



**SURESH**  
**GYAN VIHAR**  
**UNIVERSITY**  
Accredited by NAAC with 'A+' Grade

**Master of Business Administration (MBA)**

**INFORMATION TECHNOLOGY FOR  
BUSINESS**

**Semester-II**

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**SURESH GYAN VIHAR UNIVERSITY**  
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## **Learning Outcomes**

### **The student will be able to understand:**

#### **Unit I**

- Understand the concept of accounting and its evolution over time, including the transition from manual bookkeeping to modern accounting systems, and recognize the importance of accounting in providing financial information for decision-making.
- Explore the evolution of Management Information Systems (MIS) and their role in facilitating data collection, processing, storage, and dissemination within organizations, emphasizing the integration of technology and business processes.

#### **Unit II**

- Understand the various approaches to structuring Management Information Systems (MIS), including hierarchical, functional, and network-based structures, and recognize the factors influencing the choice of MIS structure in different organizational contexts.
- Synthesize the components of MIS structure, including data collection, processing, storage, retrieval, and dissemination subsystems, and understand how these components are integrated to support organizational information needs and decision-making processes.

#### **Unit III**

- Understand the various approaches to structuring Management Information Systems (MIS) and evaluate their applicability in different organizational contexts.
- Synthesize the components of MIS structure, including data collection, processing, storage, retrieval, and dissemination subsystems, to design an effective MIS architecture.
- Evaluate the extent of integration within an information system and assess its impact on organizational efficiency and decision-making.

#### **Unit IV**

- Understand the concept of Customer Relationship Management (CRM) and its significance in building and maintaining long-term relationships with customers.
- Identify the role of CRM in enhancing customer satisfaction, loyalty, and retention by providing personalized and tailored experiences across various touchpoints.
- Evaluate the advantages of CRM, including improved customer understanding, increased sales and profitability, enhanced customer service, and better marketing effectiveness.

#### **Unit V**

- Understand the moral and ethical dimensions associated with the use of Information Technology (IT), including issues related to privacy, security, intellectual property rights, and digital divide.
- Identify and analyze social issues arising from computerization, such as job displacement, changes in work patterns, social isolation, and impact on interpersonal relationships.

# **INFORMATION TECHNOLOGY FOR BUSINESS**

## **SYLLABUS**

### **UNIT I**

#### **INTRODUCTION**

Introduction, Evolution of MIS, Characteristics of MIS, Subsystems of MIS, Executive Information Systems (EIS), Information Resource Management (IRM), Role of Management Information System, Enterprise Information System, Systems, Types of Systems, System concepts applied to MIS, Information Concepts Introduction, Business data processing, Features of Information, Types of Information, Data reduction, Quality of Information, Value of Information, Management Information

### **UNIT II**

#### **STRUCTURE OF MIS AND ROLE OF COMPUTERS IN MIS**

Introduction, Multiple approaches to structure of MIS, Synthesis of MIS structure, Extent of integration of information system, Information Network, Role of computers in MIS subsystems, Production Information System, Marketing Information System, Finance Information System, Personnel Information System, Transaction Processing System and Decision Support System Introduction, Types of DSS, Characteristics of DSS, Components of DSS, DSS tools for different levels of Management, DSS capabilities, Group Decision Support System, Transaction Processing Cycle, Features of TPS, Transaction Documents, Transaction Processing Modes, Functional TPS

### **UNIT III**

#### **EXPERT SYSTEMS**

Introduction, Components and Structure of Expert System, Characteristics and objectives of Expert system, Advantages of Expert System, Disadvantages of Expert System, Applications of Expert System Enterprise Resource Planning:- Introduction, Evolution of ERP, Activities of MRPII, Popular ERP packages, Functions of SAPR/3, Baan ERP module Information integration through ERP, Implementation of ERP, Configuration and customisation of ERP, Advantages of ERP, Disadvantages of ERP

### **UNIT IV**

#### **CUSTOMER RELATIONSHIP MANAGEMENT AND SUPPLY CHAIN MANAGEMENT**

Introduction, Role of CRM, Advantages of CRM, CRM Software, CRM Packages, Types of CRM, Supply Chain, Supply Chain Drivers, Supply Chain Processes-, Supply Chain Decisions, Supply Chain Management, SCM solutions, Electronic Commerce:-Introduction, E-Commerce and E-Business, Electronic Data Interchange (EDI), Business opportunities opened up by the internet, Threats from Internet-based electronic commerce, E Commerce Activities Mobile Commerce

### **UNIT V**

#### **SOCIAL AND LEGAL ASPECTS OF COMPUTERISATION**

Introduction, Moral dimension to use of Information Technology, Social Issues, Cyber Crimes, Impact of computers on individuals, organisations and society, Major Security Threats, Security Measures, Worms and Viruses

# INTRODUCTION

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## STRUCTURE

- 1.1 Learning Objective
- 1.2 Introduction
- 1.3 Evolution of MIS
- 1.4 Characteristics of MIS
- 1.5 Subsystems of MIS
- 1.6 Executive Information Systems (EIS)
- 1.7 Information Resource Management (IRM)
- 1.8 Role of Management Information System
- 1.9 Enterprise Information System
- 1.10 Types of Systems
- 1.11 System Concepts Applied to MIS
- 1.12 Information Concepts Introduction
- 1.13 Business Data Processing
- 1.14 Features of Information
- 1.15 Types of Information
- 1.16 Data Reduction
- 1.17 Quality of Information
- 1.18 Value of Information
- 1.19 Management Information System
- 1.20 Chapter Summary
- 1.21 Review Questions
- 1.22 Multiple Choice Questions



## 1.1 LEARNING OBJECTIVE

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After completing this chapter, you will get updated about the Theoretical foundations of Management Information System -

- Its definition and role
- Its types, features, and types of systems
- Features, types, quality and value of information

## 1.2 INTRODUCTION

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The era we live in is often described as the information age as we are surrounded by information in all spheres of our life. Televisions beam information to us round the clock. Newspapers provide not only facts but also interpretations of those facts, analysis by experts and comments by learned people on what is going on around us. The Internet has opened vast vistas of information on any subject. We require all this information to take decisions, to proceed further with action, to comply with laws or to take advantage of existing situations. For example, during COVID-19, people were informed of the lockdown timings and the instructions to be followed through advertisements, announcements on radio, television, mobiles and other channels. People need to be abreast with changes happening around them. They need to understand, interpret and assimilate the information so that they make an appropriate response.

The simplest of decisions involves access to a great deal of information. In the business world, the manager is called upon to make several decisions. Each decision has its own set of requirements. Therefore, the practising manager needs a way to manage the information itself so that they are able to make the most informed decision, without letting unimportant facts distort the decision. In other words, managers don't need only information. They need a system by which the information is delivered to them in a manner that is timely and usable.

Computers have become an integral part of systems for managing the vast information. Computers are capable of storing vast amounts of data, retrieving elements of data in nanoseconds, putting together these elements in usable form and transmitting the formatted data across the world. Used wisely, computers can make the task of the manager easier to handle, enabling quick and accurate decision-making. Thus, there is need of a unified human-computer system that gathers, processes and presents data such that the manager has the right amount of information at the right time and in the right format.

This brings us to the concept of MIS or Management Information System. A Management Information System is a system to manage information that is necessary for managerial decision-making. Various authors and management experts have used various approaches to define management information system and some of the definitions are:

“An integrated user machine system for providing information to support operation, management, and decision-making functions in an organisation, the system utilises computer hardware and software, manual producer, model for analysing, planning control, and decision making and a database” - G.B. Davis

“Information system refers to the practice of integrating computer system, hardware and software used to make an organisation that a g goal” (Kenneth Hamlett)

“MIS is a system in which define data are collected, proceed and communicated to assist those responsible for the use of resources” (Institute of Management accounts)

“Management information system is a planned system of collecting, processing, storing and disseminating data in the form of information needed to carry out the function of management” (Allen s. Lee)

Thus, a comprehensive definition of MIS is: “A Management Information System 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.”

According to T. Lucey, MIS is “A system to convert data from internal and external sources into information and to communicate that information in an appropriate form to managers at all levels in all junctions to enable them to make timely and effective decisions for planning, directing and controlling the activities to which they are responsible.” Refer Fig 1.1.

Kelly defined MIS as “Combination of human and computer-based resources that result in collection, storage, retrieval, communication and use of data for the purpose of efficient management of operations and for business planning.”



Fig 1.1 Management Information System

### 1.3 EVOLUTION OF MIS

Computers emerged in the 1940s followed by emergence of different types of storage devices like the magnetic tapes, floppy disks, etc. In 1950s, shift started to take place from the manual to computerized record-keeping and transaction processing that made working much faster for the executives and managers. These systems were popularly called as EDP (Electronic Data Processing) or TPS (Transaction Processing System). These systems were able to carry out processing of routine day to day transactions. Thus, the onset of MIS



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was as a data capturing and processing system which gradually evolved into a system that though was more complex but was more intelligent too. During the decade after that, information systems which had the ability to not just collect and process data but also generate reports from the data collected and processed were required. Such information systems were capable of producing reports that could help managers at different levels to understand the various aspects of their business better. Hence, they came to be known as MIS, in short for Management Information Systems. Refer Fig 1.2.

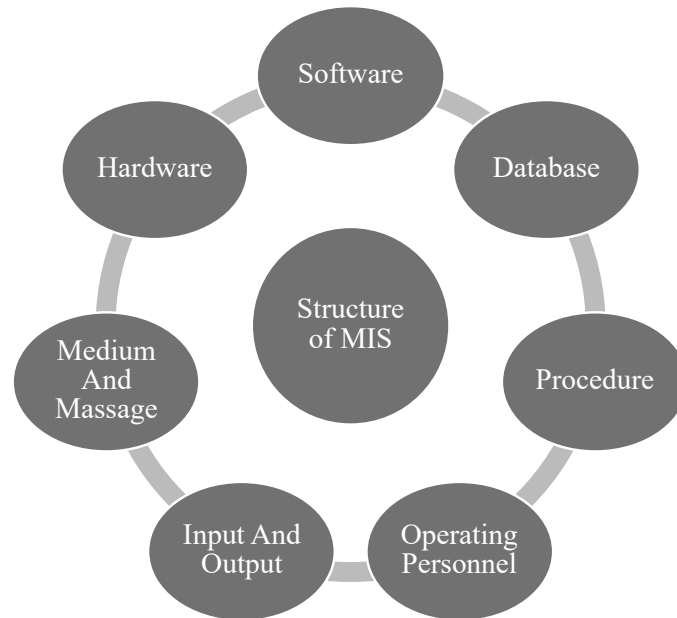


Fig 1.2 MIS

## 1.4 CHARACTERISTICS OF MIS

Following are the characteristics of a Management Information System:

- **Integrated system** - MIS is an integrated system as all activities and sub-systems of MIS are inter-related. Integration helps flow of data among the related systems and benefits in providing timely, relevant and complete information. Integration leads to a more effective MIS.
- **Information** - MIS provides relevant information to all the levels of management.
- **Presence of Sub-systems** - Many separate systems together constitute the MIS. Each system is characterized by its own inputs, outputs, goals, tasks and related activities. These subsystems may be for one or more than one levels.
- **Top-down approach** - MIS is designed following the top-down approach.
- **Feedback as critical component** - An effective MIS is one that provides relevant feedback. The feedback will help in making the system work more efficiently and effectively.
- **Enhanced productivity** - As MIS helps efficiently conducting routine tasks, provide high levels of service to external entities and enhances managerial decision-making, it can contribute towards increase in productivity in various ways.

- **Future-oriented** - MIS helps in development of long-term plans to meet the future requirements of the management. Hence, while designing the MIS, the analyst should align it with future requirements of the firm.



#### MIS has following advantages:

- Provides support in managing important information for assisting management in complex decisions.
- Stores information in an organized manner which makes searching and retrieval quick and timely
- Uses diverse mathematical tools for analysing the trends both current and future for helping the management prepare forecasts for strategic planning.
- Helps in determining future requirements of the firm and departments and assists in goal setting and formulation of strategies.
- Helps in resource identification and allocation for achievement of objectives.
- Provides information related to every aspect of activities occurring in the organisation. So helpful in problem-solving.
- Helps in assessing the performance of the company and therefore plays an important role in improving the productivity of the management, department and the organisation.
- MIS database stores all the relevant business information and as it is always accessible, comparison can be done between the current performance with the previous performance and accordingly suitable action can be taken.

#### MIS has following disadvantages:

- The information stored is highly sensitive and requires constant monitoring and filtering to avoid malicious manipulation.
- The quality of information generated depends upon the quality of input.
- Inability to update itself automatically as updating has to be done manually.
- Effectiveness of information generated through MIS reduces owing to frequent changes in the management levels as the requirements of reports also change.
- Ignores the non-qualitative factors like motivation, morale and attitude

### 1.5 SUBSYSTEMS OF MIS

Organisation being a complex system for which MIS are designed. Hence, Management Information Systems being spread across an organisation are complicated. To make understanding of such systems easier, they can be divided into three subsystems based on the level of management and their information requirements. The three subsystems are: Operational, Management or Tactical and Strategic.

- **Operational MIS** - Operational level of management is the lowest level of management. At this level, decisions are taken based on routine operations carried out. For example, how much quantity of a particular product needs to be purchased is a routine decision. Based on the operating procedures and data available, such decisions can be easily taken using Operational MIS.



- **Tactical MIS** - The next level of management is called as the tactical level of management. At this level, the managers primarily take decisions related to allocation of resources. MIS can provide the necessary information to enable effective decision-making at this level.
- **Strategic MIS** - The topmost level where the board of directors, top level executives are involved in taking strategic decisions for the division or organisation is the Strategic level of management and the MIS used at this level is the strategic MIS. For ex, decisions like what organisational level strategy should be applied in the next year for increased market is a strategic decision.

Refer Fig 1.3 for the subsystems of MIS.

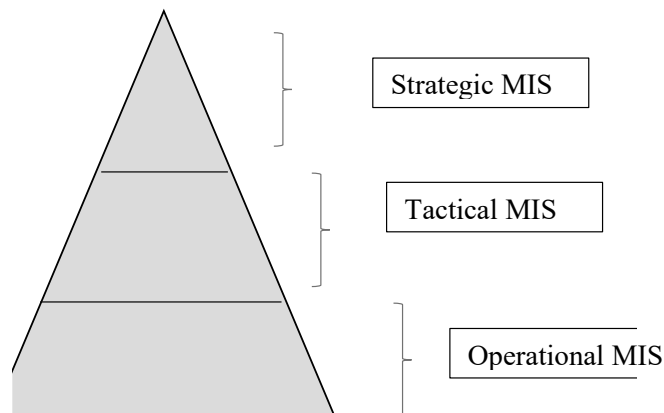


Fig 1.3 Subsystems of MIS

## 1.6 EXECUTIVE INFORMATION SYSTEMS (EIS)

Executive information system is a computer-based system that is designed to meet the information requirements of the higher level of management. The system is used to access, communicate and present information in summarized form and also support managers in problem solving. It directly supports management in the process of decision-making while providing with a simple but powerful tool to view and analyse patterns and trends. It uses data from the TPS (transaction processing system) and generates strategic management reports on the performance of the division or organisation. It can establish links on data from both internal and external sources to provide relevant information. It possesses the following characteristics:

- It integrates crucial information from different areas of an organisation for the senior management to get an overall overview.
- They provide support for strategic decisions which are long-term.
- They influence the usage and presentation of information.
- It extracts information from different systems of an organisation.
- It provides information in a summarized meaningful format.
- It has features of both MIS and DSS.

- It provides with drill-down capabilities i.e. it helps the management to get into details from a specific information with the help of hypertext style of text, sub-menus, etc.
- It is designed in a manner that it helps work on the critical success factors for achieving the organisational objectives.
- It allows the user to access the status information, the trend analysis as well as highlight deviations in case of exception reporting.
- It has built-in function which can be applied for problem-solving. Using these functions, the user can conduct the analysis and perform formatting on the results.
- EIS allows user to access huge data with accuracy by allowing both backward and forward access, skipping screens when required.
- The information can be presented in different formats like tabular, textual or graphical.

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Refer Fig 1.4 for categorisation of the above characteristics.

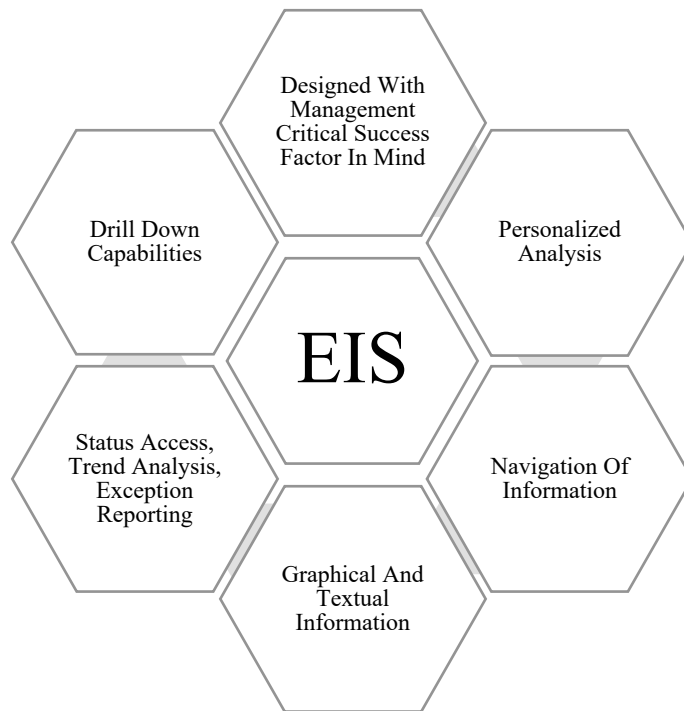


Fig 1.4 Executive Information System and its characteristics

**An EIS has following advantages:**

- Relevant Information can be easily accessed.
- Improves leadership skills.
- Supports decision-making.
- Provides flexibility / strategic control.
- Results in healthy competition in market.

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- Acts as an instrument of change.
- Results in improved reporting.
- Improves communication.
- Improves timeliness, efficiency and accuracy.
- Reduces time needed for searching and integrating information.
- Improves organisational performance.
- Scrutinized Critical success factor in detail.
- Enhances productivity by improving group coordination.
- Helps understand operations of the enterprise in a better manner.

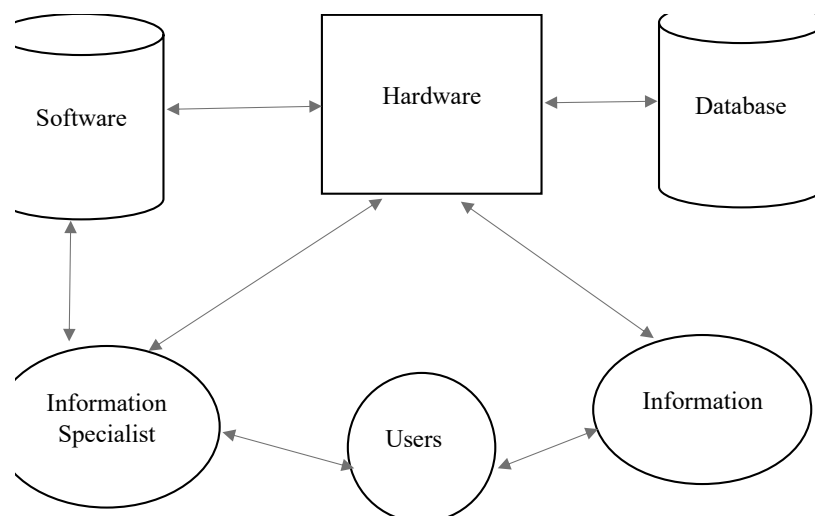
The disadvantages of EIS are as given below:

- Users may have to deal with information overload.
- Systems may become slow and difficult to manage.
- May have issues related to reliability and security of data.
- The cost of implementation is huge.

### 1.7 INFORMATION RESOURCE MANAGEMENT (IRM)

With the highly complex and dynamic environment of the times, Information is considered as an important resource in any organisation. Information Resource Management is a process that helps to manage information efficiently and effectively to help an organisation achieve its objectives. For managing the activities and different elements of an organisation, data and information are considered as valuable resources. Information is considered as an asset that when managed effectively can lead a business to its success. Managers at various levels need to pursue information resource management to identification, acquisition and management of information resources in order to meet their information requirements. Refer Fig 1.5.

Fig 1.5 Components of IRM



**Various components of IRM are:** Hardware, Software, Database, Information, Users and Information Specialists. Information resources are an important asset today and hence IRM is a necessity today.

**Given below are the benefits of an IRM:**

- Avoids duplication of information.
- Identifies gaps in information.
- Clarifies roles and responsibilities of various stakeholders of information.
- Results in cost-saving in acquisition and processing of information.
- Cost-benefit identification of different resources.
- Supports management decision-making with quality information.

## 1.8 ROLE OF MANAGEMENT INFORMATION SYSTEM

MIS plays a vital role in any organisation, large or small. Management involves decision-making and decisions demand information. Thus, every organisation needs a system whereby such information can be gathered, processed and presented to the manager to help him make a decision. The role of MIS can be understood better if the information requirements is studied at different levels in the organisation:

- **In Operational Management:** Operational management is concerned with the day-to-day operation of the business. It needs information on the various processes that are performed on a day to day basis and must be informed of changes that occur in these operations. MIS provides such information on a daily or even hourly basis to the Operational level of management to enable it to control the operations.
- **In Middle Management:** Middle management is concerned with short-term goals, problem solving, progress monitoring and short-term target setting. MIS provides the information necessary for these functions to be fulfilled by middle management.
- **In Top Management:** Top management is concerned with broader issues such as opportunities and threats from the environment, organisational strengths and weaknesses, company goals and objectives, long term growth, etc. For this it needs information on current happenings in various environments - internal and external, information to make effective decisions. MIS provides such information to the top management.

Thus, MIS plays an important role at different levels in providing the information necessary to make decisions. In order to do so it gathers, processes and presents information in a timely and usable manner. It directly affects the performance of managers at various levels. A properly designed MIS can make managers more effective, thus improving the overall performance of the business. MIS therefore plays a vital and imperative role in the organisation.

## 1.9 ENTERPRISE INFORMATION SYSTEM

An enterprise information system helps organisations integrate and coordinate business processes using a technological platform. An enterprise information system could be a

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a customer relationship management system, a supply chain management system or an enterprise resource planning system. The system may also include applications developed for handling volume of data at an enterprise level such as: email marketing systems; business intelligence; payment processing, etc. Email marketing systems help the firms to promote their products and makes use of web analytics for analysis of data regarding the marketing campaigns. Business intelligence comprises of practices and tools that help optimize performance. Payment processing systems help process payments effectively by offering diverse options and flexibility to the clients as well as track financial data.

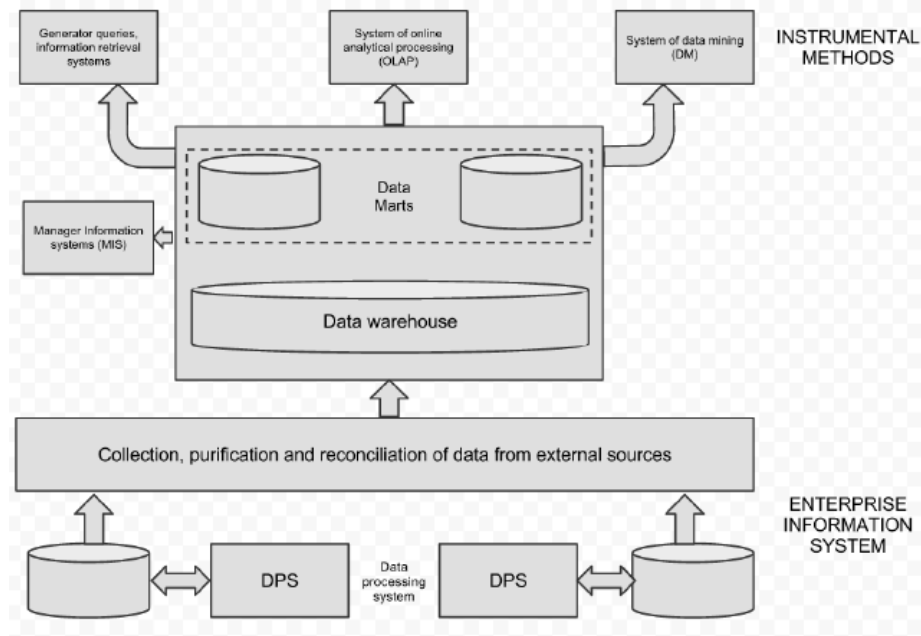


Fig 1.6 EIS

### 1.10 TYPES OF SYSTEMS

Businesses use different types of information systems based on the desired functionality. The different types of information systems that can be implemented by an organisation to help achieve its objectives are:

- **Office Automation System (OAS)** - Office automation systems are collection of tools, technologies and personnel required to operate these systems. Also known as Office Support Systems. Example of Office Automation System is Word which can be used to print various copies of letters and send to different individuals thus avoiding mundane repetition. Thus, OAS can be used by the businesses to improve communication between people, departments as well as streamline different activities.
- **Transaction Processing System (TPS)** - A transaction is any process existing in an organisation like a purchase transaction, sales transaction, etc. The processing of these transactions involves storing the related data and information or outcomes of transaction processing. TPS can help achieve accuracy and reliability in data and information. It reduces the chances of occurrence of human error. TPS is used at

the fundamental level for recording transactions. For example, TPS can be used in accounting for recording all cash transactions, in HR for recording all employee related transactions, in Production for recording all product related transactions, etc.

- **Management Information System (MIS)** - The information required by managers at different levels and in different functional areas is different. Unless a system is designed to gather, capture, collect, store, process and retrieve the information required, managers may not have the right or sufficient information at the right time to enable them to make decisions. Thus, MIS is crucial for the running of an organisation.
- **Decision Support System (DSS)** - These systems support non-routine decision-making. These systems focus on problems that are unique and rapidly changing where the procedure may not be fully predefined. DSS uses information from both internal and external sources. They also use a variety of models for analysis of data and support user-interface.
- **Executive Support Systems (ESS)** - These systems help support top management in the process of decision-making. These systems address decisions requiring insight and judgement with no pre-decided procedure for solving such problems. ESS makes use of graphs and data from multiple sources using an easy-to-use interface. ESS are designed to incorporate data regarding external events. Refer Fig 1.7.

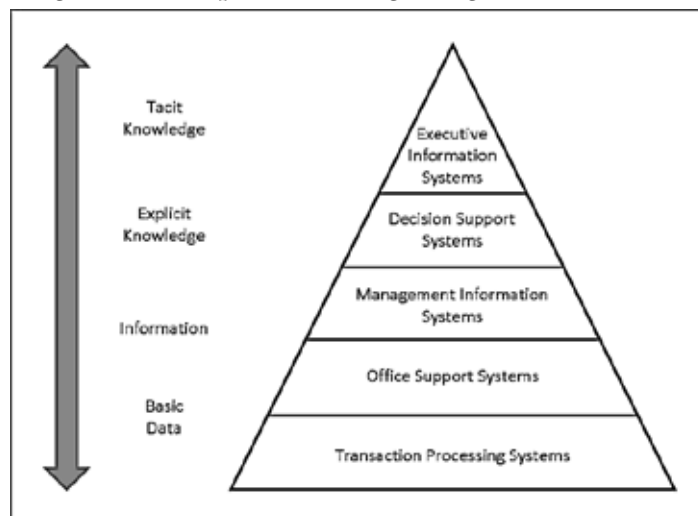


Fig 1.7 Types of Systems

## 1.11 SYSTEM CONCEPTS APPLIED TO MIS

An information system is defined as a set of inter-related components that collect, process, store and distribute information to support decision-making and control in an organisation. Data is raw facts. Information means data that have been transformed into a meaningful and useful form. There are three primary activities in an information system: Input which captures or collects raw data from either internal or external sources; Processing which converts raw input into meaningful form; and Output transfers the processed information



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to the desired destination; and finally, the Feedback which is output to help the managers evaluate or correct input stage. Control is necessary to ensure that the system works towards giving the desired output. Anything beyond the boundaries of the system is its environment. The environment can include suppliers, customers, government bodies, vendors, distributors, etc. Computer-based information systems use computer technology to process raw data into meaningful information. Thus, information systems encompass an understanding of the management and organisational dimensions of systems as well as technical dimensions of systems.

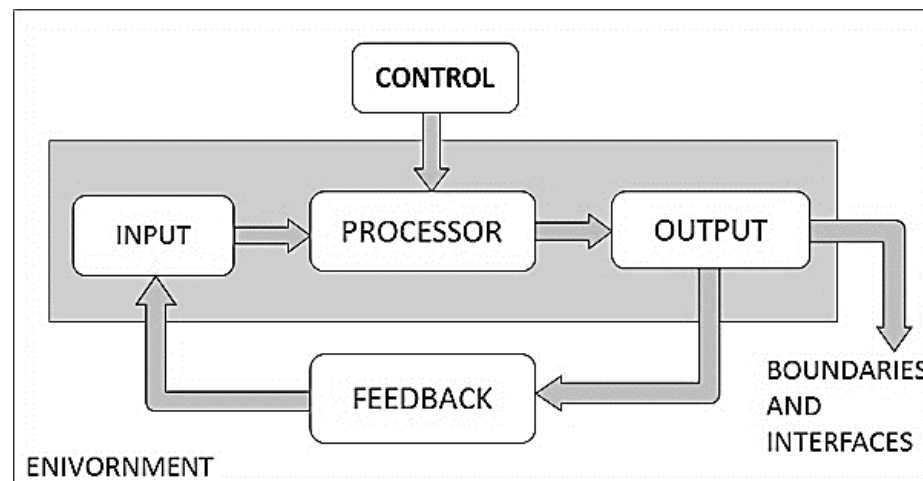


Fig 1.8 Systems concept

## 1.12 INFORMATION CONCEPTS INTRODUCTION

Information technology is one of the tools used by managers. Computer hardware is the physical equipment used for input, processing and output activities in an information system. Computer software consists of the detailed, pre-programmed instructions that control and coordinate the computer hardware components in an information system. Networking and communications technology links various pieces of hardware and transfers data from one physical location to another. A network links two or more computers to share data or resources. Internet, world's largest and most widely used network; Intranet, internal corporate networks based on internet; and Extranets, private intranets extended to authorized users outside the organisation can be used by firms to coordinate their activities with other firms. World wide web, a service provided by the Internet that uses universally accepted standards for storing, retrieving, formatting and displaying information on the Internet.

## 1.13 BUSINESS DATA PROCESSING

Data processing is the act of handling or manipulating data. Data processing is the process through which facts and figures are collected, assigned meaning, communicated to others and retained for future use. Data processing is defined as a series of actions or operations that converts data into useful information. In a typical computer system, data is the input and information is the output. The conversion of data into useful information is called processing. Data refers to individual elements which by themselves are incapable of

providing a basis for decision-making. Information is the basis, on which decisions can be made. Information is produced by combining data and formatting the result into usable form.

Data processing is essentially of three types:

- **Batch Processing** - As the term suggests, batch processing refers to the collection of data at different times within a time period and processing that data in a batch at specified intervals or at the end of the time period. In other words, the data is not processed immediately upon its collection or capture. It is stored within the system and at various points, other data too is captured and stored. At a specific point in time, all the data is processed in a batch.
- **Online Processing** - In online processing, the data is processed immediately upon the occurrence of the transaction. Online processing offers several advantages over batch processing some of which are:
  - a. Output is produced within a very short time of the transaction taking place. Thus, there is immediacy to the output.
  - b. Management decisions that require a constant information have to rely on online processing.
  - c. Results can be obtained at any time and will always be updated.

However, online processing may not always be possible. The following situations make it very difficult or even impossible to use online processing:

- a. The volume of transactions is very large and time would be wasted in trying to process data as soon as the transaction occurs.
  - b. There is a shortage of resources and available resources are being shared among many users.
  - c. Most companies use a combination of online and batch processing depending on their requirements.
- **Online Real time Processing** - In some cases, not only is information required to be processed immediately but results too have to be produced at the end of the transaction. Like in case of ATMs, which have to show the updated balance as soon as the deposit or withdrawal transaction takes place. Online real time processing systems are a refinement of online processing systems.

Data processing consists of different steps which are as given below:

- **Collection** - Data in the form of events, transaction or observations is recorded in usable form. Data is then converted into a machine usable form for processing. Data collection is also termed as data capture.
- **Conversion** - Data is converted from its source documents to a form that is more suitable for processing. It may be codified or classified.
- **Manipulation** - Once data is collected and converted, it is then manipulated through sorting, calculating, summarizing and comparing.





- **Storage** - Once data has been captured and manipulated, it is then stored for future use or reference.
- **Communication** - Communication involves the transfer of data and information produced by the data processing system to the prospective users of such information or to another data processing system.

### 1.14 FEATURES OF INFORMATION

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Information possesses many features, some of the prominent ones are as given below:

- **Accuracy** - Information presented for decision-making should be accurate. Inaccurate information will result in incorrect decisions which can lead to problems in the functioning of an organisation.
- **Complete** - Depending on the recipient of the information, it should be adequately complete else the receiver will not be able to make effective decisions.
- **Relevant** - Information provided should be relevant for the process of decision-making else it will be of no value.
- **Concise** - In times today, when there is information overload, it is imperative that the information is presented in a concise manner. Especially for the managers at higher levels, information should be summarized and concise.
- **Timeliness** - Information should reach the manager at the desired time. If the manager is not presented the information at the right time, he/she will be unable to take appropriate decision.
- **Reliable** - Information should be from a reliable and trustable source.

### 1.15 TYPES OF INFORMATION

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Information can be classified according to the use to which it is put and the level of organisation that uses it. Information may be used to formulate broad outlines of policy or to set down norms and methods of adhering to those norms or to make simple decisions about processes. Based on this understanding information can be put to different uses at different levels in the organisation, information can be classified as:

- **Strategic Information** - this type of information is required by the top or strategic level of management. It deals with national and international events, policies or strategies, industry trends, environmental threats and opportunities, etc. Strategic information helps in long-term decisions. Some examples of strategic information are: information about stability of organisation and the existing threats to its growth; information on breakthrough in technology and its application in the organisation.
- **Tactical Information** - Tactical information is required by the middle management. Such information is required in the short to medium term period and it generally relates to information required for making decisions that will have a short-term impact. Examples are information required for monthly sales forecasts, cash flow

projections, etc. This information is typically produced within the company and relates to the performance of divisions or departments.

- **Operational Information** - Operational information relates to the information that is required by a limited number of specific users to enable them to perform their day-to-day functions. Examples of operational information are daily call reports of salespersons, outstanding payment follow-up lists, etc.

## 1.16 DATA REDUCTION

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As there is huge mass of data being stored in organisational databases, it therefore becomes imperative to reduce the data so that unnecessary occupied space can be released or for optimization of storage space. It also helps in making the system more efficient. Data reduction has following benefits:

- Saves energy
- Decreases data center footprint
- Reduces physical storage cost

The techniques of Data reduction can be broadly categorized into two main types:

- **Data compression** - In this technique reduction takes place in the bits as the information is encoded using fewer bits of data. Sometimes the information can be lost leading to reduction in resolution of the data or the information may be preserved but there could be some redundancy.
- **Data deduplication** - In this technique, duplicate copies of data are eliminated either in the entire storage system or within a particular volume. In order to identify the redundant data, it makes use of pattern recognition and then it replaces the redundant data with references to a single saved copy. Thus, it is able to avoid data duplication.

## 1.17 QUALITY OF INFORMATION

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We have already discussed that information is vital in decision-making process. Senior management has to make crucial decisions about the future of the company. Middle-level managers have to make important decisions about the medium and short-term goals and operational managers have to make decisions that will affect the day-to-day operations of the business. Hence, information that they receive should be of high quality. And information is said to be of high quality when it is of relevance, the key element of quality of information. Each decision has a set of requirements about the information on which the decision will be based. The information has to meet these requirements in order to be termed relevant and thus quality information.

**Characteristics of good quality information can be defined by the acronym ACCURATE.**

These characteristics are interrelated; focus on one automatically leads to focus on other. Following are the characteristics:

- **Accurate**- Information should be accurate and free from bias. It should not have any arithmetical and grammatical errors.





- **Complete-** Accuracy of information is just not enough. It should also be complete which means facts and figures should not be missing or concealed. Depending upon the recipient and the information requirement, it should be accordingly complete.
- **Cost-beneficial-** Information should be analysed for its benefits against the cost of obtaining it. In business context, it is not worthwhile to spend money on information that is unable to recover its costs resulting in losses each time that information is obtained.
- **User-targeted-** Information should be communicated in the style, format, detail and complexity which address the needs of users of the information. Example senior managers need brief reports which enable them to understand the position and performance of the business at a glance, while operational managers need detailed information which enable them to make day to day decisions.
- **Relevant-** Information should be communicated to the right person. It means an individual who has some control over decisions expected to come out from obtaining the information.
- **Authoritative** - Information should come from reliable source. It depends on qualifications and experience and past performance of the person communicating the information.
- **Timely-** Information should be communicated in time so that receiver of the information has enough time to decide appropriate actions based on the information received. What is timely information depending on situation to situation. Selection of appropriate channel of communication is key skill to achieve timeliness of information.
- **Easy to Use-** Information should be understandable to the users. Style, sentence structure and jargons should be used keeping the receiver in mind. If report is targeted to new-comer in the field, then it should explain technical jargons used in the report.

Thus, if all or some of the above points are considered while transmitting information to the recipient, information can be said to be of quality.

### 1.18 VALUE OF INFORMATION

Based on above explanation, it can be said that information has no value if it is not useful to the intended recipient for decision-making. In other words, the information is said to possess value only the receiver of the information is in a position to take decisions based on the information provided. The value of information depends upon the person who uses it, when he uses it and for what he uses it. Hence, assessment of the value of information is related to the value of decision-making enabled by the information. However, determining the value of information is a complex issue.

**The criteria which helps define the value of information are:**

- **Accuracy/precision/correctness** — Information should be precise and close to reality. Also, information should be free of distortion, bias, or errors.

- **Consistency** — The information should be free of contradictions or convention breaks.
- **Applicability** — Information should be able to be applied directly.
- **Clarity/format** — Information should be well, understandable and clearly presented to the user.
- **Comprehensiveness/completeness** — The scope of information should be adequate. There should be not too much nor too little information.
- **Conciseness** — The information should be to the point and should void of unnecessary elements.
- **Convenience** — The information should correspond to the user's needs and habits.
- **Currency** — The information should up-to-date and not obsolete.
- **Traceability** — The background of the information should be traceable, such as the used data, author(s).
- **Accessibility** — The information should be continuously accessible without not too many obstructions.
- **Flexibility** — The information should be able to adapt to (the changing demands of) the user?
- **Integration** — The system should allow data to be integrated from various sources.
- **Reliability** — The system operation should be reliable.
- **Timeliness/Speed** — The information should be processed and delivered rapidly without delays. The information should also match the user's working pace.

### 1.19 MANAGEMENT INFORMATION SYSTEM

MIS is primarily concerned with the provision of timely and accurate information. MIS thus deals with information. MIS provides the ways and means to collect data, store it when necessary, process it into information and present this information in a meaningful manner to enable decision-making. Modern technology gives users access to tons of data, little of which may actually be information as defined by the parameter of relevance. The MIS manager has to be able to provide filters that will only let relevant information pass through, while keeping out unwanted and unnecessary information. Thus, MIS will help provide the information which is of value while enabling managers take effective decisions.

In fulfilling its purpose, MIS has certain well-defined objectives that it must meet. **Some common objectives of MIS are:**

- To provide accurate information.
- To provide timely information.
- To provide the right information.
- To provide this information in the right format.
- To provide the information to the right people.



- To filter out unwanted and unnecessary information.

MIS has a tremendous impact on the organisation and affects almost all aspects of the organisation. With a proper MIS, functional areas such as marketing, finance, production and personnel can be better managed, thus improving their effectiveness. Tracking and monitoring becomes easier across all functions. Information is provided in a timely and effective manner so that decisions can be taken based on complete, concise and comprehensive information. Forecasting and long-term planning becomes easier and more accurate. Decision models help to predict the future consequences of present actions and present environmental changes.

MIS also helps in creating and updating a unified terminology within the organisation. MIS involves the creation of a data dictionary, which codifies the terminology used in the business. Thus, there can be no misunderstanding of terms used by various levels of management. This brings about clarity of understanding and cohesive functioning.

MIS demands a systematisation of the business. It involves the application of Systems theory in the management of information and thus streamlines the business processes. The creation, implementation and control of MIS often leads to a better understanding of individual processes, as well as their effect on the overall effectiveness of the business. Processes may be streamlined as a result of flaws pointed out when the system is being studied prior to the creation of MIS. Thus, the business becomes more professional and more effective.

MIS, with its emphasis on information, helps create an information-based work culture and helps reduce the drudgery involved in manual processing of data, by effectively introducing computers. Thus, human beings are freed to put mental efforts rather than physical efforts, ultimately benefitting the organisation through the creation of a thinking workforce.

Management Information Systems (MIS) is the study of people, technology, organizations, and the relationships among them. MIS professionals help firms realize maximum benefit from investment in personnel, equipment, and business processes. MIS is a people-oriented field with an emphasis on service through technology. Businesses use information systems at all levels of operation to collect, process, and store data. Management aggregates and disseminates this data in the form of information needed to carry out the daily operations of business. Everyone who works in business, from someone who pays the bills to the person who makes employment decisions, uses information systems. Businesses concentrate on the alignment of MIS with business goals to achieve competitive advantage over other businesses. MIS professionals create information systems for data management (i.e., storing, searching, and analyzing data). In addition, they manage various information systems to meet the needs of managers, staff and customers. By working collaboratively with various members of their work group, as well as with their customers and clients, MIS professionals are able to play a key role in areas such as information security, integration, and exchange.

## **1.20 CHAPTER SUMMARY**

MIS is primarily concerned with the provision of timely and accurate information. MIS thus deals with information. MIS provides the ways and means to collect data, store it

when necessary, process it into information and present this information in a meaningful manner to enable decision-making. MIS has a tremendous impact on the organisation. We have seen that it has a vital role to play in the organisation. Since it plays such a vital role, its impact is far-ranging and it affects almost all aspects of management.

With a proper MIS, functional areas such as marketing, finance, production, personnel can be better managed thus improving their effectiveness. Tracking, monitoring, forecasting becomes easier across all functions. Information is provided in a timely and effective manner so that decisions can be taken based on complete, concise and comprehensive information. MIS helps in creating and updating a unified terminology within the organisation. MIS demands as systematisation of the business. It involves the application of systems theory in the management of information and thus streamlines the business processes. The creation, implementation and control of MIS often leads to a better understanding of individual processes as well as their effect on the overall effectiveness of the business. Thus, the business becomes more professional and more effective. MIS helps create an information-based work culture and ultimately benefitting the organisation through the creation of a thinking workforce.

## 1.21 REVIEW QUESTIONS

### SHORT ANSWER TYPE QUESTIONS

1. Define MIS.
2. State any three characteristics of MIS.
3. What is Office Automation System?
4. What do you mean by Value of Information?
5. What is Data reduction?

### LONG ANSWER TYPE QUESTIONS

1. Explain the subsystems of MIS.
2. Differentiate between MIS and Executive Information System.
3. Explain the role of MIS.
4. State the features of information. Also, explain types of information and the importance of information quality.
5. Explain the types of systems.

## 1.22 MULTIPLE CHOICE QUESTIONS

1. An integrated, user-machine system for providing information to support operations, management and decision-making functions in an organization is called \_\_\_\_
  - a. Information
  - b. Management Information System
  - c. System
  - d. Performance System





2. **EDP is an acronym for \_\_\_\_\_.**
  - a. Electronic Data Processing
  - b. Electrical Data Processing
  - c. Engineering Data Process
  - d. Enlisted Data Processing
3. **MIS helps in development of long-term plans to meet the future requirements of the management.**
  - a. Enhanced productivity
  - b. Feedback
  - c. Future-oriented
  - d. Top-down
4. **EIS is an acronym for \_\_\_\_\_.**
  - a. Executive Information System
  - b. Enterprise Information System
  - c. Entire Information System
  - d. Enterprise Integrated System
5. **A process where information is considered as an asset that when managed effectively can lead a business to its success.**
  - a. Enterprise Information System
  - b. Executive Information System
  - c. Information Resource Management
  - d. Enterprise Integrated System
6. **\_\_\_\_\_ is concerned with broader issues such as opportunities and threats from the environment, organisational strengths and weaknesses, company goals and objectives, long term growth,**
  - a. Operational Management
  - b. Top Management
  - c. Middle Management
  - d. Workforce
7. **Collection of tools, technologies and personnel required to operate.**
  - a. TPS
  - b. DSS
  - c. MIS
  - d. OAS
8. **\_\_\_\_\_ used at the fundamental level for recording transactions.**
  - a. TPS
  - b. DSS
  - c. MIS
  - d. OAS
9. **Three primary activities in an information system are \_\_\_\_, \_\_\_\_ and \_\_\_\_.**
  - a. Collection, Process, Output
  - b. Collection, Calculation, Result

- c. Input, Process, Outcome
  - d. Input, Process, Output
10. \_\_\_\_\_ deals with national and international events, policies or strategies, industry trends, environmental threats and opportunities
- a. Operational information
  - b. Tactical information
  - c. Strategic information
  - d. Quality information

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NOTES 

# STRUCTURE OF MIS AND ROLE OF COMPUTERS IN MIS

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## STRUCTURE

- 2.1 Learning Objective
- 2.2 Introduction
- 2.3 Multiple Approaches to Structure of MIS
- 2.4 Synthesis of MIS Structure
- 2.5 Extent of Integration of Information System
- 2.6 Information Network
- 2.7 Role of Computers in MIS Subsystems
- 2.8 Production Information System
- 2.9 Marketing Information System
- 2.10 Finance Information System
- 2.11 Personnel Information System
- 2.12 Transaction Processing System and Decision Support System Introduction
- 2.13 Types of DSS
- 2.14 Characteristics of DSS
- 2.15 Components of DSS
- 2.16 DSS Tools for Different Levels of Management
- 2.17 DSS Capabilities
- 2.18 Group Decision Support System
- 2.19 Transaction Processing Cycle
- 2.20 Features of TPS
- 2.21 Transaction Documents and Transaction Processing Modes
- 2.22 Functional TPS
- 2.23 Chapter Summary
- 2.24 Review Questions
- 2.25 Multiple Choice Questions

## 2.1 LEARNING OBJECTIVE

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After completing this chapter, you will get updated about the structure and role of computers in MIS -

- Types of functional information systems.
- Types, characteristics, components and capabilities of DSS.
- Features of TPS.

## 2.2 INTRODUCTION

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Information technology has changed the way we work, commute and entertain ourselves. Computers help people perform daily tasks, create reports, communicate with one another and even provide entertainment. On the business front, computers have changed the way businesses operate. Older, slower manual processes have given way to faster, more efficient computerised processes, thus improving overall effectiveness and increasing productivity. The concept of MIS has evolved over a period of time comprising many different facets of the organisational functions. MIS is a necessity of all the organisations. The initial concept of MIS was to process data from the organisation and present it in the form of reports at regular intervals. The system was largely capable of handling the data from collection to processing. This was further modified so that the system could present information in a form and format that could provide support to the user in taking a decision, an action or an investigation.

## 2.3 MULTIPLE APPROACHES TO STRUCTURE OF MIS

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The concept of MIS gives high impetus to the individual and his ability to use the information. While analysing the data, MIS relies on many academic disciplines. These include the theories, principles and concepts from the Management Science, Accounting, Operations Research, Organisational Behaviour, Engineering, Computer Science, Psychology and Human Behaviour making the MIS more effective and useful. These academic disciplines are used in designing the MIS, evolving the decision support tools for modelling and decision-making. The foundation of MIS is the principles of management and its practices.

The concept is therefore, a blend of principles, theories and practices of the Management, Information and System giving rise to single product known as Management Information System (MIS). The conceptual view of the MIS is shown as a pyramid in Fig 2.1.

The physical view of the MIS can be seen as an assembly of several subsystems based on the databases in the organisation. These subsystems range from data collection, transaction processing and validating, processing, analysing and storing the information in databases. The subsystems could be a functional level or a corporate level. The physical view of the MIS is shown in Fig 2.2.

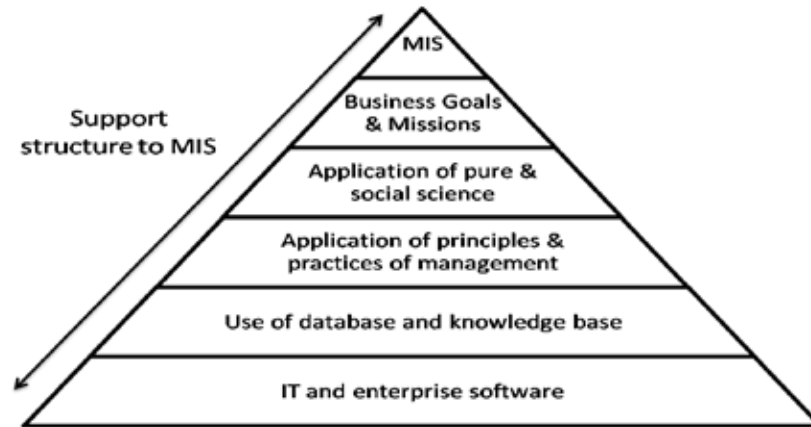


Fig 2.1 Conceptual View of MIS

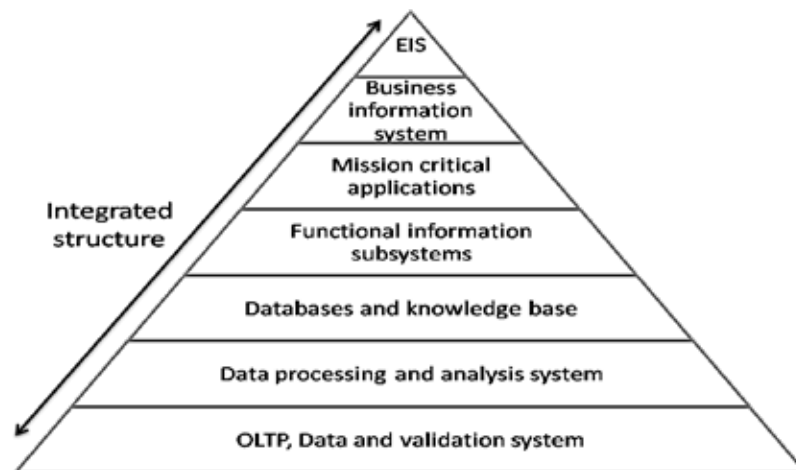


Fig 2.2 Physical view of MIS

## 2.4 SYNTHESIS OF MIS STRUCTURE

All the systems shown in Fig 2.2 together are MISs. The MIS is a product of a multi-disciplinary approach to the business management. It is a product which needs to be kept under a constant review and modification to meet the corporate needs of the information. The MIS differs in two organisations involved in the same business. The MIS is for the people in the organisation. Therefore, MIS is a dynamic concept subject to change with change in the business management process. It continuously interacts with the internal and external environment of the business and provides a corrective mechanism in the system so that the changes in the needs of the information are met with effectively.

The MIS model of the organisation changes over the time as the business passes through several phases of the developmental growth cycle. It supports the management of the business in each phase by giving the information which is crucial in the phase.

## 2.5 EXTENT OF INTEGRATION OF INFORMATION SYSTEM

Information flow is often considered as important as cash flow in an organisation. Information can make or break an organisation and has a significant role to play. It can

affect business, education, literature, government, health and wealth. Modern technology gives users access to tons of data, little of which may actually be information as defined by the parameters of relevance. The MIS manager has to be able to provide filters that will only let relevant information pass through, while keeping out unwanted and unnecessary information.

So information control and security need to be given due consideration. Information is crucial to decision-making, but too much information, erroneous information and information sabotage may defeat the whole process of data gathering, processing and the provision of information for decision-making. Therefore, companies have to keep abreast of the modern technology to ensure the safety and integrity of their information.

## 2.6 INFORMATION NETWORK

Billions and trillions of data enter into the information system of an organisation, but the challenge lies not just in collection of the data or storage of the data but in finding out the most efficient way to extract and manage data and information. With huge amount of information available, organisations need to determine the most effective way to extract, manage and share the relevant information. Hence a network making information available and shared by various users is an information network. A good example of an information network is the World Wide Web (www).

A computer network consists of computers connected to transmit, exchange or share data and resources. A computer network is built using hardware like cables, switches, routers, etc and using software like operating systems or business applications. A computer network is defined by its geographic location. **Following are the types of networks:**

- **LAN or Local Area Network** - A LAN connects computers over a relatively short distance, allowing them to share data, files, and resources. For example, a LAN may connect all the computers in an office building, school, or hospital. Typically, LANs are privately owned and managed.
- **MAN or Metropolitan Area Network** - MANs are typically larger than LANs but smaller than WANs. Cities and government entities typically own and manage MANs.
- **WAN or Wide Area Network** - WAN connects computers over a wide area, such as from region to region or even continent to continent. The internet is the largest WAN, connecting billions of computers worldwide. You will typically see collective or distributed ownership models for WAN management.
- **PAN or Personal Area Network** - A PAN serves one person. For example, if you have an iPhone and a Mac, it's very likely you've set up a PAN that shares and syncs content—text messages, emails, photos, and more—across both devices.
- **SAN or Storage Area Network** - A SAN is a specialized network that provides access to block-level storage—shared network or cloud storage that, to the user, looks and works like a storage drive that's physically attached to a computer.
- **VPN or Virtual Private Network** - A VPN is a secure, point-to-point connection between two network end points (see 'Nodes' below). A VPN establishes an



encrypted channel that keeps a user's identity and access credentials, as well as any data transferred, inaccessible to hackers.

A computer network is also defined by the protocols used for communication. The protocols could relate to the physical arrangement of its components, its control on traffic and the purpose it is used. The internet, email, audio and video sharing, Ecommerce, social networks and live-streaming are all existing because of computer networks.

The internet is very wide area network that connects billions of digital devices worldwide. Standard protocols allow communication between these devices. Those protocols include hypertext transfer protocol (the 'http' in front of all website addresses). Internet protocol (or IP addresses) are the unique identifying numbers required of every device that accesses the internet.

Network topology refers to how the nodes and links in a network are arranged. A network node is a device that can send, receive, store, or forward data. A network link connects nodes and may be either cabled or wireless links. **There are a number of topologies but the most common are bus, ring, star, and mesh (Refer Fig 2.3):**

- **A bus network topology** is when every network node is directly connected to a main cable. Bus topology is the kind of network topology where every node, i.e. every device on the network, is connected to a solo main cable line. Data is transmitted in a single route, from one point to the other. We cannot transmit data in both ways. When this topology has precisely two endpoints, it is known as Linear Bus Topology. It is mostly used for small networks. Benefits of bus topology are: cost-effectiveness; least length of cable required; easy to understand; easy expansion. Its drawbacks are: network collapses if the main computer collapses; performance of network reduces with numerous nodes and heavy traffic; transmission takes time.
- **In a ring topology**, nodes are connected in a loop, so each device has exactly two neighbours. Adjacent pairs are connected directly; non-adjacent pairs are connected indirectly through multiple nodes. So, every computer is connected to another computer on each side. The last computer is connected to the first, thus forming a ring shape. In this topology, the main computer is known as the monitor station, which is responsible for all the operations. Data transmission amongst devices is done with the help of tokens. For transmitting data, the computer station has to hold the token. The token is released only when the transmission is complete, following which other computer stations can use the token to transmit data. Data transmission is done in a sequential method, i.e. bit by bit. Repeaters are used in a Ring topology to prevent loss of data during transmission. The data transmission is unidirectional in a Ring topology, but it can be created to be bidirectional by connecting each node with another set of connecting lines. This is known as Dual Ring Topology. Benefits of a ring topology are that: network is not affected by numerous nodes or heavy traffic, as only the nodes possessing tokens can transfer data; and installation & expansion is cheap. Drawbacks of ring topology are: trouble shooting is time consuming; maintenance in terms of adding or deleting nodes is difficult; and the entire network comes to a standstill if even one computer crashes.

- **In a star network topology**, all nodes are connected to a single, central hub and each node is indirectly connected through that hub. Thus, Star Topology is the kind of network topology in which all the nodes are connected via cables to a single node called a hub, which is the central node. The hub can be active or passive in nature. Active hubs contain repeaters, while passive hubs are considered non-intelligent nodes. Each node contains a reserved connection to the central node, which the central node acts as a repeater during data transmission. Benefits of a star topology are: performance is fast owing to low network traffic; upgradation is easy; setup and modification is easy; troubleshooting is also easy; and in case of the failure of a node, the entire network continues to function. Drawbacks of the star topology are: installation and using the network is costly; and all the nodes are dependent on the hub.
- **A mesh topology** is defined by overlapping connections between nodes. You can create a full mesh topology, where every node in the network is connected to every other node. It is the kind of topology in which all the nodes are connected with all the other nodes via a network channel. Mesh topology is a point-to-point connection. It has  $n(n-1)/2$  network channels to connect  $n$  nodes. It has two techniques for transmission of data, i.e. routing and flooding. In the routing technique, the nodes possess a routing logic, like the logic for the shortest distance to the destination node or the logic to avoid routes with broken connections. In the flooding technique, all the network nodes receive the same data. Benefits of mesh topology are: data load is distributed; topology is robust; fault-diagnosis is easy; and provides privacy and security. Drawbacks of the topology are: installation and configuration are challenging; and cabling is costly.
- **Tree topology:** Tree topology is the topology in which the nodes are connected hierarchically, with all the nodes connected to the topmost node or root node. Hence, it is also known as hierarchical topology. Tree topology has at least three levels of hierarchy. Tree topology is applied in Wide Area Network. It is an extension of Bus topology and Star topology. It is best if the workstations are situated in groups, for easy working and managing. Benefits of tree topology are: easy to expand; easy to maintain and manage; error-detection is easy. Drawbacks of tree topology are: lot of cables required; expensive; and the network collapses if the root node collapses.
- **Hybrid topology:** It is a network topology comprising of two or more different types of topologies. It is a reliable and scalable topology, but simultaneously, it is a costly one. It receives the merits and demerits of the topologies used to build it. Benefits of hybrid topology are: troubleshooting and error-detection is easy; flexible; and scalable. Drawbacks of hybrid topology are: difficult to design; and is costly since it is a combination of more than one topology.

Thus, the network topology can be selected based on the requirements and considering the benefits and drawbacks of the selected topology.



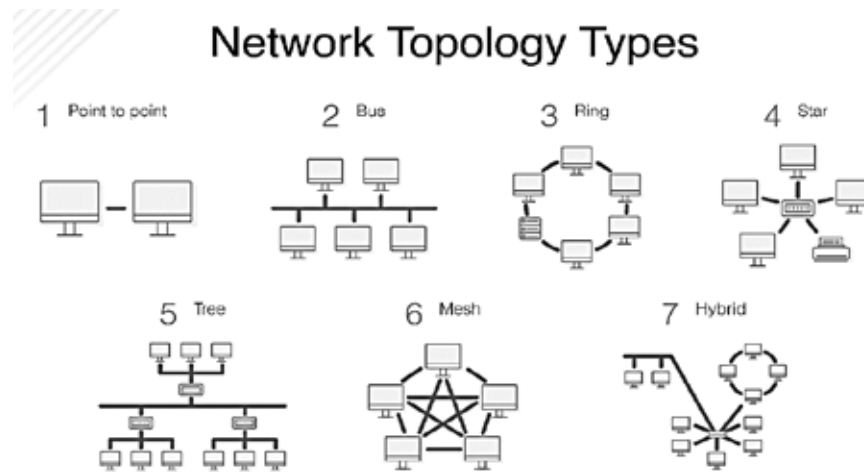


Fig 2.3 Network topology

## 2.7 ROLE OF COMPUTERS IN MIS SUBSYSTEMS

Computers have become an integral part of an organisation's information system. Computers are used for different roles, some of which are: Data collection; validation; processing; storage; reporting; security; sharing and automation. Computers are used to collect, store and provide data. Data collection can be done manually or can be automated like by using barcode reader, etc. It is important that only correct data enters the system and hence computers can be used to verify the accuracy of the data before it is store in the system for permanent use. Data can be processed further to produce a more meaningful and useful information. Computers are used extensively to store huge amounts of data which can be retrieved according to the requirement. Computers can also disseminate data to the appropriate individual. Information can be presented in various forms like graphs, charts, diagrams, narratives, etc in summarised or detailed according to the individual's need. There is more security when the data is stored in a computer. With the use of computer networks, it is also possible to share data across different users. Also, many processes in an organisation can be automated to achieve higher productivity.

## 2.8 PRODUCTION INFORMATION SYSTEM

The production management function of the organisation is concerned with the production of goods. It interacts with functions such as production planning and control, maintenance, quality control, etc. It receives inputs from inventory control. It receives feedback from quality control and marketing.

The functional goals of production management are fuller utilisation of manufacturing capacity and resources, reduction in rejection rates, maximising uptime of the plant and machinery and adherence to production schedules. The MIS will seek to aid management in achieving these goals. **The data is input into MIS through the following documents:**

- Production programme
- Production schedule

- Process planning sheet
- Job card
- Quality rating form
- Finished goods advice
- Material requisition form
- The MIS system will be expected to give information on the following:
- Quantity produced for a given period of time
- Material requirement and usage
- Rejection rates at various control points
- Breakdown reports on machinery
- Manpower utilisation
- Consumption of power, fuel, consumables, etc
- Utilisation of various items of machinery
- Hours worked / overtime shift run

At various points, management may query the MIS about information such as:

- Status of a particular job and adherence to production schedule
- Load status on different machines
- Material status, stock situation, material flow
- Results of new processes etc.

The above information helps management make different decisions related to production, such as make-or-buy decisions, sub-contracting, integration, etc. Various reports are generated by the production MIS for the purpose of evolving norms and standards and informing management of the adherence to these norms and schedules.

## 2.9 MARKETING INFORMATION SYSTEM

Marketing management is concerned with satisfying the needs of the customer. The MIS will have to aid in identifying the needs of customers, evolving product concepts, designing the product, positioning the product, pricing, promotion, etc. Market research, consumer surveys, advertising, sales promotion campaigns, dealer networks, etc form the major tasks in marketing management.

**Following documents form an important part of the input process:**

- Purchase orders from customers
- Order acceptance advice
- Delivery advice from the godown
- Delivery notes to customers
- Invoice / credit note / debit note, etc.



## NOTES



In addition, marketing management may also need data generated through market surveys, customer satisfaction polls, etc. and also through trade journals, marketing publications, industry association journals and magazines, etc. The MIS will have to refer to such data inputs as well, since they form an important part of the decision-making and in forecasting trends, customer demand, new product ideas, etc.

The MIS will be expected to give regular reports on the smooth functioning of the marketing function, including dealer development reports, customer base, market share, complaints, etc.

**In addition, the management may query the system:**

- Pending orders
- Customer complaints and suggestions
- Purchase trends
- Buying patterns
- Sales performance on different bases such as area-wise, product-wise, salesman-wise
- Finished stock levels, etc.

The reports will have to help management make decisions on day-to-day functioning as well as strategic and tactical decisions such as pricing policy, packaging, product positioning, etc. It can also support higher levels of management in risk analysis, forecasting, etc.

## **2.10 FINANCE INFORMATION SYSTEM**

Financial management has a primary objective of meeting the financial needs of the organisation by providing working capital and meeting the statutory compliances. The inputs to the system may be from the payments, receipts and data from stock exchanges of the share prices, consolidated financial results of companies, etc. The financial accounting system accounts for the financial transactions of the company and produces financial results for the company. It produces balance sheet for the company where the performance of the company is published in standard format prescribed by the government. The system becomes a repository of financial data which can be used by other systems of the enterprise. The viewers of the reports generated by the system are finance managers, cost controllers, auditors, company secretaries, and top management.

## **2.11 PERSONNEL INFORMATION SYSTEM**

Personnel management function has the primary objective of the providing suitable manpower with required ability, skills and knowledge. Its goal is to control personnel cost through continuous increase in manpower productivity through techniques like: training and development, job enrichment, promotion and rewards through performance appraisal, and structuring the organisation. The recipients of the reports generated by the system are personnel managers, head of the human resource development department and the top management. The reports generated could be attendance records, income tax reports, employee strength, training needs analysis, etc.

## 2.12 TRANSACTION PROCESSING SYSTEM AND DECISION SUPPORT SYSTEM INTRODUCTION

NOTES



Once the data has been processed, the next step is to process transaction itself. The transaction is processed and validated for correctness and consistency. Operational managers need systems that keep track of the routine activities and transactions of the organisation, such as sales, receipts, payroll, etc. Such type of information is provided by Transaction Processing Systems. A transaction processing system is a computerised system that performs and records the daily routine transactions necessary to conduct business such as employee record keeping, sales order entry, etc. The principal purpose of a TPS is to process transactions, track the flow of information and answer queries related to them.

A Decision Support System supports more non-routine decision-making. They focus on problems that are unique and rapidly changing for which the procedure for arriving at a solution may not be fully predefined in advance. They are often used to answer questions like: what would be the impact on sales if we were to double the price of the product, etc. although DSS uses internal information from TPS and MIS, however they often also require information from external sources such as current stock prices or product prices of competitors. These systems use a variety of models to analyse the data and are designed in such a way that the managers can interact with these systems directly.

## 2.13 TYPES OF DSS

There are different types of DSS as given below. Table 2.1 elaborates on the types of DSS.

- **Data driven** - These systems are used to query a database or data warehouse to provide specific information.
- **Document-driven** - These systems are more common and is generally used by a group of users. It generally serves the purpose of search web pages and finding documents based on certain keywords or terms. They generally make use of a client/server system.
- **Knowledge-driven** - Such systems include all users within an organisation and may also include consumers.
- **Model-driven** - These are complex systems that help analyse decisions or select between different choices. Such systems can be used for scheduling, decision analysis types of decisions.
- **Communication-driven DSS** - Such systems are targeted at internal teams and are generally used for conducting a meeting or collaborating.

Table 2.1 Types of DSS

Types	What it does	How it works
Data driven	Makes decisions based on data from internal databases or external databases.	Uses data mining techniques to identify patterns and trends for predicting future events. Often used to make decisions about inventory, sales and other business procedures.

*STRUCTURE OF  
MIS AND ROLE OF  
COMPUTERS IN MIS*



Document driven	Type of information management systems that uses documents to retrieve data.	Enables users to search webpages or databases or find specific search terms.
Knowledge driven	Data resides in a continuously updated knowledge base that is maintained by a knowledge management system.	Provides data to users that is consistent with company's business processes and knowledge base.
Model driven	Customized according to a predefined set of user requirements.	Used to analyse different scenarios to meet user requirements.
Communication driven	Uses a variety of communication tools to allow more than one person to work on the same task	Increases collaboration between users and the system; improves overall efficiency and effectiveness of a system.

## 2.14 CHARACTERISTICS OF DSS

Decision support systems possess the following characteristics:

- Such systems can provide support in taking semi-structured and structured decisions.
- Can support managers at different levels of an organisation, from top management to middle management to operational management.
- Can be used by managers individually or in teams with members from different departments.
- Can provide support for all the stages of the process of decision-making including intelligence, design, choice and implementation.
- Can support different decision styles and processes.
- Are adaptable and flexible and therefore dynamic.

## 2.15 COMPONENTS OF DSS

A DSS is made up of following components (refer fig 2.1):

- **Database or data warehouse** - This component stores all the data procured from internal sources (like TPS, etc.) as well as external sources (like competitors, customers, government, etc.)
- **Model management system** - This component stores the models that can be used by the managers to assist them in decision-making. These models may be numerical, graphical, forecasting, etc. models.
- **User Interface** - This component helps the user interact easily with the system.

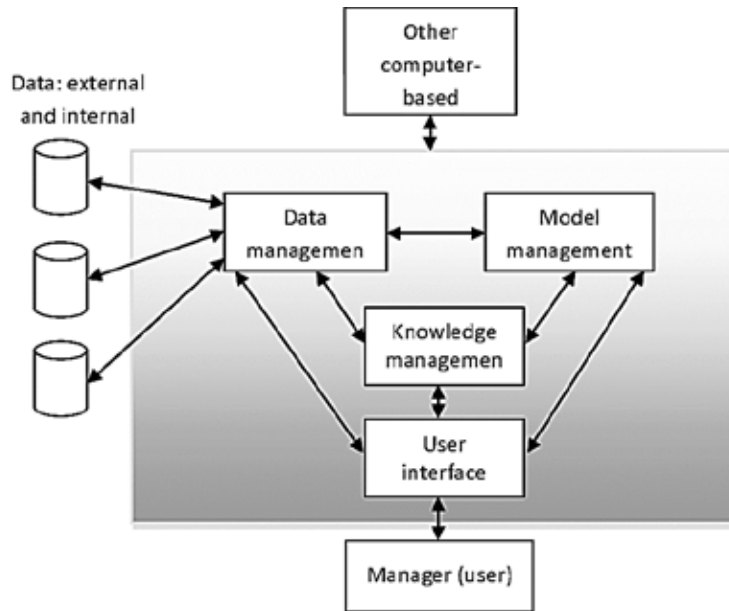


Fig 2.1 Components of DSS

## 2.16 DSS TOOLS FOR DIFFERENT LEVELS OF MANAGEMENT

Various tools are supported by a decision support system. These tools are: Query, OLAP, Spreadsheet, and Statistical analysis. Depending upon the complexity of the problem, a combination of techniques can be used by the manager using the DSS. Query can be used to get specific answers as per the requirement of the manager. OLAP is an acronym for On Line Analytical Processing used for analysis of data. Spreadsheets like MS-Excel can be used for calculation purposes. Statistical analysis can be used for applying statistical techniques for solving of complex problems.

## 2.17 DSS CAPABILITIES

DSS provides specific capabilities that support one or more tasks related to decision-making including: intelligence and data analysis; identification and design of alternatives; choice among alternatives and decision implementation.

**Following are the capabilities of a DSS:**

- DSS provides support for decision makers mainly in the semi-structured and unstructured situation by bringing together human judgments and computerized information.
- Support is provided for various managerial levels, ranging from top executives to line managers.
- Support is provided to individuals as well as to groups less-structured problems often require the involvement of several individuals from different departments and organizational levels or even from different organizations.
- DSS provides support to several interdependent or sequential decisions. The decision may be made once, several times, or repeatedly.



- DSS support a variety of decision-making processes and styles.
- DSS is adaptive over time. The decision maker should be reactive, able to comfort changing condition quickly and be able to adapt the DSS to meet these changes.
- DSS is flexible and so the user can add delete, combine, change, or rearrange basic elements.
- User-friendliness, strong graphical capabilities, and English like interactive human-machine interface can greatly increase the effectiveness of DSS. DSS attempt to improve the effectiveness of decision-making (accuracy, timeliness, quality) rather than its efficiency (the cost of making decisions).
- The decision maker has complete control over all steps of the decision-making process in solving a problem. A DSS specially aims to support and not to replace the decision maker.
- End users should be able to construct and modify simple systems by themselves. Larger systems can be built with assistance from information system specialists.
- A DSS usually utilizes models for analyzing decision-making situations. The modeling capability enables experimenting with different strategies under different configurations.

### **1.18 GROUP DECISION SUPPORT SYSTEM**

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Many decision-making situations require involvement of a number of individuals, each contributing towards the decision process. Such decision support systems are known as GDSS or Group Decision Support Systems. Information Technology supports such decision-making involving groups. GDSS also has the same components as in DSS, namely, Database, Models, DSS tools and modes of communication. GDSS support software is available on server for members to use. The users may be involved in activities like: sending and receiving information in all formats; display of notes, graphics, pictures; sharing ideas, choices, preferences; and participating in decision-making process. Thus, in GDSS, group members interact, discuss, communicate and conclude using different tools and techniques. Group members may be from different fields and may possess different knowledge and abilities.

### **2.19 TRANSACTION PROCESSING CYCLE**

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A TPS systems collects and processes the data related to a business transaction. Then the files and databases are updated and information produced which may be used for internal and/or external purposes.

The processing of transactions in a TPS passes through five stages which are as given below:

- **Data entry** - The data entry stage is a part of the input activity. In this stage, the data is captured by an activity such as recording, coding or editing. The data is then converted to a suitable form for entry into a computer system.
- **Transaction processing** - Transactions can be processed in a batch or in real-time. In batch processing, the data for transactions are collected for a pre-defined period

and then at the end of the period the transactions collected are processed. Whereas in real time processing, the data is processed immediately after it is generated and hence such systems are capable of providing immediate output to the end user

- **File and database processing** - It is important to maintain the files and databases of an organisation. The TPS ensures that the data is correct and up-to-date and therefore it makes the necessary changes to the files and databases.
- **Document and report generation** - This is the last stage in the cycle where the information is generated in the form of documents and reports.
- **Inquiry processing** - This stage takes place when the end user has an inquiry and therefore puts forth a query to the system. The system responds to the query by accordingly providing an answer.

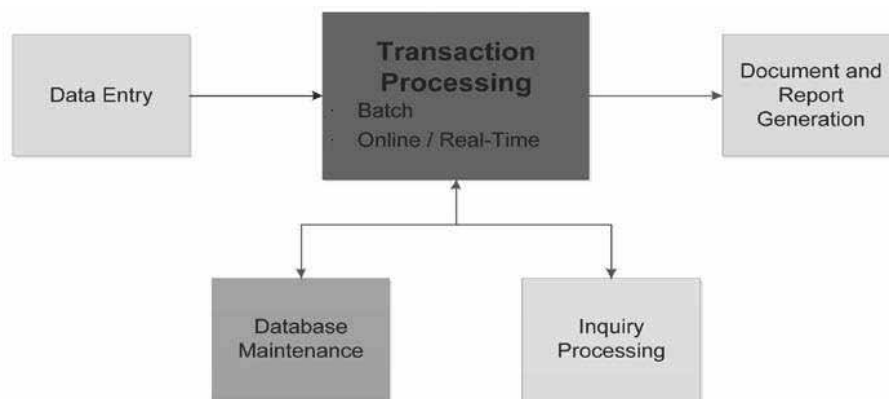


Fig 2.2 Transaction Processing Cycle

## 2.20 FEATURES OF TPS

A TPS should have the following features:

- **Access control** - TPS allows only authorized users to access the system thus preventing any unauthorized user from making changes to the system or accessing the system. This helps maintain the security of the system.
- **Equivalence** - The users of TPS are provided with similar format for data entry leading to improved user efficiency and system effectiveness.
- **High volume rapid processing** - TPS is able to process a huge volume of transactions in less time and efficient manner.
- **Reliability** - The system is reliable as it functions with the same consistency any time of the day as well as it is more secure and reduces the chances of occurrence of errors.

## 2.21 TRANSACTION DOCUMENTS AND TRANSACTION PROCESSING MODES

Documents related to transactions conducted between business and its client or customer are referred to as transaction documents. Examples of such documents could be payment



## NOTES



invoice, service statement, etc. Such documents, may be printed, mailed or electronically presented.

Transactions may be processed in the batch processing mode or real-time mode. In the real time mode, the transaction is processed at the time of entry itself. However, it is more expensive than batch-processing mode. In such a mode, the database is always up-to-date.

In the batch processing mode, the transactions are accumulated over a period of time and then the entire batch is processed at one go. Batch processing is generally carried out at periodic intervals like daily, weekly, fortnightly, monthly etc depending upon the nature of the transactions. It is less expensive than real-time processing and is easier to maintain and control. However, the database is not up-to-date.

## 2.22 FUNCTIONAL TPS

There are five functional categories of TPS based on the departmentation in the organisation. These five categories are: Manufacturing/production, Sales/marketing, Finance/accounting, Human resource and there may be other types depending upon the organisation. Manufacturing/production TPS may process tasks like scheduling, purchasing, shipping/receiving and operations. Sales/marketing TPS has sub-components like dealer communication, price changes, promotion tracking, sales management and customer service. Finance/accounting TPS carries out all activities related to billing, general ledger and cost accounting. HR TPS maintains personnel records, compensation, benefits, training details and labour relations. Other TPS could be like Customer management, etc.

## 2.23 CHAPTER SUMMARY

While analysing the data, MIS relies on many academic disciplines. These include the theories, principles and concepts from the Management Science, Accounting, Operations Research, Organisational Behaviour, Engineering, Computer Science, Psychology and Human Behaviour making the MIS more effective and useful. MIS is crucial for an organisation but it is important that the information system is designed in such a manner that it is aligned to the requirements, goals, and objectives of the organisation and the function concerned. Depending upon whether the system needs to be designed for top level management, middle management or operational management or it is for a function or an individual manager, the system needs to be accordingly structured so that it can help the user in taking effective decision.

MIS uses a network which can be of different topologies based in the cost and requirements. Information systems could be designed based on the functional aspect of an organisation be it production information system, finance information system, marketing information system or so. Decision support system is quite similar to an MIS except that it is designed keeping a particular user requirement in consideration while an MIS is designed for an entire organisation, department, unit, etc. DSS provides specific capabilities that support one or more tasks related to decision-making including: intelligence and data analysis; identification and design of alternatives; choice among alternatives and decision implementation. When DSS is used by group of people working together on a task then it

is referred to as GDSS. A Transaction Processing System is the foundation over which any other system like MIS, DSS, etc. are built upon.

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## 2.24 REVIEW QUESTIONS

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### SHORT ANSWER TYPE QUESTIONS

1. What is information network?
2. State any three characteristics of DSS.
3. What are the different tools used in DSS?
4. What is a GDSS?
5. State any three features of TPS.

### LONG ANSWER TYPE QUESTIONS

1. Explain the components of DSS.
2. Differentiate between Personnel IS and Production IS.
3. Explain types of DSS.
4. Explain the conceptual and physical view of MIS.
5. Explain the Transaction processing cycle.

## 2.25 MULTIPLE CHOICE QUESTIONS

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1. EIS is an acronym for \_\_\_\_
  - a. Employee Information System
  - b. Executive Information System
  - c. Executive Important State
  - d. Employee Income Status
2. \_\_\_\_\_ is concerned with satisfying the needs of the customer
  - a. Personnel management
  - b. Production management
  - c. Marketing management
  - d. Finance management
3. A \_\_\_\_ is a computerised system that performs and records the daily routine transactions necessary to conduct business.
  - a. TPS
  - b. MIS
  - c. DSS
  - d. EIS
4. A \_\_\_\_ supports more non-routine decision-making.
  - a. Executive Information System
  - b. Enterprise Information System
  - c. Decision Support System
  - d. Management Information System



5. The \_\_\_\_\_ component stores all the data procured from internal and external sources.
  - a. Model management system
  - b. User interface
  - c. Database or data warehouse
  - d. TPS
6. In \_\_\_\_, the data for transactions are collected for a pre-defined period and then at the end of the period the transactions collected are processed a. Operational Management
  - a. OLTP
  - b. OLAP
  - c. Real-time processing
  - d. Batch processing
7. The users of TPS are provided with similar format for data entry
  - a. Equivalence
  - b. Reliability
  - c. Rapid processing
  - d. Access control
8. OLAP is an acronym for \_\_\_\_.
  - a. OnLine Automatic Process
  - b. OnLine Automatic Processing
  - c. OnLine Analytical Processing
  - d. Office Linked Automatic Processing
9. This is the last stage in the cycle where the information is generated.
  - a. File and database processing
  - b. Inquiry processing
  - c. Transaction processing
  - d. Document and report generation
10. In \_\_\_\_ mode, database is always up-to-date.
  - a. Real time mode
  - b. Batch processing mode
  - c. Online mode
  - d. Regular mode

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# EXPERT SYSTEMS

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## STRUCTURE

- 3.1 Learning Objective
- 3.2 Introduction
- 3.3 Components and Structure of Expert System
- 3.4 Characteristics and Objectives of Expert System
- 3.5 Advantages of Expert System
- 3.6 Disadvantages of Expert System
- 3.7 Applications of Expert System
- 3.8 Enterprise Resource Planning Introduction
- 3.9 Evolution of ERP
- 3.10 Activities of MRPII
- 3.11 Popular ERP Packages
- 3.12 Functions of SAP R/3
- 3.13 Baan ERP Module Information Integration Through ERP
- 3.14 Implementation of ERP
- 3.15 Configuration and Customisation of ERP
- 3.16 Advantages of ERP
- 3.17 Disadvantages of ERP
- 3.18 Chapter Summary
- 3.19 Review Questions
- 3.20 Multiple Choice Questions



### 3.1 LEARNING OBJECTIVE

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After completing this chapter, you will get an understanding of the expert systems and the ERP -

- Characteristics, advantages and disadvantages of Expert systems
- Applications of Expert systems
- ERP and its implementation
- Advantages and disadvantages of ERP

### 3.2 INTRODUCTION

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An expert system is an advanced computer application implemented with the aim of providing solutions to complex problems, or to clarify uncertainties where normally human expertise will be needed. They are commonly used in complex problem domain and help in problem-solving that requires specific human expertise. The expert system is also able to justify its provided solutions based on the knowledge and data from past users. Normally expert systems are used in making business marketing strategic decisions, analyzing the performance of real time systems, configuring computers and perform many other functions which normally would require the existence of human expertise.

Firms also have specialized systems for knowledge workers to help them create new knowledge and to ensure that this knowledge is properly integrated into business. Knowledge workers include researchers, designers, architects, scientists and engineers who primarily create new knowledge and information for the organisation.

Expert systems are an intelligent technique for capturing tacit knowledge in a very specific and limited domain of human expertise. These systems capture the knowledge of skilled employees in the form of a set of rules in a software system that can be used by others in the organisation. The set of rules in the expert system adds to the storage resource of the organisation. By capturing human expertise in limited areas, expert systems can provide benefits, helping organisations make high-quality decisions with fewer people.

The difference between an expert system and a normal problem-solving system is that the latter is a system where both programs and data structures are encoded, while for expert system only the data structures are coded and no problem-specific information is encoded in the program structure. Instead, the knowledge of a human expertise is captured and codified in a process known as knowledge acquisition. Hence, whenever a particular problem requires the assistance of a certain human expertise to provide a solution, the human expertise which has been codified will be used and processed in order to provide a rational and logical solution. This knowledge-based expert system enables the system to be frequently added with new knowledge and adapt accordingly to meet new requirements from the ever-changing and unpredictable environment.

Some examples of expert systems are MYCIN, DENDRAL, R1/XCON, etc. There are certain roles of individuals who interact with the expert system to fully exploit its functionality and capability. They are:

- **Domain expert** – the individual or individuals whose expertise can help solve the problems.
- **Knowledge engineer** – the individual who encodes the expert's knowledge in a form that can be used by the expert system.
- **User** – the individual who will be consulting with the system to get advice provided by the expert.
- **System engineer** – the individual who builds the user interface, designs the declarative format of the knowledge base, and implements the inference engine.

### 3.3 COMPONENTS AND STRUCTURE OF EXPERT SYSTEM

Experts systems are also known as Knowledge-based systems. They were among the first truly successful forms of AI (artificial intelligence) software. An expert system has many core system components to function and interfaces with individuals of various roles. It consists of five components: a knowledge base, inference engine, knowledge acquisition system, explanation subsystem and user interface (Refer Fig 3.1).

- **Knowledge base** - It contains facts and heuristics. Heuristics are the rules on the basis of which information is processed and decision given. It is where data contributed by specialists from the required domains is put away. The Components of Knowledge Base are:
  - a. **Factual Knowledge:** As the name suggests, factual knowledge is based upon facts. Information in the form of facts are proven and widely accepted by one and all.
  - b. **Heuristic Knowledge:** While Factual Knowledge is about facts, heuristic knowledge is unorganized in nature and relies on one's own evaluation.
- **Inference engine** - This component is responsible for carrying out the process of reasoning based on expert knowledge, data, facts and heuristics. Inference Engine is the mind behind the User interface. It contains a predefined set of rules to tackle a particular issue and alludes to the information from the Knowledge Base. It chooses realities and rules to apply when attempting to answer the client's inquiry. Inference Engine gives thinking about the data in the information base. It likewise helps in deducting the issue to discover the arrangement. The two basic strategies used in inference engines are:
  - a. **Forward Chaining-** This strategy used to determine the probable outcome in the future. With the given inputs and conditions, this strategy utilizes expert systems to find out the probable outcome. This helps to extract data till a particular goal is reached.
  - b. **Backward Chaining-** This strategy used to determine why would a particular event take happen with the current circumstances provided. It is utilized in automated theorem provers, inference engines, proof assistants, and other AI applications.

- **Knowledge acquisition system** - This component is responsible for capturing and transforming information that has been acquired from a knowledge source (human expert) into the format required by the software. This component is actually responsible for building up of knowledge base.
- **Explanation system** - This system is responsible for explaining the reasoning carried out to arrive at a decision or solution.
- **User interface** - this system establishes interface with the user. It takes input from the user and give the desired decision as output to the user. It takes the client's inquiry in a coherent structure and forwards it to the inference engine. From that point onward, it shows the outcomes to the client, as such, it's an interface that enables the client to speak with the master framework. The user interface is the space that encourages correspondence between the framework and its clients.

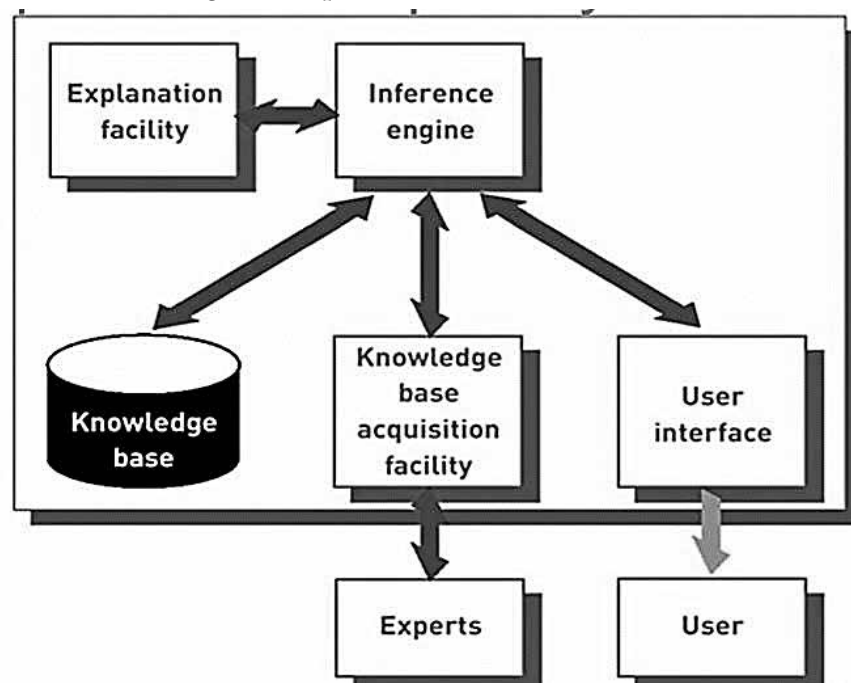


Fig 3.1 Components of Expert System

### 3.4 CHARACTERISTICS AND OBJECTIVES OF EXPERT SYSTEM

ES possesses the following characteristics:

- It can deliver high performance.
- It is capable of handling challenging decision problems and delivering solutions.
- Easy to use by the people.
- It is reliable as it gives consistent results.
- It is highly responsive.
- It can be made available anywhere and at any time.



The features of an Expert System are as given below:

- **Backward chaining** – an inference technique which continuously breaks a goal into smaller sub-goals which are easier to prove via IF THEN rules.
- **Dealing with uncertainties** – the system has the capability to handle and reason with conditions that are uncertain and data which are not precisely known.
- **Forward chaining** – an inference technique which deduce a problem solution from initial data via IF THEN rules.
- **Data representation** – the method where the specific problem data is stored and accessed in the system.
- **User interface** – that portion of the code which creates an easy to use system.
- **Explanations** – the ability of the system to explain the reasoning process that it used to reach a recommendation.

An expert system is used in the business organisations to gain tactical advantages as well as conduct forecasting regarding the market condition, customer trends, etc. In the dynamic and complex era today, every decision is critical and expert system can help organizations take effective decisions and hence is very reliable. The main objective of an expert system is to take a decision for the management.

### 3.5 ADVANTAGES OF EXPERT SYSTEM

Expert system when implemented in a business organisation can provide many advantages, some of which are given below:

- It provides consistent solutions for processes and tasks that are repetitive in nature.
- It has the ability to provide reasonable explanations for the decisional alternative selected and the logical reasoning of arriving at the decision taken.
- It is not bound by human limitations and so can work 24\*7 with the same consistency. An expert's knowledge is an invaluable asset to the company and expert system can store this knowledge for future use and reference.
- It is highly adaptable and can capture new knowledge and update itself to solve new problems and tackle the dynamism in the business environment.

### 3.6 DISADVANTAGES OF EXPERT SYSTEM

Although the expert system has many significant advantages, it still has certain limitations which are mentioned below:

- It does not possess common sense as a human expert does which may be required in decision-making. It takes decisions only based on inference rules stored in the system.
- It is not creative and so cannot make any innovative and creative decisions like a human expert especially in certain unusual situations.
- It has high development and maintenance cost.





- The task of knowledge coding is highly complex requiring intervention of human experts.

### **3.7 APPLICATIONS OF EXPERT SYSTEM**

Expert systems find applications in very diverse areas. Some of them are as given below:

- Information management
- Hospitals and medical facilities
- Help desks management
- Employee performance evaluation
- Loan analysis
- Virus detection
- Useful for repair and maintenance projects
- Warehouse optimization
- Planning and scheduling
- The configuration of manufactured objects
- Financial decision-making Knowledge publishing
- Process monitoring and control
- Supervise the operation of the plant and controller
- Stock market trading
- Airline scheduling & cargo schedules

### **3.8 ENTERPRISE RESOURCE PLANNING INTRODUCTION**

The ERP systems deal with the planning and use of resources used in the business. The resources are finance, materials, manufacturing capacity and human resource. The ERP provides methodology of assessing the resource needs for a given business plan to achieve certain business objectives. It also helps to create strategies, plans, decisions, and actions in a time-bound manner. The ERP provides a support system in the transaction processing, updating and reporting across the function. It encompasses all major functions of the business. ERP is the main system interfaced by other systems, stand alone or a part of it. ERP supports security authorisation, referencing responsibility and implementation of business rules. They help safeguard the business from illegal practice and also to protect the valuable information from misuse.

ERP systems tie together a multitude of business processes and enable the flow of data between them. By collecting an organization's shared transactional data from multiple sources, ERP systems eliminate data duplication and provide data integrity with a single source of truth. Today, ERP systems are critical for managing thousands of businesses of all sizes and in all industries. To these companies, ERP is indispensable. Refer Fig 3.2

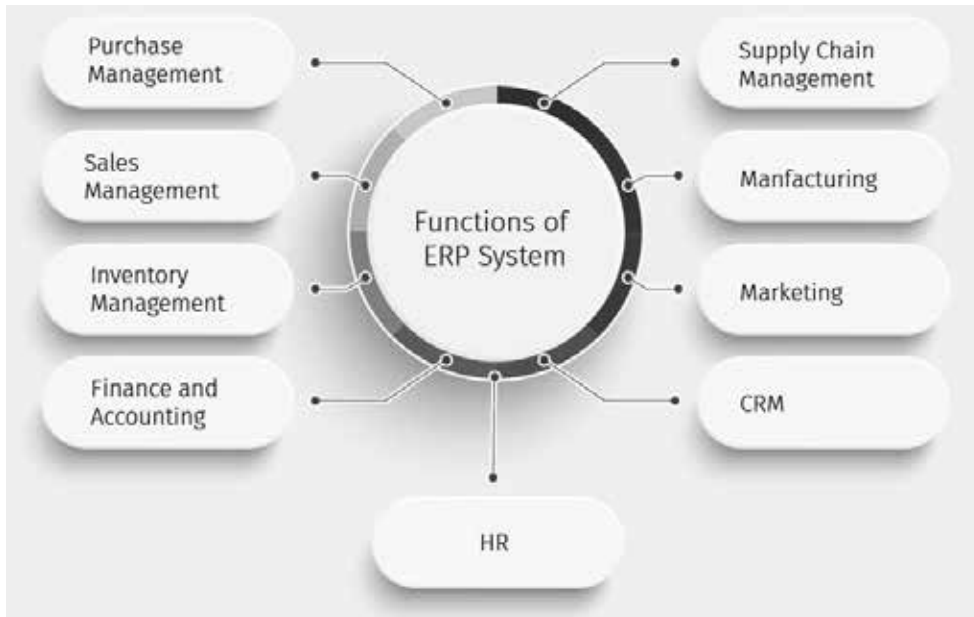


Fig 3.2 ERP and its functions

### 3.9 EVOLUTION OF ERP

The history of ERP can be dated back to 1960s when the manufacturing industries found the need of an inventory management and control system. These systems were able to identify inventory requirements, monitor usage, report inventory status and provide replenishment. Then in the 1970s came Material Requirement Planning (MRP) systems to meet the requirements of the manufacturing industries. MRP systems could schedule production processes and generate schedules for material purchases. After MRP, MRPII (Manufacturing Resource Planning systems evolved in the 1980s in order to make the process more accurate and easier. This system was able to coordinate manufacturing processes right from planning, purchase, inventory control to product distribution. It was in the 1990s when the Gartner Group first used the term ERP or Enterprise Resource Planning, which was a multi-module application software system. This software could help improve the performance of the internal business processes and integrate business activities across functional departments. Finally, in the 2000s ERP interaction with other application suites was enabled using web-browsers, etc. Then in 2010s, Android, iOS and browser applications were developed for delivering ERP software in the SaaS model (Software as a Service) which helped businesses of all scales use ERP systems since the cost of cloud ERP systems was much less.

### 3.10 ACTIVITIES OF MRPII

MRPII is very effective in managing resources and making effective plans as compared to MRP. The use of MRPII can help save the firm money, time and labour. **The process of MRPII can be broken down into following steps:**

- **Prepare demand estimates** - Identify the resources required for the supply to meet demand. The resources are broken down using bill of materials which is the list of raw materials and other components required to manufacture the product.



- **Compare current inventory with demand** - When the current inventory is compared with the demand, then the resource requirement to meet demand can be determined. MRPII allocates the inventory where it is required.
- **Prepare production schedule** - Determine the time required by each step in the manufacturing process. One can work backwards from a deadline.
- **Monitor entire process** - Ensure that milestones are being met and budget is not being exceeded. Alerts can be used for the purpose and a contingency plan should be in place.

Most of the MRPII systems in addition to what is offered by MRP, also offer master production scheduling, bill of materials and inventory tracking. They provide functionality within marketing, logistics and finance.

### 3.11 POPULAR ERP PACKAGES

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Some of the popular ERP packages are Oracle PeopleSoft, SAP Business One, SAP, NetSuite, Microsoft Dynamics, OpenSource Cloud ERP, etc. SAP R/3 software is an ERP software and one of the main products of SAP. R in SAP R/3 is an acronym for Real time while 3 indicates a three-tier application architecture that includes Application Server, Database and Client.

### 3.12 FUNCTIONS OF SAP R/3

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R/3 covers following functions: Sales and distribution; Materials management; Production planning; Quality management; Plant maintenance; Human resources; Financial accounting; Fixed asset management; Project management; Workflow and Industry solutions.

**The architecture of SAP R/3 consists of three software layers which are as given below:**

- **SAP GUI (graphical user interface)** - this layer represents the presentation layer. It runs on the end users' computer and is responsible for presenting all data to end-users; creating all GUI components and taking on all user inputs; and communicating all user requests and inputs to SAP applications across the network.
- **SAP Application layer** - It contains all the processing procedures for the business data represented by several software modules like sales and distribution, finance, production planning, etc.
- **SAP database layer** - this is an interfacing software i.e. retrieving and storing with a third-party database management system.

### 3.13 BAAN ERP MODULE INFORMATION INTEGRATION THROUGH ERP

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Baan was created by Baan Corporation launched by Jan Baan in 1978. Baan ERP works on Windows and Unix systems comprising of various modules designed for project estimation, manufacturing, management, distribution and finances. Baan has a modular software suite with multiple small programs to meet the requirements of the firms. With

the Baan ERP, the setup can be implemented on multiple servers as well as centrally. With the application of Baan ERP, operating systems and database, the users can create multi-company infrastructure. There are numerous modules like projects, finance, utilities, manufacturing, distribution, transportation and number of tools. With the tool module, the users can manage the database, customize programs and write reports.

### 3.14 IMPLEMENTATION OF ERP

Many functions like sales and manufacturing, financial management, human resource, etc are integrated across the business to deliver increased productivity and efficiency. In order to implement it successfully, a firm must define its requirements, determine how to redesign processes to take advantage of the system, configure the ERP system to support those processes and test it before implementing it at user's end.

**The various stages of ERP implementation cover the following:**

- **Discovery** - this includes selection of a system, setting up project team and a detailed definition of system requirements. In this stage the selected team including an executive sponsor, project manager and representatives from the departments, may decide and acquire an ERP system during this stage while the firm develops a clear idea of its requirements.
- **Design** - A detailed design of the new ERP system is developed based on detailed requirements and an understanding of current workflows. This includes designing new, more efficient workflows and business processes. Users must also be involved in this stage.
- **Development** - the stage of development involves configuring and customizing the software to support the redesigned processes. It also includes developing integration with organisation's other business applications.
- **Testing** - Testing and development may happen concurrently. It also includes testing of migrated data as well as include end-user training.
- **Deployment** - This stage is when the system is implemented and starts functioning. Troubleshooting may be required to be done. Also, it may take time for users to adapt to the system and achieve anticipated productivity gains. Firms may decide to deploy all module concurrently or focus first on specific high-priority modules and add other later in stages.

### 3.15 CONFIGURATION AND CUSTOMISATION OF ERP

Customization of ERP system requires building the functionality into the system. It generally requires technical software development and coding skills. It requires deep technical and product knowledge. Most often customizations are unique to the solution and requires new features to be added to meet the requirements.

While configuring ERP, one needs deep product knowledge and configuration can be done in the same manner on any instance of the same ERP software and also setup existing features to meet requirements.



### 3.16 ADVANTAGES OF ERP

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- Better management of resources reducing the cost of operations.
- Planning at function and process level increasing the productivity of the business.
- Customer satisfaction increase due to shorter delivery cycle.
- Business operations transparency between business partners.
- Human resource can be utilised better due to access to information across the databases distributed over the organisation.
- Because of its proactive nature, management can be alerted at a number of points demanding decision or action.
- Usage of best business procedures resulting in consistency of operations.
- Management becomes knowledge-driven and organisation becomes a learning organisation.

### 3.17 DISADVANTAGES OF ERP

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- High investment and/or integration cost.
- Requires change management since business processes, procedures, etc will need to change according to ERP requirements.
- End-users are to be trained for their daily operations.
- Business processes critical to an organization are to be reengineered to align them with an ERP solution.

### 3.18 CHAPTER SUMMARY

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This chapter highlighted on two very important types of systems required in the dynamic times of today. An Expert System will help the management in taking a decision while ERP provides an integrated platform to a business organisation. It is important to understand the applications of both Expert systems and ERP. Expert systems are an intelligent technique for capturing tacit knowledge in a very specific and limited domain of human expertise. These systems capture the knowledge of skilled employees in the form of a set of rules in a software system that can be used by others in the organisation. The set of rules in the expert system adds to the storage resource of the organisation. By capturing human expertise in limited areas, expert systems can provide benefits, helping organisations make high-quality decisions with fewer people.

The ERP systems deal with the planning and use of resources used in the business. The resources are finance, materials, manufacturing capacity and human resource. The ERP provides methodology of assessing the resource needs for a given business plan to achieve certain business objectives. It also helps to create strategies, plans, decisions, and actions in a time-bound manner. The ERP provides a support system in the transaction processing, updation and reporting across the function. It encompasses all major functions of the business.



### 3.19 REVIEW QUESTIONS

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#### SHORT ANSWER TYPE QUESTIONS

1. Who are knowledge workers?
2. Define an Expert System.
3. State any three characteristics of Expert System.
4. State any two advantages and disadvantages of Expert system.
5. Give names of some popular ERP packages.

#### LONG ANSWER TYPE QUESTIONS

1. Explain the components of Expert Systems.
2. Explain the functions of SAP R/3.
3. Explain the stages of ERP implementation.
4. State advantages and disadvantages of ERP.
5. Differentiate between Expert system and ERP.

### 3.20 MULTIPLE CHOICE QUESTIONS

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1. ERP is an acronym for \_\_\_\_
  - a. Employee Response Process
  - b. Enterprise Resource Planning
  - c. Employee Resource Planning
  - d. Enterprise Resource Processing
2. \_\_\_\_ systems capture knowledge of skilled employees
  - a. ERP systems
  - b. MIS
  - c. Expert systems
  - d. TPS
3. \_\_\_\_ are the rules on the basis of which information is processed and decision given
  - a. Knowledge base
  - b. Inference engine
  - c. Acquisition system
  - d. User interface
4. MRP is an acronym for
  - a. Management Resource Planning
  - b. Material response planning
  - c. Material requirement planning
  - d. Management response process
5. MRPII is an acronym for \_\_\_\_
  - a. Model response planning 2
  - b. Manufacturing resource planning



- c. Management resource planning
- d. Material resource planning
- 6. \_\_\_ is a popular ERP packaging
  - a. OLTP
  - b. SAP
  - c. OLAP
  - d. Batch processing
- 7. \_\_\_ contains all the processing procedures for the business data represented by several software modules like sales and distribution, finance, production planning, e
  - a. SAP GUI
  - b. SAP application layer
  - c. SAP database layer
  - d. SAP R/3
- 8. \_\_\_ includes selection of a system, setting up project team and a detailed definition of system requirements
  - a. Design
  - b. Development
  - c. Discovery
  - d. Analysis
- 9. \_\_\_ is building the functionality into the system
  - a. File and database processing
  - b. Inquiry processing
  - c. Configuration
  - d. Customization
- 10. \_\_\_ stage is when the system is implemented and starts functioning
  - a. Testing
  - b. Deployment
  - c. Discovery
  - d. Development

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# CUSTOMER RELATIONSHIP MANAGEMENT AND SUPPLY CHAIN MANAGEMENT

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## STRUCTURE

- 4.1 Learning Objective
- 4.2 Introduction
- 4.3 Role of CRM
- 4.4 Advantages of CRM
- 4.5 CRM software and packages
- 4.6 Types of CRM
- 4.7 Supply Chain and Supply Chain drivers
- 4.8 SC processes
- 4.9 SC decisions
- 4.10 Supply Chain Management
- 4.11 SCM solutions
- 4.12 Introduction to E-Commerce and E-Business
- 4.13 Electronic Data Interchange (EDI)
- 4.14 Business opportunities opened up by the internet
- 4.15 Threats from Internet-based electronic commerce
- 4.16 Ecommerce activities
- 4.17 Mobile Commerce
- 4.18 Chapter Summary
- 4.19 Review Questions
- 4.20 Multiple Choice Questions





## 4.1 LEARNING OBJECTIVE

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After completing this chapter, you will get an understanding of the CRM and SCM -

- Advantages of CRM and its types.
- SCM, its drivers and processes.
- Internet advantages and threats.

## 4.2 INTRODUCTION

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In order to operate, businesses must deal with many different pieces of information about suppliers, customers, employees, invoices and payments and of course their products and services. They must organize work activities that use this information to operate efficiently and enhance the overall performance of the firm. Information systems make it possible for firms to manage all their information, make better decisions and improve the execution of their business processes.

Customer relationship management (CRM) is a technology for managing all your company's relationships and interactions with customers and potential customers. The goal is simple: Improve business relationships. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability.

A CRM system gives everyone — from sales, customer service, business development, recruiting, marketing, or any other line of business — a better way to manage the external interactions and relationships that drive success. A CRM tool stores customer and prospect contact information, identify sales opportunities, record service issues, and manage marketing campaigns, all in one central location — and make information about every customer interaction available to anyone at the company.

With visibility and easy access to data, it's easier to collaborate and increase productivity. Everyone in the company can see how customers have been communicated with, what they've bought, when they last purchased, what they paid, and so much more. CRM can help companies of all sizes drive business growth, and it can be especially beneficial to a small business, where teams often need to find ways to do more with less.

The system primarily focuses on enhancing relationships with clients using smart tools for formulation of effective strategies. It helps in competitive positioning as well. All the data are stored in a database that is centralised and unified which therefore helps users access and manage the data effortlessly.

## 4.3 ROLE OF CRM

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Firms use CRM (Customer Relationship Management) to help manage their relationships with their customers. CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing and service to optimize revenue, customer satisfaction and customer retention. This information helps firms identify, attract and retain the most profitable customers, provide better service to existing customers and increase sales.



A CRM has features that can record numerous customer interactions online. It can also automate diverse business processes thereby providing managers with essential tools that help in measuring and monitoring a firm's productivity and performance. However, all this needs to be aligned with an effective strategy. Enhanced customer acquisition, development and retention is the resultant of a well-developed CRM strategy. Using CRM, firms are able to add value through enhancement of customer interactions.

Thus, CRM software has the capability to integrate crucial business operations like sales, marketing and service to enhance a customer's experience as well as encourage the customer for repeat purchase. As a CRM system is expected to streamline and simplify an organisation's workflow, it can help businesses close the gaps existing between sales, marketing and customer service departments.

#### **4.4 ADVANTAGES OF CRM**

Customer relationship management systems help capture and integrate customer data from all over the organisation, consolidate the data, analyse the data and then distribute the results to various systems and customer touch points across the enterprise. A touch point or a contact point is a method of interaction with the customer such as telephone, email, customer service desk, website or retail store.

Well-designed CRM systems provide a single enterprise view of customers that is useful for improving both sales and customer service. Good CRM systems provide data and analytical tools for answering questions like 'Who are our most loyal customers?', 'Who are our most profitable customers?' and 'What do these customers want to buy?'. Firms use the answers to these questions to acquire new customers, provide better service and support to existing customers, customize their offerings more precisely to customer preferences and provide ongoing value to retain profitable customers.

**It benefits a business in the following ways:**

- Security, scalability, and mobile CRM access.
- Transparent and simplified work processes.
- Enhanced reporting tools for resulting in increased sales.
- In-depth analytics and reports on the group's performance.
- Easy information sharing across the company.
- Improved tools for enhanced collaboration among departments and with consumers.
- Immediate access to all the vital information thus speeding up the workflow.
- Improved CRM strategy for a bigger impact on target audience through personalized marketing campaigns.

#### **4.5 CRM SOFTWARE AND PACKAGES**

Commercial CRM software packages range from niche tools to perform limited functions such as personalizing websites for specific customers to large-scale enterprise applications that capture interactions with customers, analyse them with sophisticated reporting tools



and link to other major enterprise applications such as supply chain management and enterprise systems. The more comprehensive CRM packages contain modules for employee relationship management also.

**CRM systems may provide some of these capabilities:**

- **Sales Force Automation** - This module helps staff increase their productivity by focussing sales efforts on the most profitable customers. CRM systems provide sales prospect and contact information, product information, product configuration capabilities and sales quote generation capabilities. The software enables sales, marketing, and delivery departments to easily share customer and prospect information.
- **Customer Service** - The customer service module provides information and tools to increase the efficiency of call centers, help desks and customer support staff. They have capabilities for assigning and managing customer service requests. They may also include web-based self-service capabilities.
- **Marketing** - CRM systems support direct marketing campaigns by providing capabilities for capturing prospect and customer data for providing product and service information, for qualifying leads for targeted marketing and for scheduling and tracking direct marketing mails. Marketing modules also include tools for analysing marketing and customer data, identifying profitable and unprofitable customers, designing products and services to satisfy specific customer needs and identify opportunities for cross-selling.

#### 4.6 TYPES OF CRM

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CRM could be of operational, analytical or collaborative type.

- **Operational CRM** includes customer-facing application, such as tools for sales force automation, call center and customer service support and marketing automation. They help streamline the processes of the firm for improving customer relationships. They therefore provide tools for improved visualization and efficient handling of the customer.
- **Analytical CRM** includes applications that analyse customer data generated by operational CRM applications to provide information for improving business performance. Analytical CRM applications are based on data warehouses that consolidate the data from operational CRM systems and customer contact points for use with OLAP, data mining and other data analysis techniques. With the help of digital tools and numerous platforms it has now become easy to collect huge quantities of data. Thus, an analytical CRM provides with features that can give insights on trends of customer behaviour. This information will help understand what activities lead to successful sales, increase customer retention and also identify the most common problems.
- **Collaborative CRMs** ensure that all concerned departments and teams in the firm have access to the same updated customer data. Everyone has updated data on customer interactions that happened with the firm through email. This integration

between departments and channels saves the customers from repetition of their requirements or problems and so gives a satisfying experience to them.

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#### 4.7 SUPPLY CHAIN AND SUPPLY CHAIN DRIVERS

Supply chain consists of all stages involved in servicing the customer to fulfil the expectations. A supply chain includes the manufacturer, suppliers, and also the logistics, warehouse, retailers and customers. A supply chain is an extended enterprise where participants in the chain have specific contributing roles to the goal of reaching the customer. Supply chain is a network of participants (refer Fig 4.1). The objective of supply chain is to maximise the value of supply chain where value is defined as 'Final product worth to the customer less the value of effort spent in delivering that product worth'. Supply chain profitability is the total profit of all participants in the chain. Supply chain is driven by three main inputs namely, Information, Funds and Goods. All three inputs flow between participants of the chain. Higher the speed of this flow higher is the response of the supply chain. The cost of supply chain depends upon service level set and facilities built in the chain.

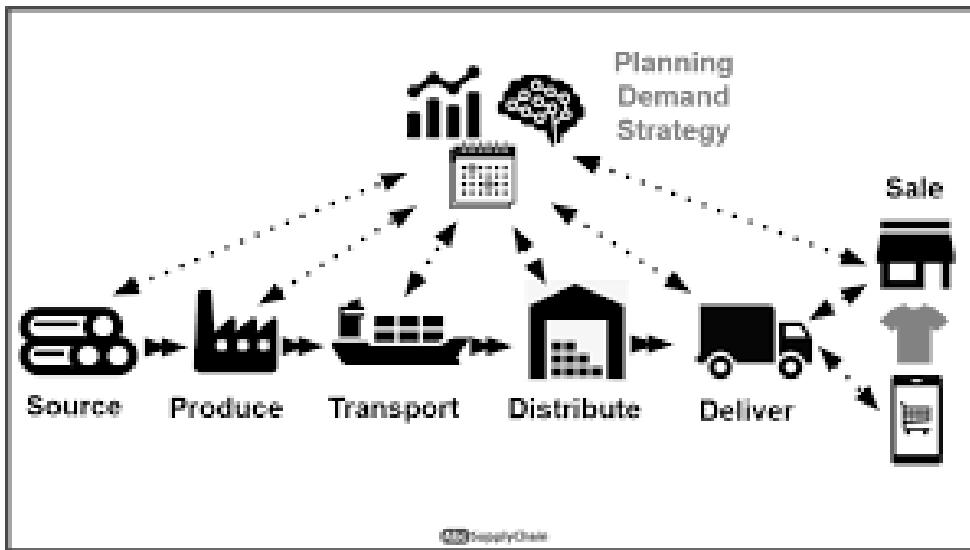


Fig 4.1 Supply Chain

#### 4.8 SC PROCESSES

Major supply chain functions are Marketing, Manufacturing, Procurement, Operations, Inventory, Warehousing, Distribution and Customer Service. The process begins with customer order and ends with delivery of goods or services. These functions are managed through supply chain participants who could be many at each stage in the chain. Refer Fig. 4.2.

The processes of a supply chain are as given below:

- **Plan** - It is a strategic process of SCM in order to achieve the final objectives. Supply chain managers need to identify a list of critical components like warehouse efficiency, plant layout, transportation cost, etc.

*CUSTOMER  
RELATIONSHIP  
MANAGEMENT  
AND SUPPLY CHAIN  
MANAGEMENT*

- **Source** - This is a stage where the focus is supplier selection to supply the raw material. The supplier selected should be reliable so that production process can take place smoothly. Along with supplier selection, there is a need for a tangible system so that supplier development happens on a continuous basis to improve their effectiveness as well.
- **Execute** - At this stage the processes designed earlier are implemented such that the plans are able to take shape outcomes of which are manufactured products ready for testing, packaging and delivery. The stage ensures that maximum efficiency is attained and especially if IT solutions are used for the purpose.
- **Deliver** - When a SC reaches this stage, delivery of the product or service needs to be done. It is important to ensure that the product or service reaches the right place at right time in right quantity. IT tools when used can help in enhancing the various activities involved as well as monitor the stages that a product goes through.
- **Return** - This is the last stage of the process. It encompasses inventory management as well as review of returned products for quality purposes. This stage should be a value enhancement measure aiming for maximum efficiency. The resources should be deployed supported by technology to attain faster pickups and quicker replacements.

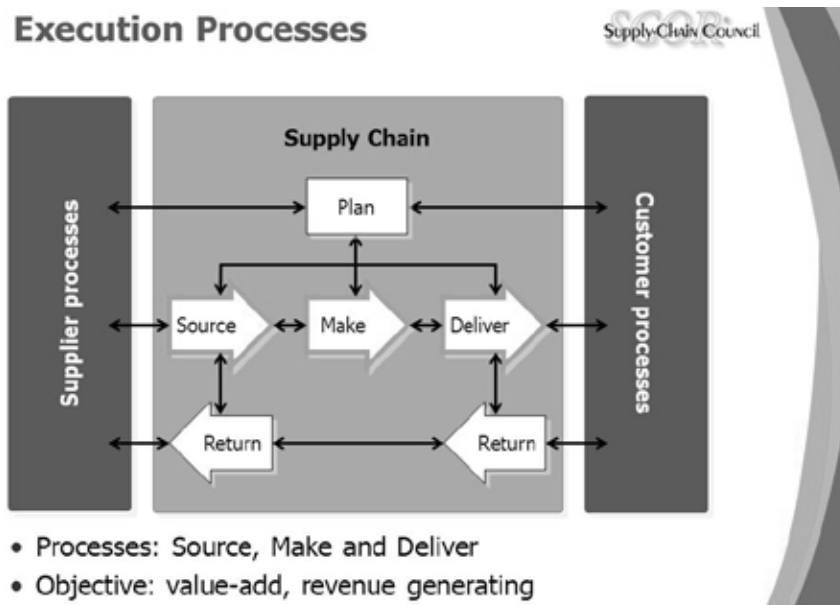


Fig 4.2 SC processes

#### 4.9 SC DECISIONS

Supply chain decisions fall in four major areas: production; inventory; location; and transportation (distribution).

- **Production** - These decisions related to the type of products to produce, where to produce them, the capacity of the manufacturing facility, etc. Such strategic level decisions will affect the costs, revenues and also the service given to the customer. At operational level, the production decisions could include preparation of master

production schedule, equipment maintenance schedule, quality control measures, etc.

- **Inventory** - Inventory decisions are related to management of the inventory. Inventory could be of raw material, work in process material or finished product. Inventory is primarily maintained to cater to uncertainties in the supply chain. However, holding inventory also has an associated cost and therefore it is important to manage inventory efficiently. Inventory related decisions could be determining optimum level of order quantity, reorder level, safety stock level, etc.
- **Location** - In order to create a supply chain, it is important to decide the location of the sourcing points, the production facilities. The decision of selecting the location of the facility involves planning of resources and hence is a long-term decision. The location will influence the cost, the route and the time taken for the product to reach the customer.
- **Transportation** - Deciding the mode of transport is an important SC decision as it involves consideration of time, cost, etc. Like choosing air transport may be speedier, reliable but more expensive. Transportation by sea or rail may be cheaper but take more time in transportation and hence have uncertainty associated with them. Such decisions may relate to routing, scheduling of equipment, shipment sizes etc for effective transportation strategy.

#### 4.10 SUPPLY CHAIN MANAGEMENT

The process view of a supply chain involves customer order cycle, retail stock cycle, transportation cycle, goods handling cycle, goods manufacturing and delivery cycle and procurement cycle. Supply Chain Management (SCM) means management of these cycles effectively and efficiently maximising the value of the chain. SCM needs information support to manage the chain. This information is about the customer requirements, stocks and funds in the supply chain. Supply chain management effectiveness depends upon supply chain design i.e evolving a structure of production units and their locations, suppliers, warehouses and locations; distributor - dealer - retailer channels and customers.

The participants in supply chain need information about goods movement, order placed and order delivered and payables and receivables. If all the participants are tied up in supply chain through an integrated information system, supply chain management will be highly effective and help firms involved to achieve their desired objectives.

SCM is the systemic, strategic coordination of business functions of a firm and across the other firms within the SC for the purpose of improving performance of the firm as well as the SC. The SC consists of various partners involved in meeting customer's demands directly or indirectly. The SC includes the manufacturer, supplier, logistics, warehouses, retailers and finally consumers.

Companies and distribution channels compete more today on the basis of time and quality. Having a defect-free product to the customer faster and more reliably than the competition is no longer seen as competitive advantage but simply a requirement to be in the market. Customers demand products consistently delivered faster, exactly on time, and with no





damage. Each of these necessitates closer coordination with supplier and distributors and therefore need for supply chain management.

#### **4.11 SCM SOLUTIONS**

SCM software is designed to help firms meet customer demand in the most cost-effective and effective manner. It is able to track the movement of products from their source to the warehouse, store, etc and also through the return if the case maybe. SCM software solutions will help streamline the processes of an organisation, reduction in costs, as well as improve relations with both suppliers and customers.

SC software could either help businesses plan their supply chains or execute the supply chain. The first are known as SC planning systems which enable the firm to model its existing SC, generate demand forecasts for products and develop optimal sourcing and manufacturing plans. Such systems help companies make better decisions such as determining how much of a specific product to manufacture, establish inventory levels for raw materials, determine where to store finished goods and identify the transportation mode to use for product delivery.

SC execution systems manage the flow of products through distribution centers and warehouses to ensure that products are delivered to the right locations in the most efficient manner. They track the physical status of goods, the management of materials, warehouse and transportation operations and financial information involving all parties.

The SCM solutions could focus on Inventory optimization, Warehouse management, Demand forecasting, Procurement, Order fulfilment and returns and Supplier Management. ERP (enterprise resource planning) software has modules for providing such SCM solutions. These systems could be integrated with the other systems in the firm. A stand-alone SCM software may also be designed based on the size of the firm and the scale of operations it possesses.

#### **4.12 INTRODUCTION TO E-COMMERCE AND E-BUSINESS**

E-business means carrying out the business using electronic methods for business processes. In e-business, discontinuity of process marked with delays, on line waiting and storage is eliminated through on line integration of customers, partners, suppliers and employees. It allows information sharing bringing transparency in business management processes. The biggest beneficiary of e-business is the customer, who has access to information about the products and services and order it from any supplier located in any country. The customer is hence knowledgeable forcing the business to become customer-centric. The other beneficiary is the supplier or vendor who gets access to information on inventory, schedules, order status etc. enabling to manage resources effectively to meet customer's real time needs. In e-business environment, employees are also empowered with intelligent support of MIS and DSS making them more efficient and effective.

E-Commerce refers to the use of the Internet and the Web to transact business. More formally, e-commerce is about digitally enabled commercial transactions between and among organisations and individuals. Commercial transactions involve the exchange of money across organisational or individual boundaries in return for products and

services. Ecommerce technology permits commercial transactions to cross cultural and national boundaries far more conveniently and cost effectively than traditional commerce. Ecommerce can be of different types: B2B (Business to Business); B2C (Business to Consumer); C2B (consumer to business); C2C (consumer to consumer).

The benefits of Ecommerce are as given below:

- **Convenience** - Use of Ecommerce offers high levels of convenience and accessibility. Customers are able to locate what they require from the comfort of their mobiles too. They can access it any time of the day and more customer convenience translates to profitability for a business.
- **Boundary-less transactions** - A brick-and-mortar store exists in a geographical area and this could be a limitation for a consumer. Whereas using ecommerce this limitation can be overcome as a consumer can transact from anywhere. Thus, the business is able to reach more consumers, both nationally and globally thus increase their sales manifold.
- **24\*7 operational** - The internet functions throughout the day, which is not possible with a physical store that operates within fixed timings. Thus, with ecommerce, sales can take place 24\*7.
- **Scalability** - As the customer base increases, ecommerce business can be expanded to accommodate more sales. Whereas expanding brick-and-mortar store requires relocation or renovation, which is expensive. So, ecommerce expansion is comparatively cheaper and more effective.
- **Personalized experience** - Using ecommerce and artificial intelligence together, personalized shopping experience can be created for the customers. With AI-enabled up-selling and cross-selling, customers can be presented with products as per their interests thus also creating a loyalty base of customers.
- **Access to Innovative Technology** - With improvement in technology, business processes can be better streamlined thus saving time and money. Using ecommerce, products can be better marketed, service levels can be further enhanced along with enhanced team collaboration. And all this can be done with certain apps and integrations unlike in case of a physical store.
- **Affordable & Effective marketing** - With the help of technological advancements and affordable marketing channels like search engine marketing, social media, email marketing, etc. can be used to pull customers to the ecommerce business.

	Business	Consumer
Business	B2B	B2C
Consumer	C2B	C2C

Fig 4.3 Ecommerce Business Models



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There are different types of Ecommerce business models and a firm can implement one based on their benefits and challenges and the firm's objectives (Fig 4.3). The common ones are as given below:

- B2C - Business to Consumer**  
 This is the most common business model. When a consumer buys through an online store then it is a B2C transaction. The process of taking a decision for a B2C purchase is much faster than a B2B transaction especially for lower-item values. Because of this shorter sales cycle, less expenditure is done on a sale though the order value is also small and the orders are not of a recurring nature like in case of B2B transaction. Technology is used vastly to market products and ensure convenience for the consumer. Refer Fig 4.4.
- B2B - Business to Business**  
 In this model, a business enters into a commercial transaction with another business. B2B transactions have a longer sales cycle but the order value is also higher and the orders are generally of a recurring nature. Ecommerce storefronts are used in place of the traditional catalogs. Refer Fig 4.5
- C2B - Consumer to Business**  
 C2B businesses permit individuals to sell goods and services to companies. The ecommerce website might allow customers to post their product or service and then the businesses may carry out the bidding process. Affiliate marketing services also are considered as C2B. The competitive edge of this model is in the pricing of goods and services. This model has also been used to connect firms to social media influencers for product marketing.
- C2C - Consumer to Consumer**  
 A C2C business is also called as online marketplace as it connects consumers to exchange their goods and services. The business makes money by charging transaction fees. eBay pioneered this model. The businesses benefit from self-propelled growth by motivated buyers and sellers. The main challenge with this model is control of quality and maintenance of technology.



Fig 4.4 B2C model



Fig 4.5 B2B model

### 4.13 ELECTRONIC DATA INTERCHANGE (EDI)

Electronic data interchange enables the computer-to-computer exchange between two organisations of standard transactions such as invoices, bill of lading, shipment schedules or purchase orders. Transactions are automatically transmitted from one information system to another through a network eliminating the printing and handling of paper at one end and the inputting of data at other (refer Fig 4.6).

EDI is used to link supply chain participants through electronic exchange of documents from one stage to other. Suppliers have online access to selected parts of the purchasing firm's production and delivery schedules and automatically ship materials and goods to meet prespecified targets. The benefit of EDI is paperless exchange of information, quick access to accurate information, and reduced cycle times.

The transactions done through EDI are defined by the corresponding message standards. Missing information or information at the wrong place will lead to erroneous processing of the EDI document. An EDI transmission could be: point-to-point direct where two systems connect directly without any intermediary; and value-added network where the data transmission is managed by a third-party network. In future, EDI will be the core document exchange capability utilizing technological innovations such as Artificial intelligence, Blockchain and Internet of Things.

**Following are the benefits of using EDI technology for a business:**

- The technology helps save time and money by using automated processing of documents.
- The solutions using EDI help enhance efficiency and productivity as larger number of documents can be shared and accurately processed in less time.



- As EDI uses rigid standardization, there is reduction in data transfer through EDI and so the information is properly formatted prior to entering a business process.
- Traceability and reporting are enhanced as the electronic documents can be integrated with IT systems for data collection and analysis.
- The automation achieved through EDI leads to positive customer experiences because of efficient transaction execution and finally reliable product and service delivery.

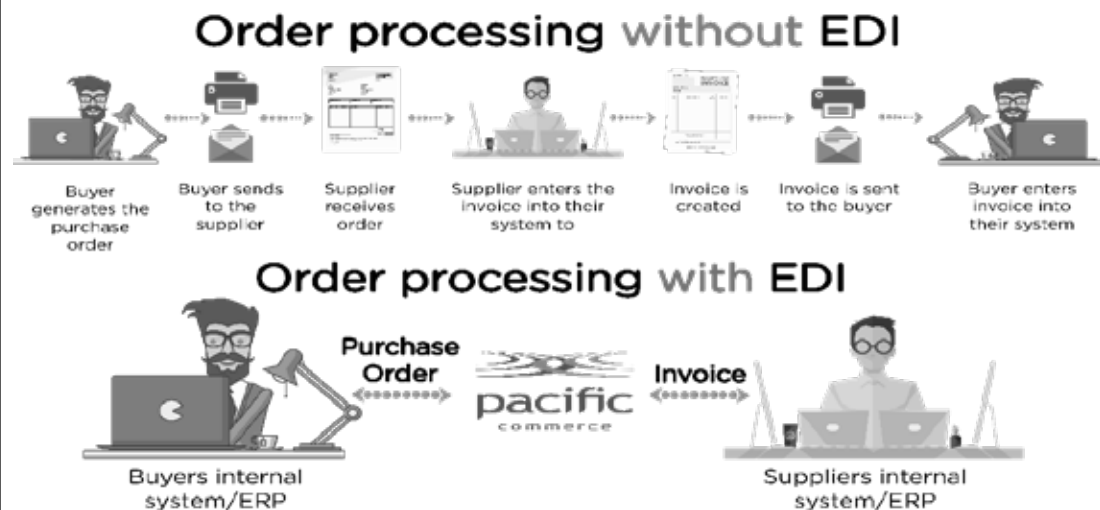


Fig 4.6 Comparison of Order processing with/without EDI

#### 4.14 BUSINESS OPPORTUNITIES OPENED UP BY THE INTERNET

The reason why ecommerce has grown so rapidly is because of the unique nature of internet and the web. Ecommerce remains the fastest growing form of commerce when compared to physical retail store, services and entertainment. The first wave of ecommerce transformed the business world of books, music and air travel. In the next wave, marketing and advertising, telecommunications, online travel, bill payments faced a similar transformation. The breadth of ecommerce offerings keeps growing especially in the services economy of social networking, travel, retail apparel, appliances, home furnishings, entertainment, etc. The online demographics of shoppers broaden as compared to ordinary shoppers. Small businesses and entrepreneurs continue to flood the ecommerce marketplace taking advantage of cloud-based computing resources. Mobile ecommerce has gained popularity. As a result of all this, the potential market size for e-commerce users has grown tremendously. Thus, the Internet has created a digital marketplace where millions of people all over the world are able to exchange massive amounts of information directly and instantly as well as make purchases and sales. As a result, the Internet has changed the way companies conduct business and increased their global reach.

**Some of the opportunities are as listed below:**

- Owing to the IoT gaining popularity, interaction with customers is changing shape. Advanced voice technologies can be used today to carry out numerous searches

while the customer places an order. Such automated voice technologies will help improve customer service, high end-to-end experience and be more productive.

- Tracking customer behaviour either within physical stores or online stores has become invaluable for the businesses. This behaviour can then be integrated to enhance customer service.
- Proactive use of social media based on location and proximity will trigger marketers and representatives to engage customers
- There will be many more such opportunities as the technological advancement opens door to still more. Thus, internet is extensively used by the business today and it has changed the perspective of business. There are numerous businesses that solely run online. And businesses today find it difficult to operate without the internet.

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#### 4.15 THREATS FROM INTERNET-BASED ELECTRONIC COMMERCE

Ecommerce threat occurs by using the Internet for unfair means with the intention of stealing, fraud and security breach. There are various types of ecommerce threats like in electronic payment systems, e-cash, data misuse, credit/debit card frauds, etc. E-commerce organisations use electronic payment systems. Unauthorized transactions are performed causing businesses great losses. Refund frauds are also done where the hackers fill fake requests for refunds. Many a times customers have received mails or messages from hackers acting as real business sites and thus trick users into believing them and conducting their e-commerce transactions on these fake websites. This is known as Phishing. Spam is also a very common thread whereby the spammers send infected links via email or social media inboxes. When these links are clicked, the user is directed to the spam websites. Hackers may also install a malicious software like trojans, viruses, spywares, etc. on the computer system. These programs can swipe any sensitive data or infect the website or computers. Special bots maybe developed to scan the website for confidential information. Thus, the competitors, etc may use the data to harm the other's business. Hence, it will not be wrong to say that the ecommerce threats are wreaking havoc in online transactions.

**To sum up the threats have been listed below:**

- **Financial frauds-** There are various kinds of financial frauds prevalent in the ecommerce industry. A credit card fraud may happen when a cybercriminal uses stolen credit card data to purchase products on online store or when the fraudster steals personal details and identity and misuses it. A fake return and refund fraud may take place when the fraudsters perform unauthorized transactions or engage in refund frauds where they file fake requests for returns.
- **Phishing-** Customers receive messages or emails from hackers pretending to be store owners or salespersons. They present fake copies of the website or its pages for consumers to believe them. In case the client gives them sensitive personal information then they could get cheated by these hackers.



- **Spamming-** People with malicious intent send infected links via comments, messages on blog posts, contact forms, email or social media inbox. Once these links are clicked, you will be directed to the spam websites. It will not only lower your website security but spamming also reduces the speed and affects performance in a severe manner.
- **Malware-** Malicious software is designed by hackers and installed on the computer system without your knowledge. Such software may include trojan, viruses, spyware, etc. These malicious programs can swipe any sensitive data present on the systems along with infecting the website.
- **Bots-** Special bots may be developed by attackers which can go through your website to get information about prices and inventory. Such hackers, generally your competitors may then use the information to lower their prices, etc.
- **E-Skimming-** This involves infecting a website's checkout pages with malicious software with the intention of stealing personal and payment details of the client.

The above threats can be tackled through certain solutions given below:

- **TTPS and SSL certificates-** HTTPS (hyper-text transfer protocol security and secure sockets layer) HTTPS protocols keep the users' sensitive data secure by securing data transmission between server and client. Thus, they avoid any interception by unauthorized personnel.
- **Anti-malware and Anti-virus software-** Anti-malware is a software program that detects, removes and prevents infectious software (malware) from infecting the IT systems. Anti-virus is a software used to prevent viruses from entering the systems as well as cleaning the system from existing viruses.
- **Securing with passwords-** Always use complex passwords and keep changing them frequently. Also, restrict user access by defining user roles. Have the admin panel send notifications in case a foreign IP tries to access it.
- **Securing payment gateway-** Avoid storing the credit card information of clients on the database. Let a third party handle the payment transactions away from your website. This will ensure safety for customers' personal and financial data.
- **Deploying Firewall-** Effective firewalls keep fishy networks and other cyber-attacks away from your website. They also help in regulating traffic to and from the website to ensure passage of only trusted traffic.
- **Additional Security Implementations-** Always scan websites and online resources for malware. Regularly back-up your data. You may use multi-layer security for increased data protection. Update systems regularly and employ effective plug-ins. Finally, have a dedicated security platform so that it is secure from frequent cyber-attacks.

## 4.16 ECOMMERCE ACTIVITIES

The various ecommerce activities are as presented in the figure below:

### E-commerce business activities



Fig 4.7 Ecommerce activities

## 4.17 MOBILE COMMERCE

M-Commerce applications have taken off for services that are time-critical, that appeal to people on the move or that accomplish a task more efficiently. Mobile commerce is the use of a mobile device for carrying out commercial activities like online transactions, buying and selling products, payment of bills, and online banking. M-commerce is able to cover a wide user base thus allowing businesses to target them for sales, purchase, feedback, etc. With the onset of m-commerce, brand new industries, services came up and the existing ones tended to grow in new directions like mobile banking, contactless payments, in-app payments, etc.

M-commerce can be of different types. Mobile shopping whereby mobile is used for shopping purchases. Mobile banking is quite similar to online banking. Mobile payments are a progressive innovation with payment options so that the customers can take advantage of various mobile payment options. It has also served as a trigger for new services and industries or even helped existing ones grow, some of which are: mobile money transfer, electronic ticketing and boarding passes, digital content purchases and delivery, mobile banking, contactless payments and in-app payments, location-based services, mobile marketing and loyalty cards, etc.



**M-commerce may cover a range of transactions, which can be categorized as follows:**

- **Mobile Shopping-** Mobile shopping is similar to E-commerce but accessible via a mobile phone. Mobile shopping is now possible through mobile optimized websites, dedicated shopping apps and through social media platforms too.
- **Mobile banking-** There is not much difference between mobile banking and online banking. However, there are certain transaction types which may be restricted or limited on mobile devices. Mobile banking generally involves a dedicated app using chatbots and messaging apps.
- **Mobile payments-** There is an abundance of payment methods available on the mobile depending upon the region you are located. Customers in different regions prefer certain payment options, so it becomes complex for the online retailers to manage the payments on a global scale.

**M-Commerce has been benefits and disadvantages which are given below.**

**Benefits of M-commerce are as follows:**

- Better overall customer experience in terms of mobility, reachability and location-tracking
- Huge growth potential
- Ideal medium for omnichannel commerce with Omnichannel commerce referring to selling both in-store and online through multiple channels
- Variety of payment options available

**Disadvantages of M-commerce are as follows:**

- Need for mobile commerce optimization as owing to changes in consumer behaviour, changes need to be made with respect to latest technologies and applications
- Need to figure out the right mix of payment options depending upon the area of business and the locations served.
- As it is easier for customers to compare prices therefore, the business needs to aware of the competitors pricing strategies, etc.
- Need to comply with a large range of regulations while being transparent with customers

#### **4.18 CHAPTER SUMMARY**

Firms use CRM (Customer Relationship Management) to help manage their relationships with their customers. CRM systems provide information to coordinate all of the business processes that deal with customers in sales, marketing and service to optimize revenue, customer satisfaction and customer retention. This information helps firms identify, attract and retain the most profitable customers, provide better service to existing customers and increase sales.

Supply chain consists of all stages involved in servicing the customer to fulfil the expectations.

A supply chain includes the manufacturer, suppliers, and also the logistics, warehouse,

retailers and customers. A supply chain is an extended enterprise where participants in the chain have specific contributing roles to the goal of reaching the customer. Major supply chain functions are Marketing, Manufacturing, Procurement, Operations, Inventory, Warehousing, Distribution and Customer Service. The process begins with customer order and ends with delivery of goods or services. These functions are managed through supply chain participants who could be many at each stage in the chain.

The Ecommerce revolution is still unfolding. Individuals and businesses will increasingly use the Internet to conduct commerce as more products and services come online and households switch to a more advanced telecommunication system. More industries will be transformed by e-commerce including travel reservations, music and entertainment, news, software, education and finance. Ecommerce threat occurs by using the Internet for unfair means with the intention of stealing, fraud and security breach. There are various types of ecommerce threats like in electronic payment systems, e-cash, data misuse, credit/debit card frauds, etc. E-commerce organisations use electronic payment systems.

NOTES



#### 4.19 REVIEW QUESTIONS

##### SHORT ANSWER TYPE QUESTIONS

1. What is the role of CRM?
2. State any three advantages of CRM.
3. What is the objective of a Supply Chain?
4. Name the processes of a SC.
5. State any three business opportunities opened up by the Internet.

##### LONG ANSWER TYPE QUESTIONS

1. Explain the capabilities of CRM system.
2. Differentiate between Operational CRM and Analytical CRM.
3. Explain the SC decisions.
4. Explain EDI.
5. Explain Ecommerce and M-commerce.

#### 4.20 MULTIPLE CHOICE QUESTIONS

1. CRM is an acronym for \_\_\_\_
  - a. Customer Response Method
  - b. Customer Relationship Method
  - c. Customer Relationship Management
  - d. Company Relationship Management
2. \_\_\_\_ systems provide information to coordinate all of the business processes that deal with customers in sales, marketing and service to optimize revenue, customer satisfaction and customer retention
  - a. a. ERP
  - b. b. CRM





- c. c. SCM
- d. d. EDI
3. **Sales Force Automation is a type of \_\_\_\_ system**
  - a. CRM
  - b. Expert
  - c. SCM
  - d. ERP
4. \_\_\_\_ ensure that all concerned departments and teams in the firm have access to the same updated customer data
  - a. Operational CRM
  - b. Analytical CRM
  - c. Collaborative CRM
  - d. Customized CRM
5. **Final product worth to the customer less the value of effort spent in delivering that product worth is the \_\_\_\_**
  - a. Supply chain
  - b. Value
  - c. Logistics
  - d. Material resource planning
6. **The \_\_\_\_ could focus on Inventory optimization, Warehouse management, Demand forecasting, Procurement, Order fulfilment and returns and Supplier Management**
  - a. SCM solutions
  - b. CRM solutions
  - c. EDI solutions
  - d. Ecommerce
7. \_\_\_\_ refers to the use of the Internet and the Web to transact business
  - a. Ecommerce
  - b. ERP
  - c. SCM
  - d. CRM
8. **EDI is an acronym for**
  - a. Enterprise Data Internet
  - b. Enterprise Document Interchange
  - c. Electronic Data Interchange
  - d. Electronic Document Interchange
9. **Ecommerce threat occurs by using the Internet for unfair means with the intention of \_\_\_\_**
  - a. Stealing
  - b. Fraud
  - c. Security breach
  - d. All of the above

10. \_\_\_\_\_ is an activity of ECommerce
- a. Conduct market research
  - b. Track shipping
  - c. Provide product information
  - d. All of the above

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# SOCIAL AND LEGAL ASPECTS OF COMPUTERISATION

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## STRUCTURE

- 5.1 Learning Objective
- 5.2 Introduction
- 5.3 Moral dimensions to use of IT
- 5.4 Social Issues
- 5.5 Cyber Crimes
- 5.6 Impact of computers on individuals
- 5.7 Computers, organisations and society
- 5.8 Major Security threats
- 5.9 Security Measures
- 5.10 Worms and Viruses
- 5.11 Chapter Summary
- 5.12 Review Questions
- 5.13 Multiple Choice Questions



## 5.1 LEARNING OBJECTIVE

After completing this chapter, you will get updated about the impact of computers on society

- Security threats and measures.
- Social issues and cybercrimes.
- Moral dimensions of use of it.

## 5.2 INTRODUCTION

The computer system is the key technology of the modern era and is central and essential to operations in the modern industry, business and service sector. And their impact on the society, environment, etc is going to increase manifold. Most problems taking place in everyday life like failure in power supply, network issues, traffic bottlenecks are being blamed upon the technological problems because of the computers. Information systems create new questions related to society, legality, ethics as they create opportunities for intense social change, threatening existing distributions of money, power, etc. and new kinds of crime.

As business organisations have moved into E-enterprise mode, it has raised certain issues in the areas of secrecy, privacy, confidentiality, destruction and theft of information and information systems. These issues assumed more importance when business processes came to be managed through internet and telecommunication networks. The threat to information could be accidental or malicious and it could get generated from personnel within the organisation who have an authorised access or from personnel who are not authorised to access the system.

Some of the problems caused by computerization are:

- Computer crime
- Software and data theft
- Hacking
- Viruses
- Unreliable software
- Netiquette
- Privacy

## 5.3 MORAL DIMENSIONS TO USE OF IT

The major ethical, social and political issues raised by information systems include the following moral dimensions:

- **Information rights and obligations** - What information rights do individuals and organisations possess with respect to themselves? What can they protect?
- **Property rights and obligations** - How will traditional intellectual property rights be protected in a digital society in which tracing and accounting for ownership are difficult and ignoring such property rights is so easy?



- **Accountability and Control** - Who can and will be held accountable and liable for the harm done to individual and collective information and property rights?
- **System quality** - What standards of data and system quality should we demand to protect individual rights and the safety of society?
- **Quality of life** - What values should be preserved in an information and knowledge-based society? Which institutions should we protect from violation? Which cultural values and practices are supported by the new information technology?

## 5.4 SOCIAL ISSUES

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IT and internet together have majorly affected individuals and society. Individuals and organisations exist in a society in a social environment. Technology affects this existence due to impact on privacy, culture, job opportunities and markets. Government, Business, Individuals and Organisations are changing to new social and environment order creating a new society.

The way IT impacts on the society is presented below:

- **Privacy** - there is risk of losing privacy, loss of confidentiality of personal or organisation's key information. This can result in exposure to personal data, financial data, health data, knowledge and information about behaviour also.
- **Work Culture** - Work culture tends to become stressful with 24\*7 i.e. no time boundaries. There are demands of continuous improvement in skills and competencies. As a result, the health of individuals gets affected, social interaction gets reduced and cost of education and learning also reduces.
- **Job opportunities** - There are reduced job opportunities and there is increase in demands for technology enabled skills and competencies. As a result, the standard of living is very high for some while others are not affected. There is increase in time spent on learning and unlearning.
- **Market** - Customer becomes more knowledgeable and so the customer requirements and expectations are constantly rising. This creates pressure for continuous innovation. Customer behaviour becomes more dynamic and unacceptable.
- **Business and Organisation** - Both become more strategic and competitive. Every aspect of business is fuelled with demands innovation and creativity. Also, there is increase in risk exposure. As a result, organisation becomes lean and flat. Employees become knowledge workers while customers and vendors become business partners.

## 5.5 CYBER CRIMES

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Newer technologies create new opportunities for committing crime by creating new valuable items to steal, new ways to steal them, and new ways to harm others. Computer crime is the commission of illegal acts through the use of computer. Computers can be the object of crime as well as the instrument of crime. Cybercrime is a crime that involves a computer and network. It can harm an individual's security and financial health. With growth in the importance of computer in commerce, entertainment and government, cybercrime

too has grown. Cyber-crime could take place in the form of a fraud, stealing of identities or intellectual property, trafficking, digital piracy, money laundering, counterfeiting and violating privacy.

Thus, Cybercrime is a criminal activity that mainly targets or involves using a computer, network associated with a computer, or a connected device. It is not always conducted by individuals or hackers but could be done by organizations too. The primary aim of Cybercrime is to damage for-profit – personal or political. Cybercrime is a broad term that covers a range of illegal activities conducted via the computer or the Internet.

The best way to protect one from Cybercrime is to exercise careful and sensible digital habits. **Certain measures that can be taken to prevent cyber-crime are:**

- Be careful when you open emails with undefined links or attachments.
- Avoid downloading anything from an untrusted or unknown source.
- Make sure you are visiting a legitimate website.
- Make sure to update your computer with software updates.
- Avoid using Wi-Fi in public spaces as they are unsecured and unencrypted.
- Do not log in to your bank account in a public space
- Make sure you have strong, unique passwords that are a combination of letters, numerals and symbols.
- Always have an antivirus installed that will throw warnings and protect systems from attacks

## 5.6 IMPACT OF COMPUTERS ON INDIVIDUALS

The computer and its uses have grown rapidly throughout the globe. They are used to handle numerous tasks owing to their vast potential. They also help to resolve many problems encountered by humans in daily life. Thus, they have lot of impact on our life ranging from saving of time, money and effort. Computers have brought about drastic transformation in the realms of communication, utility facilities, education and health care to name a few.

Today, computer is considered as the most life changing and successful invention in our life. It is difficult for a business to survive without adopting computers in their business processes.

Computers have brought people closer and has facilitated contacts between them through emails, videoconferencing, social medias, chats, etc. Television, print media, etc. has also been influenced by computers right from the stage of production, control, storage to broadcasting. With the help of computers, we can create document, display on screen, modify and then print or publish it through www. Social networking sites opens yet another sophisticated but easy to use communication.

In education too, learning and teaching has reached new heights. Information on any subject is available in no time and can be shared across. Classes are equipped with smart



## NOTES



classrooms. Libraries have become digital; distance education has become possible changing the paradigm of higher education.

Computers have also made our life more comfortable and convenient. When it comes to transportation, the way people travel has been facilitated with transportation. It saves time and difficulties associated with travelling. GPS applications permits us to go virtually anywhere in the world as these technologies help us reach the destination. Even utility facilities like water, electricity, agriculture, etc have become more sophisticated and improved with the use of computers. Computers simplify security and monitoring systems using access control and surveillance systems.

Computers provide immense potential for enhancing the effectiveness of health care sector. Patient data and medical information can be stored for future use. Robotics can be used for conducting certain operations.

In the coming future, computers will further bring about many more changes in all spheres of life using AI, Machine learning, Internet-based education, driver-less vehicles and even space travelling.

### **5.7 COMPUTERS, ORGANISATIONS AND SOCIETY**

The study of organisations, and management is important in the field of MIS. In any organisation, MIS has to be designed, developed and implemented to fit the organisation. The MIS will fail if it does not consider the structure, culture and motivation within the organisation.

The organisation structure influences the information flow within the organisation. Tall and thin organisation structures tend to have a greater vertical flow of information and lesser horizontal flow. Flat organisations tend to have both, vertical as well as horizontal information.

The organisation culture also affects the information flow in the organisation and hence the design of MIS. A culture of openness and information sharing fosters a two-way information flow, vertically and horizontally while a culture of hostility and inter-departmental rivalry will lead to very little horizontal flow of information.

The leadership or managerial style also greatly influences the design of MIS. An autocratic management style permits very little information sharing and the information flow will generally be more upward. Horizontal information flow may also be lacking or minimal. Participative leadership styles foster greater information flow in all directions. Functional units are more co-operative and less confrontative, leading to greater information sharing in a cross-departmental manner. Vertical information flow is also two-way, with the managers sharing information with subordinates and subordinates passing on accurate and timely information to managers.

The MIS professional needs to study the organisational culture, management styles and information flow in the organisation before attempting to design the MIS. Once designed, the organisation culture and management styles will also affect the implementation of the system.

Our generation strives to be the quick paced society. For that, our generation uses computers to their full potential in order to do more tasks and to do them at a faster pace.

Computers benefit the business and personal world by being able to do the following more efficiently: buying and selling products, communicating throughout the world, enhancing our knowledge, job influences, entertainment, research, and paying bills. We're now capable of creating new, more and better quality of tasks via computer technology. Computers also benefit society with the enhancement of knowledge of medicine which creates more effective treatments for a healthier and longer life. Computers are improving healthcare through robotics and research. We communicate operation results and any surgical problems easily and immediately between healthcare providers all over the world. Using robotics, surgeons can now perform surgeries in remote and/or distant countries without ever leaving their resident hospital. education, computers have changed the way we are able to acquire knowledge.

## 5.8 MAJOR SECURITY THREATS

A *security threat* is a malicious act that aims to corrupt or steal data or disrupt an organization's systems or the entire organization. A *security event* refers to an occurrence during which company data or its network may have been exposed. And an event that results in a data or network breach is called a *security incident*.

Disrupting the business is a powerful way to distract you, cost you time and money. Cybercriminals can also cause disruption with ransomware attacks. Hackers gain access to information you need and then they demand ransom for releasing the data.

- **Distortion** - Hackers are distorting the data and technologies that businesses use. This can result in distrusting the integrity of information or mistakenly trust false information.
- **Deterioration** - deterioration of a company's complete control over its processes can open it up to a variety of risks of which cybercriminals can take advantage of.

**There are different types of information security threats some of which are listed below:**

- **Insider threats**- An insider threat occurs when individuals close to an organization who have authorized access to its network intentionally or unintentionally misuse that access to negatively affect the organization's critical data or systems.
- **Viruses and worms**- Viruses and worms are malicious software programs (malware) aimed at destroying an organization's systems, data and network. A computer virus is a malicious code that replicates by copying itself to another program, system or host file. It remains dormant until someone knowingly or inadvertently activates it, spreading the infection without the knowledge or permission of a user or system administration. A computer worm is a self-replicating program that doesn't have to copy itself to a host program or require human interaction to spread. Its main function is to infect other computers while remaining active on the infected system. Worms often spread using parts of an operating system that are automatic and invisible to the user. Once a worm enters a system, it immediately starts replicating itself, infecting computers and networks that aren't adequately protected.





- **Botnets-** A botnet is a collection of Internet-connected devices, including PCs, mobile devices, servers and IoT devices that are infected and remotely controlled by a common type of malware. Typically, the botnet malware searches for vulnerable devices across the internet. The goal of the threat actor creating a botnet is to infect as many connected devices as possible, using the computing power and resources of those devices for automated tasks that generally remain hidden to the users of the devices.
- **Drive-by download attacks-** In a drive-by download attack, malicious code is downloaded from a website via a browser, application or integrated operating system without a user's permission or knowledge. A user doesn't have to click on anything to activate the download. Just accessing or browsing a website can start a download. Cybercriminals can use drive-by downloads to inject banking Trojans, steal and collect personal information as well as introduce exploit kits or other malware to endpoints.
- **Phishing attacks-** Phishing attacks are a type of information security threat that employs social engineering to trick users into breaking normal security practices and giving up confidential information, including names, addresses, login credentials, Social Security numbers, credit card information and other financial information. In most cases, hackers send out fake emails that look as if they're coming from legitimate sources, such as financial institutions, eBay, PayPal -- and even friends and colleagues. In phishing attacks, hackers attempt to get users to take some recommended action, such as clicking on links in emails that take them to fraudulent websites that ask for personal information or install malware on their devices. Opening attachments in emails can also install malware on users' devices that are designed to harvest sensitive information, send out emails to their contacts or provide remote access to their devices.
- **Distributed denial-of-service (DDoS) attacks-** In a distributed denial-of-service (DDoS) attack, multiple compromised machines attack a target, such as a server, website or other network resource, making the target totally inoperable. The flood of connection requests, incoming messages or malformed packets forces the target system to slow down or to crash and shut down, denying service to legitimate users or systems.
- **Ransomware-** In a ransomware attack, the victim's computer is locked, typically by encryption, which keeps the victim from using the device or data that's stored on it. To regain access to the device or data, the victim has to pay the hacker a ransom, typically in a virtual currency such as Bitcoin. Ransomware can be spread via malicious email attachments, infected software apps, infected external storage devices and compromised websites.
- **Malvertising-** Malvertising is a technique cybercriminals use to inject malicious code into legitimate online advertising networks and web pages. This code typically redirects users to malicious websites or installs malware on their computers or mobile devices. Users' machines may get infected even if they don't click on

anything to start the download. Cybercriminals may use malvertising to deploy a variety of moneymaking malware, including cryptomining scripts, ransomware and banking Trojans.



## 5.9 SECURITY MEASURES

To control the threats to information systems and the degree of vulnerability, an organisation must invest in proper security. The objective is to reduce significantly the incidence of failures, erroneous human actions, and predict and prepare for contingencies to minimise the damaging impact. Manual measures include security policies, procedures, rules and operations discipline which creates awareness about security and enforces administrative discipline in work process across the organisation. Automated measures such as smart cards, Id's , view monitors and such other devices are built in security mechanisms of physical infrastructure and information systems infrastructure. Some of these measures are security controls, fault tolerant computer systems, physical access control, usage monitoring, employee evaluation, entry level security codes, biometric security, audit trail, virus entry protection, firewalls, encryption, etc.

In a few words, the following processes and tools will give you a **basic level security** against the most common IT risks:

- **Use strong passwords** as Strong passwords are vital to good online security. Make your password difficult to guess. Create a **password policy** for the business to help staff follow security best practices.
- **Control access** Make sure that individuals can only access data and services for which they are authorised. This can be done by: controlling physical access to premises and computers network; restricting access to unauthorised users; limiting access to data or services through application controls; restricting what can be copied from the system and saved to storage devices and by limiting sending and receiving of certain types of email attachments.
- **Firewalls** Firewalls are effective gatekeepers between the computer and the internet, and one of the major barriers to prevent the spread of cyber threats such as viruses and malware.
- **Use security software** Use security software, such as anti-spyware, anti-malware and anti-virus programs, to help detect and remove malicious code if it slips into your network.
- **Update programs and systems regularly** Updates contain vital security upgrades that help protect against known bugs and vulnerabilities. Make sure to keep software and devices up-to-date to avoid falling prey to criminals.
- **Monitor for intrusion** Use intrusion detectors to monitor system and unusual network activity. If a detection system suspects a potential security breach, it can generate an alarm, such as an email alert, based upon the type of activity it has identified.



- **Raise awareness** Employees have a responsibility to help keep the business secure. Make sure that they understand their role and any relevant policies and procedures, and provide them with regular cyber security awareness and training.

## 5.10 WORMS AND VIRUSES

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Viruses and worms are computer programs with malicious intent. Most often, viruses are programs that attach themselves to executable or non-executable files and replicate themselves when the infected host file is activated. Then the virus program gets executed and copies itself to other files on the system or carries out a malicious activity like deletion of files, disruption of user work, etc. A virus could be a file virus, boot sector virus, script virus or a macro virus.

Some examples of viruses are blaster, slammer, creeper, rainbow, etc.

Worms are stand-alone malicious programs and so do not need the host file to be activated. They can operate on their own without attaching to other computer program files and rely less on human behaviour in order to spread. After entering the system through a network or infected file, the worm can execute and replicate itself. It does not need any event for triggering it. It can make numerous copies which spread across the network and can rapidly infect servers or computers. They can spread through emails, internet, servers, downloads, and even messages. Some examples of worms are storm, Morris, etc.

## 5.11 CHAPTER SUMMARY

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The computer system is the key technology of the modern era and is central and essential to operations in the modern industry, business and service sector. And their impact on the society, environment, etc is going to increase manifold. Today, computer is considered as the most life changing and successful invention in our life. It is difficult for a business to survive without adopting computers in their business processes.

Computers have brought people closer and has facilitated contacts between them through emails, videoconferencing, social medias, chats, etc. Television, print media, etc. has also been influenced by computers right from the stage of production, control, storage to broadcasting. With the help of computers, we can create document, display on screen, modify and then print or publish it through www. Social networking sites opens yet another sophisticated but easy to use communication.

Businesses need to pay special attention to information system security. In addition to losses from theft of financial data, the difficulties of eradicating the malicious software or repairing damage caused by identity theft add to operational costs and make both businesses and individuals less effective. Hence, security and control should be a top priority. To control the threats to information systems and the degree of vulnerability, an organisation must invest in proper security. The objective is to reduce significantly the incidence of failures, erroneous human actions, and predict and prepare for contingencies to minimise the damaging impact. Manual measures include security policies, procedures, rules and operations discipline which creates awareness about security and enforces administrative discipline in work process across the organisation. Automated measures such as smart

cards, Id's , view monitors and such other devices are built in security mechanisms of physical infrastructure and information systems infrastructure.

NOTES



## 5.12 REVIEW QUESTIONS

### SHORT ANSWER TYPE QUESTIONS

1. What do you understand by threat to information system?
2. What is privacy?
3. What is cyber-crime?
4. In what forms can a cyber-crime occur?
5. What is distortion?

### LONG ANSWER TYPE QUESTIONS

1. Explain the moral dimensions to the use of IT.
2. In what ways does IT impact a society.
3. Explain the various major security threats.
4. What measures can be taken to tackle the security threats.
5. Differentiate between worms and viruses.

## 5.13 MULTIPLE CHOICE QUESTIONS

1. \_\_\_ is a moral dimension to the use of IT
  - a. Accountability and control
  - b. Quality of life
  - c. System quality
  - d. All of the above
2. Individuals and organisations exist in a society in a \_\_\_ environment
  - a. Social
  - b. Ethical
  - c. Legal
  - d. Ecological
3. Loss of \_\_\_ can result in exposure to personal data.
  - a. Morality
  - b. Privacy
  - c. Piracy
  - d. Ethics
4. \_\_\_ is a crime that involves a computer and network
  - a. Computer crime
  - b. Network crime
  - c. Cyber crime
  - d. LAN crime
5. Form of cyber crime
  - a. Fraud

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- b. Stealing of Intellectual property
  - c. Digital piracy
  - d. All of the above
6. **Counterfeiting is a \_\_\_\_\_**
- a. Virus
  - b. Worm
  - c. Cyber crime
  - d. Moral issue
7. **\_\_\_\_\_ is a powerful way to distract you, cost you time and money like ransomware attacks**
- a. Deterioration
  - b. Distortion
  - c. Money laundering
  - d. Disruption
8. **\_\_\_\_\_ results in distrusting the integrity of information or mistakenly trust false information.**
- a. Deterioration
  - b. Distortion
  - c. Money laundering
  - d. Disruption
9. **\_\_\_\_\_ is a manual measure while \_\_\_\_\_ is an automated security measure.**
- a. Biometric security, security policies
  - b. Security policies, biometric security
  - c. Rules, procedures, physical access control, fault tolerant systems
10. **\_\_\_\_\_ is a malicious program that does not require human intervention.**
- a. Fraud
  - b. Virus
  - c. Worm
  - d. Distortion

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# ANSWER KEY

## UNIT I

QUES.	ANSWERS	QUES.	ANSWERS
1.	b.	6.	b.
2.	a.	7.	d.
3.	c.	8.	a.
4.	a.	9.	d.
5.	c.	10.	c.

## UNIT II

QUES.	ANSWERS	QUES.	ANSWERS
1.	b.	6.	d.
2.	c.	7.	a.
3.	a.	8.	c.
4.	c.	9.	d.
5.	c.	10.	a.

## UNIT III

QUES.	ANSWERS	QUES.	ANSWERS
1.	b.	6.	b.
2.	c.	7.	b.
3.	a.	8.	a.
4.	c.	9.	c.
5.	b.	10.	b.

## UNIT IV

QUES.	ANSWERS	QUES.	ANSWERS
1.	c.	6.	a.
2.	b.	7.	a.
3.	a.	8.	c.
4.	c.	9.	d.
5.	b.	10.	d.

## UNIT V

QUES.	ANSWERS	QUES.	ANSWERS
1.	d.	6.	c.
2.	a.	7.	b.
3.	b.	8.	a.
4.	c.	9.	b.
5.	d.	10.	c.

# NOTE

# NOTE



# NOTE

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