using a knowledge base.

- All above three components in KBES are independent of each other. So, in case of replacement or modification or maintenance it will become easy.

5.7.4 Benefits of DSS in MIS

- Decision making systems, tools, and techniques are used in all levels of management. These systems take data from MIS.

- DSS are basically used by managers for testing new alternatives, training and learning.
- DSS can also work as internal part of MIS. Real-time decision-making systems are embedded in MIS.
- The MIS would become more useful if the decision making is made the person independent and executed with well-designed DSS. Still if anything is not included in DSS then DSS itself brings to notice such situations to decision makers and allows them to act upon.
- Sometimes decision-making systems require multidimensional analysis then such systems are kept out of the main MIS system and are used for modelling so that decisions will become strategic.
- Many decisions such as new product launch, price revision, appointing new dealers, change of product design/change in manufacturing process requires critical analysis of data and careful evaluation of different available alternatives and selecting best from them.
- The decision support system plays a leading role in the management information system as a support to decision making.
- KMS are situated at the top of the MIS model and are also taking organizations at the top of the maturity model. KMS decisions are taken when an organization wants to become a learning organization from its own operations and performance.
- KMS is used when business becomes knowledge driven instead of information driven and hence becomes part of formal MIS.

Summary

- Management information systems term is commonly referring to group of information management methods tied to the automation or support of human decision making, e.g., Decision Support Systems, Expert Systems, and Executive Information Systems. Without any of these systems, MIS cannot exist.
- MIS provides all types of information to take decisions in business. These two systems mainly go Hand in Hand. Now in the 21st century computers are widely used for DSS due to various reasons like speedy computations, increase in productivity, technical and quality support and mainly they overcome the cognitive limits of human brain due to their capacity and speed characteristics.
- Some decisions are programmable and some are non-programmable.
- There are various forms of decision support systems like status inquiry systems, data and information analysis systems, accounting systems and model driven, communication driven and document driven systems.
- Many decision support systems used in business like accounting involve many persons as group decision support systems.

- Artificial Intelligence is one of the main GDSS systems.
- Business intelligence and analytics are data management solutions implemented in companies and enterprises to collect historical and present data, while using statistics and software to analyse raw information, and deliver insights for making better future decisions.
- An EIS is a computer-based system that serves the information needs of top executives.
- Enterprise Support Systems: It is a comprehensive support system that goes beyond EIS and includes communication, office automation, analysis, business intelligence etc. These systems provide tools for enterprise management.
- Knowledge management should be seen as a management philosophy, which can be successfully imbibed into the organizational culture by appropriately training the people. Knowledge management is introduced to help organizations create, share and use knowledge efficiently.
- Decision making and problem solving are the two main situations where uncertainty comes into picture. In such situations, flexible systems with two methods such as generalized or knowledge based expert systems are needed to overcome uncertainty.

Check Your Understanding

1. Which of the following is the reason for using computers in DSS?
 - (a) Decreased productivity
 - (b) Increased productivity
 - (c) Slow computations
 - (d) Mismanagement of data
2. Decision making consists of __ types of decisions.
 - (a) 3
 - (b) 12
 - (c) 2
 - (d) 0
3. Which of the following DSS systems do not involve computation analysis?
 - (a) Data Analysis Systems
 - (b) Information Analysis Systems
 - (c) Accounting Systems
 - (d) Status Inquiry Systems
4. DSS can collect and analyse __ time data.
 - (a) Execution
 - (b) Static

- (c) Dynamic
(d) Real
5. GDSS stands for _____.
(a) Guided Decision Support System
(b) Green Decision Support System
(c) Gathered Decision Support System
(d) Goal oriented Decision Support System
6. OLAP stands for _____.
(a) Online Analytical Process
(b) Online Acquired Processing
(c) Online Area Processing
(d) Online Analytical Processing
7. ___ uses past and present knowledge.
(a) Business Analytics
(b) Business Intelligence
(c) Business Analysis
(d) Business Area
8. Which of the following tools are used for communication in ESS?
(a) Webex
(b) TCBWorks
(c) Microsoft Teams Meeting Tool
(d) All of the above
9. ___ knowledge is hard to document.
(a) Tacit
(b) Explicit
(c) Both tacit and explicit
(d) None of the above
10. Tacit to tacit knowledge conversion process known as _____.
(a) Externalization
(b) Combination
(c) Socialization
(d) Internalization
11. Which of the following is an important part of Enterprise resources management?

- (a) Enterprise Information System
- (b) Executive Support System
- (c) Decision Information System
- (d) Executive Information System

Answers

1. (b)	2. (c)	3. (d)	4. (d)	5. (a)	6. (d)	7. (b)
8. (d)	9. (a)	10. (c)	11. (a)			

Practice Questions

Q.I. Answer the following questions in short.

1. Identify the following Tacit or Explicit Knowledge:
 - (a) Software Product
 - (b) Smart card
 - (c) Consultants Advice
 - (d) Online Help
 - (e) Report Card
 - (f) Tea testing process by tester
 - (g) Machine setting ad tuning
2. Write the goal of AI?
3. What is the Knowledge bottleneck problem?
4. Write any two benefits of EIS.
5. State various capabilities of ESS.
6. State any one example of ESS.
7. State two types of knowledge.
8. State the different modes of knowledge conversion.
9. What is a semantic network?
10. What are frames?
11. What is Knowledge Management?

Q.II. Answer the following questions.

1. What is the purpose of DSS in MIS?
2. What are the different reasons that computers are used in Decision making purpose?
3. What are two different types of decision making?
4. Explain different types of DSS.
5. With neat diagram explain different components of DSS.

6. State the various reasons used to develop DSS?
7. Write various advantages and disadvantages of DSS.
8. Explain various components of GDSS.
9. Write a short note on AI.
10. Explain various applications of Artificial Intelligence.
11. Differentiate between business intelligence and business analytics.
12. Write various benefits of EIS.
13. Explain in brief various capabilities of ESS.
14. Differentiate between EIS and DSS.
15. What are identifying attributes of tacit knowledge?
16. What are identifying attributes of explicit knowledge?
17. What are different modes of knowledge conversion? Explain with diagram.
18. Explain in brief architecture of KMS.
19. What are Knowledge based expert systems?

Q.III. Define the terms.

1. Tacit Knowledge
2. Explicit Knowledge
3. AI
4. DSS
5. GDSS
6. Expert Systems
7. KBES
8. Knowledge Management
9. Semantic Knowledge

♦♦♦

6...

Applications of MIS in Manufacturing and Service Sectors

Learning Objectives...

- To identify applications of MIS and IT to management functions of the industry.
- To understand model of information processing systems.
- To find application of MIS model to various business functions.

6.1 APPLICATIONS OF MIS IN MANUFACTURING AND SERVICE SECTORS

- Transaction processing is the base for applications of MIS in various sectors. Due to online transaction processing systems huge data in DBMS will get stored. All such online systems do OLTP (Online Transaction Processing).

Objectives of MIS:

- The system developer has to keep in mind following objectives while designing such Management Information Systems:
 1. The way of transaction processing, handling and final result of transaction (success/fail) with report generation facility.
 2. Working of query system for status of records, results, documents on real time basis (for example, status of an account)
 3. Providing an Analysis system for some business trends for critical assessment and validations of rules, policies, and decisions taken for strategic planning. Such systems help in DSS for decision making purpose.
 4. Providing control information to ensure the correct execution of business as per business plan, progress towards growth and goals of business with the help of standard norms, targets and budgets.

- 5. Providing report generation to fulfil business information needs, compliance, knowledge updatations, operation management, decision analysis, plan of action and control.
- The basic meaning of manufacturing is industrial, engineering, trade, business and work.
- The need of an information system for all such manufacturing sectors is at function levels such as personnel, finance, production, materials, marketing and corporate business management. All these functional level systems should be integrated to provide all types of cross functional information for various decisions taken in business at middle and top management level.

6.2 MIS FOR FINANCIAL AND MARKETING MANAGEMENT

6.2.1 Financial MIS

- A financial MIS provides financial information for managers to make daily decisions on operations within the organization. Most systems provide following functions:
 - Integrate financial information from multiple sources.
 - Provide easy access to financial information in summarized form.
 - Enable financial analysis using easy-to-use tools.
 - Compare historic and current financial activity.
- A financial MIS often has several subsystems, depending on the type of organization. These include systems to analyse revenues, costs and profits, auditing systems for both internal and external purposes and systems to manage funds. A financial MIS can also be used to prepare reports for third parties, such as external auditors or shareholders.

6.2.1.1 Objectives of Financial Management

1. To meet the financial needs of the business from time to time by providing working and long-term capital.
2. To meet statutory compliance by way of declaring the audited financial results.
3. To submit all reports and returns to the Government and Tax authorities.
4. To fulfil the obligations to the shareholders.

6.2.1.2 Tools and Techniques

- Various tools and techniques used by financial management to meet above objectives are as follows:
 1. Break Even Analysis
 2. Capital Budgeting and ROI Analysis
 3. Cost Analysis
 4. Cash Flow Rejections
 5. Ratio Analysis

- 6. Financial Modelling
- 7. Management Accounting
- 8. Expense Analysis, Auditing and Control

6.2.1.3 Documents required in MIS for Financial Management

- Different input transactions documents are required in MIS for financial management:
 1. **Payments:** To suppliers, authorities, employees, shareholders, stakeholders and financial institutions.
 2. **Receipts:** From customers, authorities, employees and financial institutions. (Journal vouchers, bills, debit notes. Receipts and transfer documents)
 3. Data from stock exchange related to share prices, consolidated financial results of other companies etc.

6.2.1.4 Viewers of FM system

- Financial Managers, Cost Controllers, Auditors, Material Managers, Marketing Managers, Secretaries and Top Management.

6.2.1.5 Applications of Financial Management

- Major application of FM is financial Accounting System. This system keeps track of all financial transactions till the balance sheet of a business, fixed deposits, and shares. It works as an enterprise for other systems in business.
- 1. **Accounting:** Direct or indirect transactions in terms of money in the following:
 - Sales
 - Purchase
 - Salary/Wages
 - Inventory
 - Expenses
 - Capital Purchase
 - Fixed Deposits
 - Shareholder's Funds
 - Income Tax
 - Sales Tax
 - Excise duty
 - Customs duty
 - Octroi and other local taxes
 - Consumption
 - Budgets
 - Fixed Assets

2. **Query:** It shows the debit and credit balance of an account. Query process the transactions and shows current status of account, transaction document in respect to the following keys:
 - o Main account
 - o Subsidiary account
 - o Location (branch etc.)
 - o Document (bills, credit note, debit note, receipt etc.)
3. **Decision Analysis:** This analysis is based on the financial status of the company. Many decisions of business can be taken for its progress such as borrowing of credit terms, capital budgeting and selection of investment alternatives, sources of finance, analysis of debtors and creditors etc.
 - Following is the list of applications which supports above decisions:
 - o Cash flow analysis
 - o Sources and uses of funds
 - o Debtors analysis and aging
 - o Creditors analysis and aging
 - o Budget analysis
 - o Ratio analysis and management norms
 - o Capital budgeting and ranking of investment alternatives
 - o Cost analysis of various production inputs and alternatives
4. **Control:** It has been noted that cost of business increases when it does not run in a planned manner. There should be control in all activities of business with some exceptions mentioned below:
 - o Accounts receivables, outstanding beyond the acceptable norms.
 - o Advances to creditors and non-realisation of obligations.
 - o Valuation of non-moving inventory for disposal.
 - o Analysis of non-moving accounts and legal actions.
 - o Shortage of funds in excess of planned and rescheduling of activities and priorities.
 - o Cost overruns beyond the norms and action on alternatives.
 - o Performance analysis of lines of business showing adverse performance leading to the decision-whether to continue or discontinue the line of business.
 - o Revision of terms and conditions in business with alternatives will be considered.
5. **Reports:** Statutory compliance and operations update are the two fields where the FMS will work on a major role. Top management is highly dependent on reports provided by FMS. Many companies rely on the financial management system for management information.
 - a. **Statutory Compliance:** It contains following things:
 - o Tax returns

- Registers: Sale Tax, Excise, Tax deducted at source.
 - Declaration of certain results to the financial institutions.
 - Declaration of financial results to the public every six months.
 - Declarations of annual results to the board, shareholders and public within a stipulated time.
- b. Information Updates:** It contains following things:
- Monthly trial balance, balance sheet and profit and loss account.
 - Stock valuation
 - Accounts receivables and aging
 - Account payables and aging
 - Expenses on major accounts
 - Cash position
 - Payments and receipts which are statutory obligations
 - Sales purchase of assets by certain classification
 - 'Overall business achievements in major lines of business.
- c. Operations Update:** It contains the following things:
- Filing of statutory returns and reports
 - Statutory payments such as Advance Tax, Sales Tax, Octroi, Excise Duty etc.
 - Transactions executed and accounted for in the system.
 - Report on finished goods, dispatches and invoicing.
 - Reports on material receipts and payments to the suppliers.
 - Obligatory payments such as rents, insurance premium, membership fees, interest and dividend.
 - When all operations are updated satisfactorily the management can conclude that all business transactions are working fine and according to the business plan.
- d. Decision Analysis:** It contains the following things:
- Break even analysis for cost and price decision.
 - Return on investment analysis for choice of investment.
 - Trend analysis on price of selected commodities which play a crucial role in business performance leading to decisions of alternatives material supplier change in product design etc.
 - Cash flow analysis.
 - Sources and use of funds.
 - Debtor's analysis and aging.
 - Creditor's analysis and aging.
 - Budget analysis.
 - Ratio analysis and management norms.
 - Capital budgeting and ranking of investment alternatives.

- Cost analysis of various production inputs and alternatives.
 - Analysis of current and fixed assets.
- e. **Action Update:** Decision analysis shows various areas of decisions on which action should be taken. Some actions are also taken for exceptional cases also. Exception reports on implementation of decision and its impact on the business are listed a below:
1. Overdue receivables
 - Legal action
 - Termination of business association
 2. Non supply of goods and services but advance paid
 - Legal action
 - Revision of terms
 - Termination of business association
 3. Payments of creditors where penalties are involved.
 4. Poor usage of fixed assets and disposal.
 5. Non-moving inventory of say more than two years and its disposal.
 6. Evolving new systems and procedures to control expenses and implementation.

6.2.2 Marketing MIS

- A **Marketing MIS** supports activities throughout the many activities of marketing departments. Some of the typical subsystems of a marketing MIS are marketing research, product development and delivery, promotion and advertising, product pricing and sales analysis.
- One of the most common uses of a marketing MIS is to produce sales reports. These are typically produced on a regular schedule, such as by week, month, and quarter. Reports can be organized by sales representative, product, customer, or geographic area. Such reports allow managers to see which aspects of sales are doing well and which ones need attention.
- Perhaps one sales representative has suddenly experienced a drop in sales by losing one major customer and needs some support to develop some new leads. If there are only a handful of sales reps sharing one office, a manager might be able to pick up on this just by talking to everyone. However, what if a manager must oversee more than 100 sales reps in 12 different offices around the nation? A specialized information system that provides regular updates in a meaningful format will make it a lot easier for the manager to make effective decisions.

6.2.2.1 Functions of Marketing Management

- To satisfy the customer is the basic function of marketing management. The function scope will include:

- Identifying the needs of consumers.
- Evolving product concept.
- Designing the product.
- Positioning the product in the market and selling the product at appropriate price.
- Different activities such as market research, consumer survey, advertisement, sales promotion campaign, product stock maintenance and developing dealer distribution networks, forecasting of sales, evolving marketing strategies, pricing, product designing, launching products into differ markets, assessing consumer responses to a new market plays a major role in marketing function.
- The above functions strongly depend on production and finance department. The functions strongly depend on production department for:
 - Uninterrupted supply of goods
 - Stock maintenance
 - Inventory management at various locations.
- The function strongly depends on finance as to obtain orders from customers and fulfil them.
- Evolving different competitive marketing strategies in all branches of marketing management is the main function of marketing management.

Input transaction documents: Important documents are as follows:

1. Customer order
 2. Order acceptance
 3. Delivery notes
 4. Invoice, credit note, debit note
- Some data was also borrowed from company literature. For example, price lists, product literature etc. Lots of information needed in marketing management is not transaction based. Such information can be drawn from surveys, research studies of the market, product journals, industry association publications etc.

6.2.2.2 Applications of Marketing Management

1. Accounting:

- Main entities are sales in terms of quantity and value. Other entities are as follows:
 - Product sale
 - Product family
 - Sales value
 - Sales tax
 - Dealer
 - Distributor
 - Customer

- o Excise duty
 - o Zone
 - o Area
 - o Inventory
 - o Receivables
 - o Market segment
 - o Exports market
 - o Returns
 - o Complaints
- Such data is needed for statutory compliance and operations update.
- 2. Query:**
- Queries based on customer, product, price, stock, sale and certain cumulative statistics relating to sales. All the queries are related to status of orders like from customers, manufacturers etc. another example: comparison of two product groups, customer groups, zones and areas.
 - Importance is given to handle customer complaints, product satisfactions, price and discounts, quality, dealers, customers, distributors etc.
- 3. Decision Analysis:**
- Some decisions should be taken on a daily basis such as pricing, allocation of stocks to orders, acceptance of order, discounts and commission. All such decisions are based on terms and conditions. Some complex decisions are also taken such as increase or decrease in price, packaging terms, and new products. All such decisions are based on strategic and tactical decisions.
 - Applications are developed to support and smoothen the above decision making process which contains break even model, risk analysis model, distribution mode, network model, product launch model etc.
- 4. Control:**
- Many factors should be controlled to achieve goals such as sales versus budget, marketing cost versus budgeted cost, product sale versus target fixed for market segments-distributor, dealer, branch and marketing persons, planned sales programme versus actual sales verses competitors sales.
 - Applications are designed to help in such decisions. Applications require understanding of behaviour of consumer, market, product and competition.
- 5. Reports:**
- (i) **Statutory Compliance Reports:** This is mainly related to taxes and duties and filing the returns to appropriate government authorities. Reports are sales tax register, returns and excise duty returns etc. In some industries like alcohol, tobacco, gold some reports have to be maintained from time to time as per government format.

- (ii) **Information Update Reports:** These reports are based on summaries on various entities such as orders, sales, value, stocks, budgets etc. with reference to past and future projections on periodical intervals. The reports are as follows:
- Product Sales Ledger
 - Sales Summaries
 - Accounts Receivables
 - Orders received and accepted
 - Sales Analysis
 - Aging of Receivables
 - Contribution Analysis
 - Market Analysis
 - Competition Analysis
- Factors such as customer, class of customer, market segment, product, product family, sales representative, branch area and zone, dealer and distributor used for classification and summaries in these reports.
- (iii) **Operations Update Reports:** These reports give detailed information of marketing operations ranging from orders received, processed, accepted, executed, dispatched, billed and money recovered. All these reports are generated from daily transaction processing. So examples are:
- Order Book
 - Dispatch Report
 - Inventory
 - Invoice
 - Customer complaints
 - Complaints disposed
- (iv) **Decision Analysis Report:** This report tie up the specific decision to its results. For example, a decision is taken to launch 2 advertising methods. Then find out pre and post sales to determine which advertisement is good. Many such situations where alternatives are tested have to be considered here.
- (v) **Action update report:** This report will lead to such decisions as price reduction, withdrawal of product from the market, changing the product position, allocating more budgets for expenses, inventory personnel resources. Some of the reports are :
- Sales vs Budget
 - Expenses vs Sales
 - Sales growth vs Sales objective
 - Sales verses market segment vs Budget
 - Stock vs Budgeted stock levels
 - Complaints vs Number of complaints serviced.

6.3 INTRODUCTION TO SERVICE AND SERVICE SECTOR

6.3.1 Concept of Service

- Service is identifiable, intangible activity or a process designed to fulfil certain expectations of the customer/consumer.
- Kotler defined service as 'service is an activity or a benefit that one part can offer to another which is essentially intangible and does not result in the ownership of anything. Its production may not be tied to physical products'.

6.3.1.1 Characteristics/ Attributes of Service

- Characteristics/ Attributes of Service are as follows:
 1. **Intangibility:** Services lack physical existence. They can be delivered and received by customers.
 2. **Inseparability of receiver and provider:** Receiver and provider must present. Service process cannot be executed unless both are present at time of service delivery.
 3. **Storage:** Services cannot be stored like goods.
 4. **Inconsistency:** Incidents of services may vary according to customer, process. It cannot standardise.

6.3.1.2 Service Process Cycle

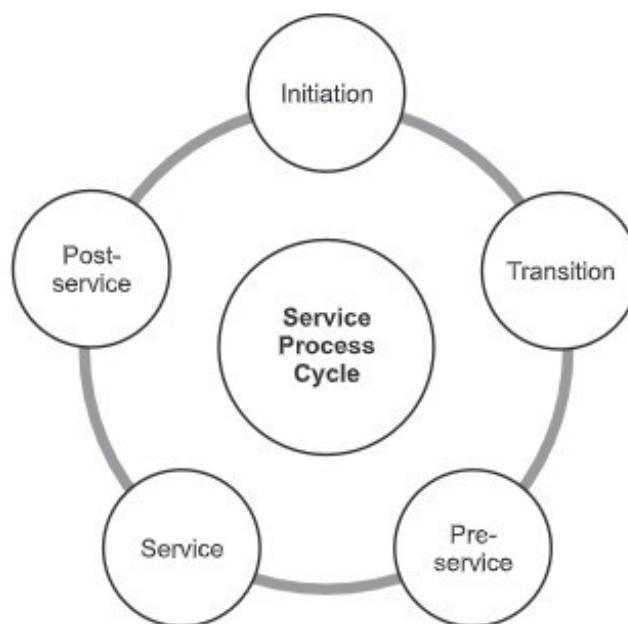


Fig. 6.1: Service Process Cycle

Table 6.1: Stages of Service Process Cycle

Stage	Steps	Example:	Example:
		Passenger Service	Educational Institute
Initiation	Enquiry, information seeking, checking, assessing	Seeking information on flights, fare, services, timings, facilities	Through website, advertisements
Transition	Step towards or prior to effecting the services.	Issue of ticket and instructions about check in of baggage, pre-boarding service.	Information brochure and online application form.
Pre-service	Check and crosscheck of documents, records, vouchers. Providing guidance, exchange of documents, assurance of quality	Ticket inspection at counter, issue of boarding pass, movement guidance for security check.	Cross check the certificate application form.
Service	Affecting the service delivery with goods and physical assistance.	Finding a seat, Providing in-flight assistance and services.	Best faculty with infrastructure.
Post-service	Concluding the service, providing existing assistance, service recovery.	Baggage arrival and reclaiming, exit guidance, next flight information, transport assistance.	Giving world class placement.

6.3.2 Service Sector

- The service sector, also known as the tertiary sector, is the third tier in the three-sector economy. Instead of the product production, this sector produces services maintenance and repairs, training, or consulting. Examples of service sector jobs include housekeeping, tours, nursing, and teaching.

6.3.2.1 Types of Service Sector

- These include IT and ITeS (Information Technology Enabled Services), Tourism and Hospitality Services, Medical Value Travel, Transport and Logistics Services, Accounting and Finance Services, Audio Visual Services, Legal Services, Communication Services, Construction and Related Engineering Services, Environmental Services, Financial Services and Education.

6.3.2.2 Importance of Service Sector

- The service sector makes an important contribution to GDP in most countries, providing jobs, inputs and public services for the economy. Trade in services can improve economic performance and provide a range of traditional and new export opportunities.
- The importance of service industries in the economy is that they contribute significantly to the domestic and global economy. Product companies that offer services to consumers promote the value attached to the product business.

6.3.2.3 Role of Service Sector

- Service sector provides finance, marketing, transport, insurance for the development of the agriculture sector. The expansion of service sector activities boosts the secondary sector activities as well. Service sector can play a major role in reducing inequalities in the distribution of income in the economy.
- There are 13 different types of service sectors in India such as Trade, Tourism including Hotels and Restaurants, Shipping, Port services, Storage services, Telecom and related services, Real Estate services, IT services, Accounting and Auditing services, Research and Development services, Legal services, Consultancy, and Construction.
- Service sector does not have physical goods to be manufactured for the customer. MIS found in manufacturing and selling organisation will not be suitable in the service sector.
- Service industry requires data processing applications such as payroll, accounting and inventory.
- The main goal of service sector is to provide satisfactory service to customer.
- Due to change in socio economic behaviour of customer, expectations about services and its outcomes are also changed. Service remains the same but the manner of offering service is changed. All service industries provide good front end facility to customer and make him comfortable for rest of the services provided. Due to the use of technology in the service sector, this sector is also in demand.
- Services should be distinctive so as to remain competitive in nature.

6.3.2.4 Distinctive Service

- This creation of distinctive service is a wilful management act. To manage service effectively, it is important to understand the distinctive characteristic of service between product and the service, the customer expectation and the perception.

6.3.2.5 Five principles of Distinctive Service

- Tom Peters in 'The Service Edge' states five principles of a distinctive service:
 1. Listen, Understand and Respond to the customers.
 2. Define a Superior service and establish a service strategy.
 3. Set standards and measure and performance.
 4. Select , Train and Empower the employees to work for the customers.
 5. Recognise and reward the accomplishments.

6.3.2.6 Service vs Product

- A product is tangible but a service is not.
- A product consumes shelf space, life and has physical unit of measure.
- The product can be offered on payment while services are offered on demand.
- Quality control of product can be done with standards, while quality control of service is difficult due to its reference to customer expectations which are difficult to judge and control.
- Product demonstration can be done before sale while service cannot be demonstrated.
- The product can be produced, sold and consumed in stages while the service has to be produced, sold and consumed simultaneously. The receiver and service provider are very close to each other.
- The service expectations are dynamic and not static. It is about service process, outcome, satisfaction related to both.

6.3.2.7 Customer Expectation and Perception

- To create distinctive service, the management of service business must understand the customer's expectations. If the expectations and perceptions are not rational then customer awareness and education is necessary.
- Following table will clear ideas about customer expectation and perception about medical service.

Table 6.2: Customer Expectation and Perception about Medical Service

Purpose	Expectation	Perception
Annual health check up	Quick service and total coverage at a single location with proper guidance and advice.	Depends on the socioeconomic status.

Contd...

Normal Treatment	Proper guidance and very less waiting time.	Less proper work and infrequent visits.
Emergency	Immediate attention, necessary resources and services as immediately available.	Doctor's choice and a norm of immediate attention.
Hospitalisation	Clean and quiet surroundings, pleasant stay and fast recovery.	Start hotel cleanliness and a service with a smile.
Old patient	Expects help to conduct in the hospital, affectionate service, rest facilities and faster service at least cost.	Good layout and help to read, write and to be mobile.
Child patient Care	Expectations of parents are relevant.	Interactions reduce parent's anxiety.

6.3.2.8 Applications of Service Sectors

- There are different service industries like Airlines, Hotels, Hospitals, Banking, Insurance.
 - 1) **Airlines:** Airlines used to move people and goods from one location to another safely on time.
Perceptions: Schedule, convenience, prices, seat comfort, meal quality, treatment by staff, facilities provided at airport, assistance in travel arrangement, pre-post travel period, attention to passenger's problems at the front desk.
 - a. **Passenger Information:**
 - Type, class and purpose of travel
 - Socio-economic group
 - Duration of stay at destination
 - Food at eating habits
 - Language and communication needs
 - Expectations on the service before and after the journey
 - Traffic flow between the town's cities and countries
 - b. **Information on Aviation Industry:**
 - Providing the best service package with safety and security needs with planning and control.
 - 2) **Hotels:** Hotels are viewed as a place of convenience, comfort, enjoyment, and service. Hotels are designed for:
 - Individuals Stay
 - Business Executives
 - Families/ groups
 - Tourist groups

Different **MIS responsibilities** such as:

- o Keeping track of customer profiles: (Type of customer, nature and purpose of visit, duration of stay, service demanded, socio-economic class of customer, religion, language and culture of the religion).
- o Monitoring occupancy level.
- o Monitoring the level of expectations.
- o Monitoring the communication needs of customers.
- o Maintenance of customer database.

3) Hospitals: Providing medical, clinical assistance to customers with best health care products and services.

a. **Front end Applications:**

- o Maintenance of patient database
- o Medical service database
- o Resource planning and control
- o Medical case history database

b. **Core applications** containing manpower and personnel planning, payroll, billing, Inventory control, financial accounting, maintenance of services, facilities, and resource utilisations and analysis.

c. **Critical control applications** such as patient's statistics, lab statistics, doctor statistics, disease statistics etc.

4) Banking: Providing financial services.

- o Maintenance of Customer database
- o Providing services to account holders
- o Services to business promotions
- o Human resource upgradation

5) Insurance: Providing risk management to peoples, goods, vehicles.

- o Information for new products, policies
- o Settlement of claims
- o Management of policies

6.4 CUSTOMER SERVICE DESIGN AND SERVICE MANAGEMENT SYSTEM

- Customers initiating the service and taking benefits of services. This process is influenced by the :
 - o Assessment of service, Scope, quality.
 - o Assessment of price of offer and willingness to pay that price.
 - o Perception of ease of availing service delivery.
 - o Perception of service standard.
 - o Extend of knowledge about the service.
 - o Impact of promotion campaign.

6.4.1 Customer Service Design

- Service process designers have to keep in mind the assessment and analysis of customer choices, preferences, quality expectations, willingness to pay the price and these things to design customer service.
- Following factors influences Customer Service Design:
 - Promotion
 - Product
 - Price
 - Place
 - Processes
 - People(process drivers)
- Following figure 6.2 will give clear ideas of this:

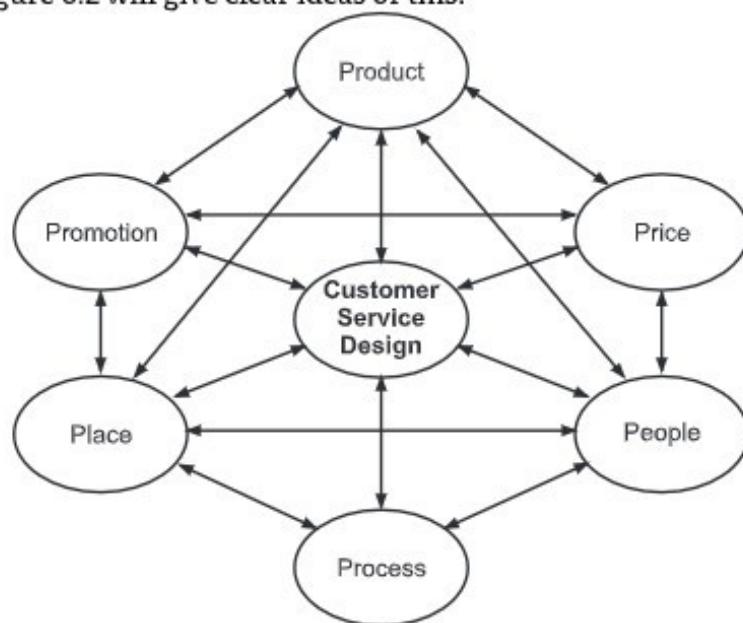


Fig. 6.2: Factors influences Customer Service Design

- All above factors are cross linked to each other. Service product formation will decide the nature of promotion, layout of the place and facilities where service products will be delivered. The process could be mechanised or automated.
- Customer service design addresses primarily the service product formation which states that:
 - Who is the customer?
 - What is service scope?
 - How is it delivered?
 - What is the quality level?
 - What additional features to provide?
 - What should be the price of service?

- Where should it be offered and what facilities to provide?
- Who would drive the service process?
- What kind of promotion would enthuse customers to avail the service?
- What process design would deliver the scope?
- Customer service design plays crucial role in customer satisfaction. It is strategic. Cost depends on service level. Higher the service level, higher is the cost. The customer service design is a key business differentiator.

6.4.2 Service Management System (SMS)

- Service process starts from initiation to delivery till post service evaluation. All service delivery processes will be designed in this cycle. When service process design is finalized then it is launched and implemented. Management of the process will be done through the service management system. Following figure will give a clear idea about Service Management System.

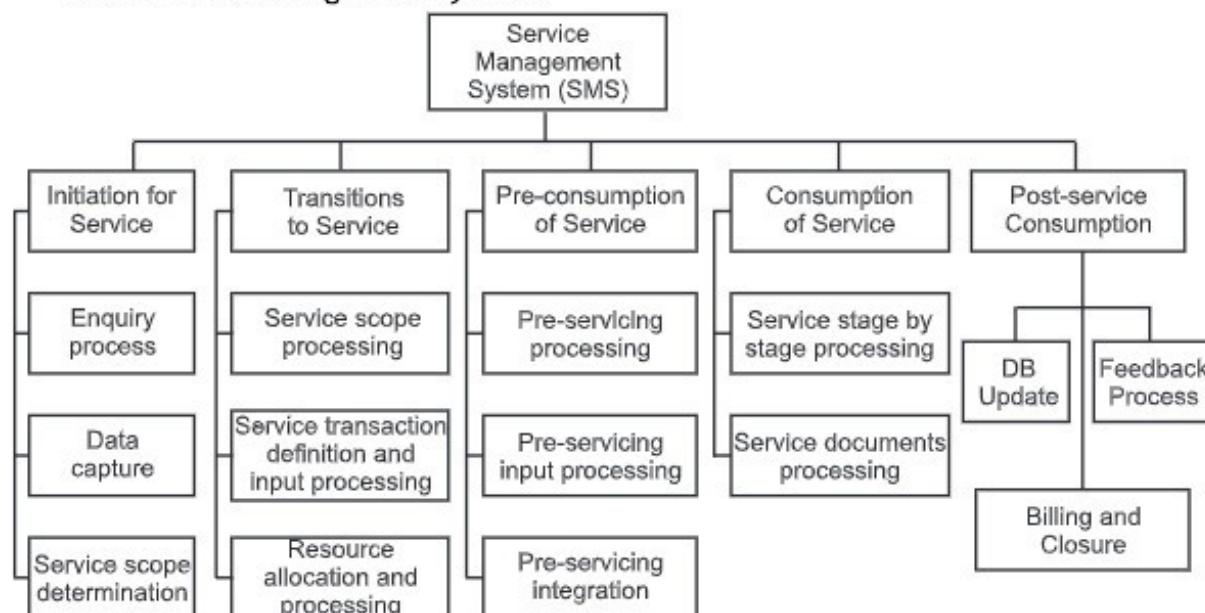


Fig. 6.3: Service Management System

- Let's discuss each process with its scope and objective:

1. Initiation to Service Sector (Front End):

a. Scope:

- i) Answering standard and non-standard queries.
- ii) Recording query details and seeking for agreement for service.
- iii) Data capturing in standard format for service action initiation.
- iv) Determine the service requirement.
- v) Create a bill of service offer.
- vi) Give a Service Job Number, put the service job in a queue.

b. **Objective:** Win the customer for availing the service.

2. Transition to Service:

a. **Scope:**

- i) Check, Assess validate the service requirement.
- ii) Determine commercial and technical viability and operational feasibility.
- iii) Check for submission of any document or goods which may be mandatory for service.
- iv) Obtain formal acceptance for beginning the service.
- v) Issue acknowledgement acceptance card voucher etc.

b. **Objective:** Establish technical commercial feasibility and obtain customer acceptance.

3. Pre- Service (Backend):

a. **Scope:**

- i) Inspect all submissions from all points of view.
- ii) In doubt, clarify and ascertain.
- iii) Issue service job identity for record communication and for reference at a later date.
- iv) Update customer database with this service job identity.

b. **Objective:** Enlist the service offer with identity.

4. Service (Backend):

a. **Scope:**

- i) Conducting the customer and\or the goods for service after execution.
- ii) Execute all necessary transactions which are part of the service process.
- iii) Collect transaction results and update the records for reporting.
- iv) Produce and or display documents.
- v) Collect relevant data for computing cost of service.
- vi) Close the service process and obtain an acknowledgement of service completion.

b. **Objective:** Complete the service execution process efficiently and effectively to the satisfaction of the customer.

5. Post-service (Backend):

a. **Scope:**

- i) Collect feedback on service experience, suggestions if any.
- ii) Bill the customer for services availed.
- iii) Process payment as per terms of services.
- iv) Update customer record, job record and other information databases.
- v) Generate a report for examination to close the service offer.

b. **Objective:** Collect data and information about service for decision making and improvement.

6.4.3 SMS Architecture Model

- Following Fig. 6.4 will give a clear idea about the SMS Architecture Model.

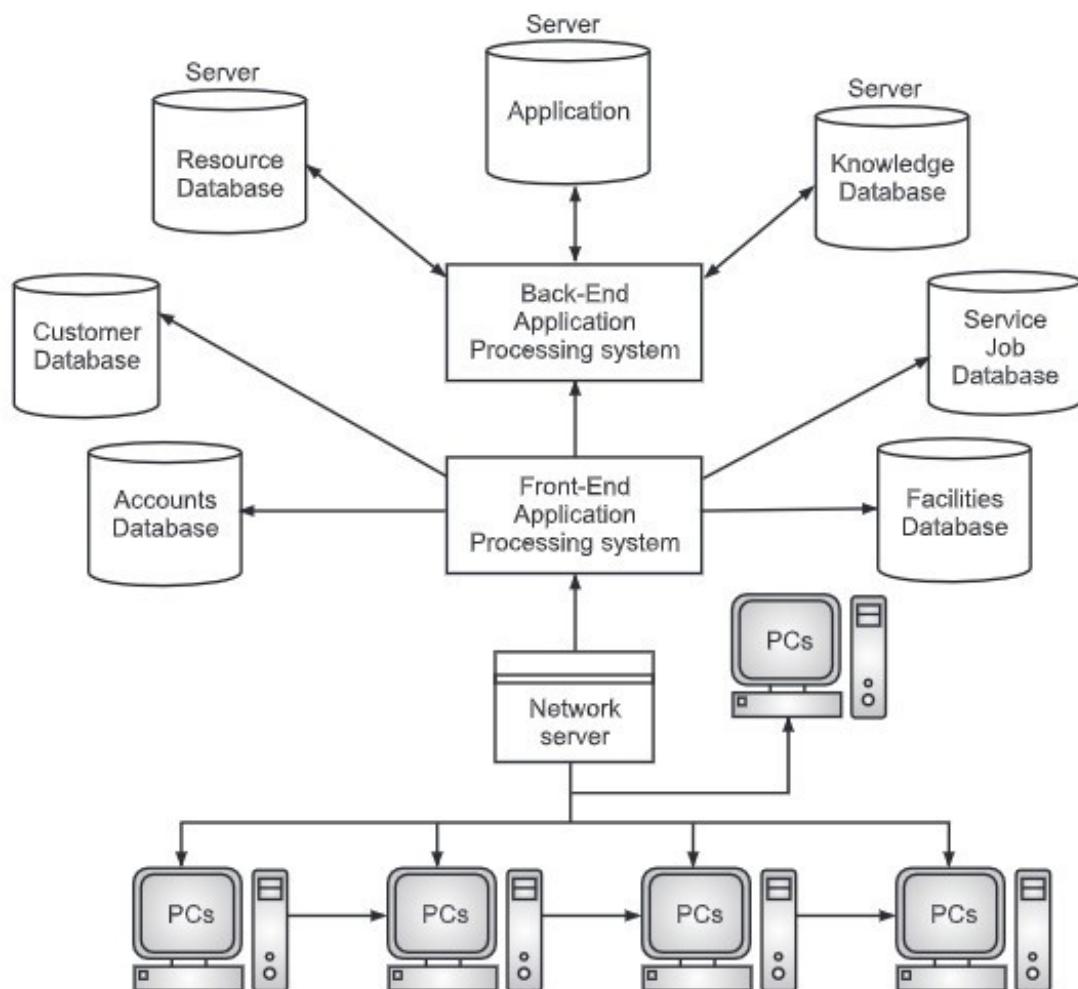


Fig. 6.4: Conceptual SMS Architectural Model

- SMS Architectural Model contains various components. There is a network of computers as this model is based on information technology. Computers are needed for processing any kind of information. Databases like customer database, account database, knowledge database, service job database and facilities database are stored separately. They communicate through each other with different front end OLAP tools and data mining tools. The backend database processing system should be strong and non-volatile. It should keep persistent data. All communication is handled through the network.

Summary

- Transaction processing is the base for applications of MIS in various sectors. Due to online transaction processing systems huge data in DBMS will get stored.
- A financial MIS provides financial information for managers to make daily decisions on operations within the organization. Most systems provide these functions:
- A marketing MIS supports activities throughout the many activities of marketing departments. Some of the typical subsystems of a marketing MIS are marketing research, product development and delivery, promotion and advertising, product pricing and sales analysis.
- Service sector does not have physical goods to be manufactured for the customer. MIS found in manufacturing and selling organisation will not be suitable in the service sector.
- Service industry requires data processing applications such as payroll, accounting and inventory.
- MIS applications are there in every sector as Airlines, Hotels, Hospitals, Banking, and Insurance.
- Customer service design plays a crucial role in customer satisfaction. It is strategic. Cost depends on service level. Higher the service, level higher is the cost. The customer service design is a key business differentiator.
- When service process design is finalized then it is launched and implemented.

Check Your Understanding

1. _____ is the base for any application of MIS in various sectors.
 - (a) Analytical Processing
 - (b) Transaction Processing
 - (c) Process Halt
 - (d) Objective Processing
2. OLTP stands for _____.
 - (a) Online Trim Processing
 - (b) Online Transaction Processing
 - (c) Online Trade Processing
 - (d) Online Trigger Processing
3. _____ sector is the important contribution to GDP.
 - (a) Sales
 - (b) Purchase
 - (c) Service
 - (d) Transaction

4. A product is _____.
(a) Intangible
(b) Tangible
(c) True
(d) False
5. The Service Process System contains ___ steps.
(a) 2 (b) 3
(c) 4 (d) 5
6. SMS stands for_____.
(a) Service Management System
(b) Service Manageable System
(c) Sales Monitor System
(d) Service Monitor System
7. One of the most common uses of a marketing MIS is _____.
(a) To produce sales reports
(b) To write purchase documents
(c) To print employee reports
(d) To display financial reports
8. The service sector, also known as the _____ sector.
(a) Binary (b) Unary
(c) Unique (d) Tertiary
9. Tool/technique used by financial management is _____.
(a) Break Even Analysis
(b) Capital Budgeting and ROI Analysis
(c) Cost Analysis
(d) All of the above
10. Normally, MIS found in a manufacturing organization will not be suitable in the _____ sector.
(a) education (b) banking
(c) service (d) healthcare

Answers

1. (b)	2. (b)	3. (c)	4. (b)	5. (d)	6. (a)	7. (a)
8. (d)	9. (d)	10. (c)				

Practice Questions

Q.I. Answer the following questions in short.

1. Write any two objectives of MIS in financial management.
2. Write any two techniques used by financial management to meet financial objectives.
3. What is financial MIS?
4. What is Marketing MIS?
5. What is the main goal of the service sector?
6. What is a distinctive service?

Q.II. Answer the following questions.

1. What kind of Objectives the systems design has to keep in mind while designing MIS system?
2. What are the objectives of financial management MIS?
3. What are different techniques used by financial management to meet financial objectives?
4. What are different input transaction documents required in MIS for financial management?
5. What are different applications of financial management in MIS?
6. What are different kinds of reports generated by MIS in financial management?
7. What are different transaction documents in Marketing MIS?
8. Write a short note on the Service Sector.
9. What are five principles of a distinctive service according to Tom Peter?
10. Explain Service VS Product.
11. What are different characteristics/ attributes of service?
12. Explain the service process cycle with a diagram.
13. What are MIS applications in the following sectors:

(a) Airline	(b) Banking
(c) Insurance	(d) Education
(e) Hotels	(f) Hospitals
14. Draw the SMS architectural Model.

Q.III. Define the terms.

1. Financial MIS
2. Marketing MIS
3. Service
4. Distinctive Service
5. Service Sector
6. Service Management System

