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M.Com Sem. I
Management Information System
Paper : MC-106
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INTRODUCTORY LETTER

Dear Learner, we applaud you for joining University School of Open Learning as student in the First semester of M.Com Class. Hope you will enhance your knowledge and improve your employability skills under distance learning mode.

This module has been prepared on the subject Management Information System of Paper MC-106 . You are advised to go through the Prescribed syllabus in the beginning and prepare for your exams and assignment accordingly.

Management Information System can be defined as system that is designed to organize systematically and analyze accurately the data or information which is gathered, analyzed, and distributed on continuous basis from internal as well as external sources of an organization. The objective of such system is to provide the basis for Strategic decisions.

Under this module, you will able to understand the concept, importance, need and advantages of MIS & its relevance with other disciplines, Multiple approached to the Structure of MIS, Information System and its types, methodologies in developing and implementation Of System, other various safety issues of Information System.

The module has been divided into four units. Each unit further contains lessons as per the prescribed suyllabus. This module aims at addressing the needs of the distance learners. The module has been designed to meet the requirements of today's student who are no satisfied with the conventional teaching methodologies and learning material. Thus every effort has been made to make your journey through this module has been divided into four units encompassing ten chapter as prescribed in your syllabus.

These lesson scripts are to aid you in learning and you have to supplement it with some important books as given in the suggested readings, For optimum benefit and learning you must do the self assessment exercises and activities given in the lesson. These will definitely help you in picking up the important concepts easily. Every effort has been made to ensure that after going through the lessons you will be confident in writing your exams and your assignments.

Wishing you the very best of luck.....

DCMS, USOL

LESSON 1: MIS INTRODUCTION

STRUCTURE

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Definition
- 1.3 Characteristics
- 1.4 *MIS for an Organization*
- 1.1 Problems and Solutions in Implementing MIS
- 1.2 Benefits of MIS
- 1.3 Limitations of MIS
- 1.4 Sub-System of MIS
- 1.5 Impact of MIS
- 1.6 Objectives of MIS
- 1.7 Factors responsible for Development of MIS
- 1.8 Summary
- 1.9 Glossary
- 1.10 References
- 1.11 Further Readings
- 1.12 Model Questions

1.0 OBJECTIVES

After studying this lesson you will be able to:

1. Understand the concept and definition of Management Information System
2. The advantages and disadvantages of MIS.
3. The significance and role of MIS.

1.1 Introduction

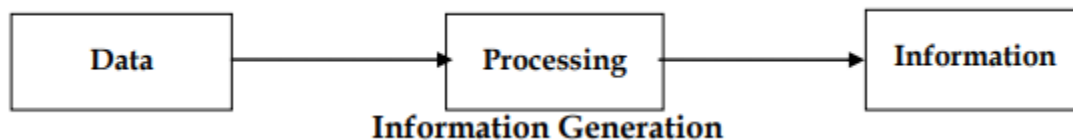
MIS stands for management information systems. Management information system is that system which allows the managers to make decisions for the successful operation of the businesses. MIS also refers to the organizations that develop and maintain most of the computer system in the enterprise helpful for the managers to make decisions.

Management Information Systems (MIS), referred to as Information Management and Systems, is the discipline covering the application of people, technologies, and procedures collectively called information systems, to solving business problems. "MIS' is a planned system of collecting, storing and disseminating data in the form of information needed to carry out the functions of management." Academically, the term is commonly used to refer to the group of information management methods tied to the automation or support of human decision making, e.g. Decision Support Systems, Expert Systems, and Executive Information Systems.

Management : Management is art of getting things done through and with the people in formally organized groups. The basic functions performed by a manager in an organization are: Planning, controlling, staffing, organizing, and directing.

Information : Information is considered as valuable component of an organization. Information is data that is processed and is presented in a form which assists decision maker.

System : A system is defined as a set of elements which are joined together to achieve a common objective. The elements are interrelated and interdependent. Thus every system is said to be composed of subsystems. A system has one or multiple inputs, these inputs are processed through a transformation process to convert these input(s) to output.



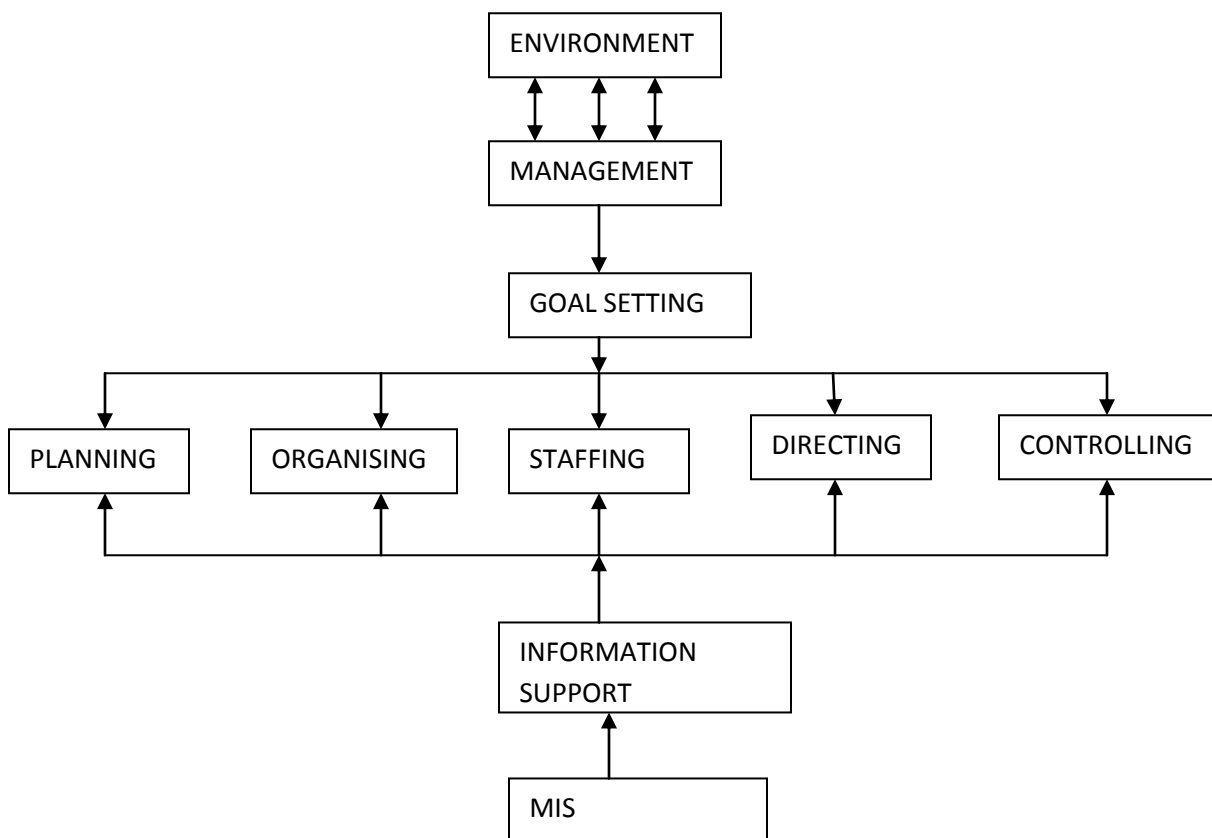
It refers to a computer- based system that provides managers with the tools for organizing, evaluating and efficiently running the departments of the organization. it helps in providing past, present and prediction information. The use of software helps in fast decision making, data resources, decision support systems, people management, project management etc to help the departments run efficiently.

Intoday's world MIS is a computerized business processing system which is helpful in generating information for the people in the organization to meet the information. It also helps in better decisionmaking so asto achieve the corporate objective of the organization.

The main goal of MIS in an organization is to deliver information systems to the various levels of corporate managers. MIS professionals create and support the computer system throughout the company. MIS is a complex system comprising of different subsystems in which data is processed and the information generated as a result is used at different levels of management from top to bottom level.

The management analyzes the environment and then sets goals and objectives to be accomplished. To perform the task information is required. To perform functions like planning, organizing, staffing, directing and controlling the information is provided or supplied by the MIS.

Fig1.1: Purpose of MIS in Management



While managing the information at each of the three levels, consider aspects need consideration:

- An information management solution must be provided for staff at each of the three levels.

- If corporate solutions aren't provided, then staff will find their own solutions. This is the source of poor-quality intranet sub-sites, and other undesirable approaches
- A clear policy must be developed, outlining when and how it will apply at all the three levels and how information should be managed at each level.
- Processes must be put in place to 'bubble up' or 'promote' information from lower levels to higher levels. For example, some team-generated information will be critical for the whole organization.

As much as possible, a seamless information management environment should be delivered that covers all the three levels.

EVOLUTION OF MIS

Before the concept of management information systems was created, computer scientists were just programmers creating applications for science and math calculations. As computer usage evolved in fields of business and data management, software applications were needed to process nonscientific data. A field of study would be needed to bridge the gap between computer programmers and the business world to create information-based applications for business and networks. Mainframe Processing of Data

- In 1939, Dr. John V. Atanasoff and his assistant Clifford Berry, constructed the first electronic digital computer. Their machine, the Atanasoff-Berry-Computer (ABC) provided the foundation for the advances in electronic digital computers. These computers processed binary bits of information and performed mathematical computations for science projects. The invention of the first mainframe computer led to a career field established as Computer Science. The category of Computer Science was given because computer usage was strictly related to the science field and the processing of scientific data. The ENIAC Computer

- In 1944, a leap in computer processing would take place with the ENIAC computer. The ENIAC Computer is the prototype from which all modern computers evolved from. The ENIAC comprised thirty separate units and weighed more than thirty tons and consumed 200 kilowatts of electrical power. The ENIAC was still used for the processing of scientific data in the field of ballistics and played a role in the development of the atomic bomb. On the horizon was the concept of applying computers in other areas of education, business and everyday life. The

concept of creating business applications would emerge with IBM creating the 8-bit punch card system. The processing of punch cards from a business perspective would become known throughout the industry as "information science application".

Purpose of Management Information System

Information processing is a major social activity. A significant part of an individual's working and personal time is spent in recording, searching for, and absorbing information, as much as 80% of a typical executive's time is spent on processing and communication information. Their duties involve the production and use of information outputs documents, reports, analysis, plans, etc.

The system provides information on past, present, and project future and on relevant events inside and outside the organization in the society. it may be define as planned and integrated system for gathering relevant data,covering it in to right time. The main purpose of **management information system** is to provide the right and correct information to the right people at right time.

Another important purpose of **management information system** is that it is needed by all business organization because of increased complexity and rate of change of today's business environment foe example marketing manager needs information about sales performance and trends financial manager needs information on returns, production manager needs information analyzing resources requirement and workers productivity and personnel manager needs information analyzing resources requirements and workers productivity and personnel manager needs information concerning employee compensation and professional development. thus effective managers with the specific marketing,financial,production and personnel information, and products they require to support their decision making responsibilities.

1.2 Definition

MIS is a combination of 3 English Letters:

M which stands for Management

I which stands for Information

S which stands for System

With the help of these 3 letters we can make a number of combinations:

MI = Management Information means information regarding management.

MS= management System means the basic structure of the management like the hierarchical order of management.

IS= Information System which provides the information

SM= System Management means how to manage a system whether it is a business, organization etc

SI = System Information means the information regarding the system like what are the different parts of the system, how they relate to each other etc.

IM = Information Management means how to manage a particular information.

MIS = Management Information System.

The MIS can be defined as a system which helps to provides information support for decisionmaking in the organization.

The MIS is defined as an integrated system of man and machine for providing the information to support the operations, the management and the decision making function in the organization.

The MIS can also be defined as a system based on the database of the organization evolved for the purpose of providing information to the people in the organization.

Another definition of MIS is that it is a Computer based Information System.

Definition of Management Information System

Management Information System can be defined as a formal method of collecting timely information in a presentable form. in order to facilitate effective decision making and implementation, in order to carry out organizational operations for the purpose of achieving the organizational goal. A **management information system** is a system design to provide selected decision –orientation information needed by management plan, control and evaluate the activities of the corporation. It is designed within the frame work that emphasizes profit,

planning, performance planning and control at all levels. It complements the ultimate integration of required business information sub system both financial with in the company.

According to Philip kolter A marketing information system consist of people, equipment and procedures together,sort,analyse,evaluate and distribute the needed timely and accurate information and marketing decision makers.

Professor Allen S. Lee states that research in the information system field examines more than the technological system,or just the social system or even the two side by side in addition it investigates the phenomena that emerge when the two interact.

An information system can be any organized combination of people, hardware, software, communication network and data resources that collects, transforms and disseminates information in an organization.

Essential Requirement of an Effective MIS :

(i) **Qualified System and Management Staff:** The prerequisite of an effective MIS is that it should be managed by qualified officers. These officers should have a mutual understanding about the roles and responsibilities of each other. be understand clearly the view of their fellow officers. For this, each organization should have two categories of officers :

(a) **System and Computer Experts** who in addition to their expertise in their subject area , they should also be capable of understanding management concepts to facilitate the understanding of problems asked by concern. They should also be clear about the process of decision making and information requirements for planning.

(b) **Management experts** who should also understand quite-clearly the concepts and operations of a computer. This basic knowledge of computer will be useful will place them in a comfortable position, while working with systems, technicians in designing or other-wise, of the information system.

(ii) **Futuristic Perspective:** An effective MIS should be capable of meeting the future requirements of its executives as well. This capability can be achieved by regular monitoring and updating the MIS.

(iii) Support of Top Management: For a management information system to be effective, it must receive the full support of top management.

The Reasons for this are: (a) Subordinate managers are usually lethargic about activities which do not receive the support of their superiors. (b) The resources involved in computer-based information system are larger and are growing larger and larger in view of importance gained by management information system.

(iv) Common Database: It is an integrated collection of data and information which is utilized by several information subsystems of an organization. A common database may be defined as a super file which consolidates and integrates data records formerly stored in a separate data file. Such a database can be organized as an integrated collection of data records into a single super file or it can be organized as an integrated collection of several data file.

(v) Control and maintenance of MIS: Control of the MIS means the operation of the system as it was designed to operate. Sometimes, users develop their own procedures or short cut methods to use the system which reduces its effectiveness.

ROLE OF THE MANAGEMENT INFORMATION SYSTEM:

The role of the MIS in an organization can be compared to the role of heart in the body. The information is the blood and MIS is the heart. In the body the heart plays the role of supplying pure blood to all the elements of the body including the brain. The heart works faster and supplies more blood when needed. It regulates and controls the incoming impure blood, processes it and sends it to the destination in the quantity needed. It fulfills the needs of blood supply to human body in normal course and also in crisis.

The MIS plays exactly the same role in the organization.

(1) The system ensures that an appropriate data is collected from the various sources, processed, and sent further to all the needy destinations. The system is expected to fulfill the information needs of an individual, a group of individuals, the management functionaries: the managers and the top management.

(2) The MIS satisfies the diverse needs through a variety of systems such as Query Systems, Analysis Systems, Modeling Systems and Decision Support Systems the MIS helps in Strategic Planning, Management Control, Operational Control and Transaction Processing.

(3) The MIS helps the clerical personnel in the transaction processing and answers their queries on the data pertaining to the transaction, the status of a particular record and references on a variety of documents. The MIS helps the junior management personnel by providing the operational data for planning, scheduling and control, and helps them further in decision making at the operations level to correct an out of control situation.

(4) The MIS helps the middle management in short term planning, target setting and controlling the business functions. It is supported by the use of the management tools of planning and control. The MIS helps the top management in goal setting, strategic planning and evolving the business plans and their implementation.

(5) The MIS plays the role of information generation, communication, problem identification and helps in the process of decision making. The MIS, therefore, plays a vital role in the management, administration and operations of an organization.

1.3 Characteristics

1. Management oriented: The system is designed from the top to work downwards. It does not mean that the system is designed to provide information directly to the top management. Other levels of management are also provided with relevant information.

2. Management directed: Management orientation of MIS, it is necessary that management should continuously make reviews. For example, in the marketing information system, the management must determine what sales information is necessary to improve its control over marketing operations.

3. Integrated: The word 'integration' means that system has to cover of all the functional areas of an organization so as to produce more meaningful management information, with a view to achieving the objectives of the organization. It has to consider various sub-Systems, their objectives, information needs, and recognize the independence, that these sub-systems have amongst themselves, so that common areas of information are identified and processed without repetition and overlapping. For example, in the development of an effective production scheduling system, a proper balance amongst the following factors is desired:

i. Set up costs

- ii. Overtime
- iii. Manpower
- iv. Production capacity
- v. Inventory level
- vi. Money available
- vii. Customer service.

4. Common data flows: The integration concept of MIS, common data flow concept avoids repetition and overlapping in data collection and storage, combining similar functions, and simplifying operations wherever possible. For example, in the marketing operations, orders received for goods /become the basis billing of goods ordered, setting up of the accounts receivable, initiating production activity, sales analysis and forecasting etc.

5. Heavy element: A management information system cannot be established overnight. It takes almost 2 to 4 years to establish it successfully in an organization. Hence, long-term planning is required for MIS development in order to fulfill the future needs and objectives of the organization. The designer of an information system should therefore ensure that it would not become obsolete before it actually gets into operation. An example of such a feature of MIS may be seen in a transportation system where a highway is designed not to handle today's traffic requirements but to handle the traffic requirements five to ten years.

6. Flexibility and ease of use: While building an MIS system all types of possible means, which may occur in future, are added to make it flexible. A feature that often goes with flexibility is the ease of use. The MIS should be able to incorporate all those features that make it readily accessible to wide range of users with easy usability.

Characteristics of Management Information System

Management information system and top management - management information system is a comprehensive and coordinated set of information subsystems which are rationally integrated and which transform data information in a variety of ways to enhance productivity in conformity with the manager's style and characteristics on the basis of established quality.

1. Management oriented - the system is designed from top to bottom. This does not mean that the system will be geared to providing information directly to top management rather it means that the system development starts from an appraisal of management needs and overall business objectives it is possible that top management is the focus of the system such as their needs cornerstone on which the system is built for example- a marketing information system basic sales order processing the shipment of goods to the customers and the billing of the goods are fundamental operation control activities, however if the system is designed properly this transaction information can be traced by salesman, sales territory, size of order, geography and product line furthermore if designed with strategic management needs in mind external competition market and economic data can be created to give a picture of how well the company's product are faring in their marketing environment and to serve as a basic of new product or marketplace introduction the initial application can be geared to the operational and management control areas but in such a way as not preclude its integration into a strategic planning subsystem for upper management.

2. Management directed - because of the management information system it is imperative that management actively directs the system development efforts to determine what information is necessary to improve its control of operation it is rare to find an management information system where the manager himself or a high level representative of his department is not spending a good deal of time in system design it is not a non time involvement for continued review and participation are necessary to ensure that the implemented system meets the specification of the system that designed therefore management is responsible for setting system specification and it must play a major role in subsequent trade off decision that inevitably occur in system development. An important element of effective system planning is the process for determining the priority of application development. Management must control this process if a management information system is the objectives. A company without a formal application

approval cycle and a management steering to determine priorities will never develop an **management information system**.

3. Integrated - integration is significant because of the ability to produce more meaningful management information for example in order to develop an effective production scheduling system we must balance such factors as:

A. Set up cost.

B. Work force.

C. Overtime rates.

D. Production capacity.

E. Capital requirement

D. Customer service.

4. Common data flows - Because of the integration concept of **management information system** there is an opportunity to avoid duplication and redundancy in data gathering storage and dissemination for example customer orders are the basic for billing the customer for goods ordered setting up the accounts receivable initiating production activity sales analysis sales forecasting and so on it is prudent to capture this data closest to the source where the event occur and use it throughout the functional area it is also prudent to capture it once and thus avoid the duplicate entry of sources data into several system.

5. Heavy planning elements - **Management information system** do not occur overnight they take from three to five years and longer to get established firmly within a company a heavy planning element must be present in **management information system** development the **management information system** designer must have the future objectives and needs of the company firmly in mind. the designer must avoid the possibility of system obsolescence before the system planning is an essential ingredient to successful **management information**

system the management information system provides meaningful direction towards which one strives.

6. Sub-system concept - In tackling a project as broad and complex in scope as a management information system, one just avoid losing sight both the forest and the trees. Even though the system is viewed as a single entity, it must be broken down into digestible sub-system that can be implemented one at a time. The breakdown of management information system into meaningful subsystems set the stage for prioritized implementation. The subsystem analysis is essential for applying boundaries to the problem, thus enabling the designer to focus on manageable entities that can be assigned and computerized by selected system and programming team.

7. Flexibility and ease of use - Despite a careful analysis of the future management information needs it is impossible to predict what is desire their to five year hence. This is true in most industries and especially in industries with rapid change patterns, it is naïve to think that if anyone possesses the omniscience to predict the future with this aa a premise, the next best thing an management information system developer can do is to built in the flexibility to incorporate as many manufacture nuances as possible.

8. Data base - The data is the mortar that holds the functional system together each system requires access to a master file or data covering inventory, personnel, vendors, customers, general ledger, work in progress and so on. If the data is stored efficiently and with common usages in mind one master file can provide the data needed by any of the functional system. It seems logical to gather data once, properly validate it and place it on a central storage medium that can be accessed by any system. However it is not unusual to find a company with multiple data files, one serving one functional system and another serving another system.

9. Distributed data processing - The majority of the companies implementing management information system have a geographic network of sale office, distribution channel, manufacturing plants,divison,subdivision and so on some of these entities are operated in a completely independent fashion and therefore may not be part of the integrated management

information system more often than not, the remote site to have the connection with each other and with a host of operation in order to create a effective **management information system** with geographical boundaries some from of distributed data processing is necessary. Distributed data processing can be thought of as the delivery system, placing information in the hands of those who need it when they need it.

10. Information as a resource - Providing the entire organization must be a concept that information is a valuable resource particularly in the management control and strategic planning areas must be properly managed. This is a subtle but important change in thinking. It was a common in the past to view the data processing.

1.4 MIS for an Organization

To facilitate the management decision making at all levels of company, the MIS must be integrated. MIS units are company wide. MIS is available for the Top management. The top management of company should play an active role in designing, modifying and maintenance of the total organization wide management information system. Information system and Information technology have become a vital component of any successful business and are regarded as major functional areas just like any other functional area of a business organization like marketing, finance, production and HR. Thus it is important to understand the area of information system just like any other functional area in the business. MIS is important because all businesses have a need for information about the tasks which are to be performed. Information and technology is used as a tool for solving problems and providing opportunities for increasing productivity and quality. Information has always been important but it has never been so available, so current and so overwhelming. Efforts have been made for collection and retrieval of information, However, challenges still remain in the selection analysis and interpretation of the information that will further improve decision making and productivity.

MIS for a Business Organization :

1. Support the Business Process : Treats inputs as a request from the customer and outputs as services to customer. Supports current operations and use the system to influence further way of working.

2. Support Operation of a Business Organization : MIS supports operations of a business organization by giving timely information, maintenance and enhancement which provides flexibility in the operation of an organizations.

3. To Support Decision Making : MIS supports the decision making by employee in their daily operations. MIS also supports managers in decision making to meet the goals and objectives of the organization. Different mathematical models and IT tools are used for the purpose evolving strategies to meet competitive needs.

4. Strategies for an Organization : Today each business is running in a competitive market. MIS supports the organization to evolve appropriate strategies for the business to assented in a competitive environment.

While developing an information management strategy within an organization, it is useful to consider information's need at on three levels:

- Corporate (Top Level)
- Team, Division, Business Unit (Middle Level)
- Individual (Low Level)

The needs of each of these three levels must be met if a coordinated and effective solution is to be maintained in the long-term.

Failure to address any one of the levels will lead to areas of the business or individuals finding their own solution, which may not fit well within the strategic goals of the organization.

Corporate (Top Level Information) : At the top level corporate information's that

is useful for the whole organization. This 'global' information is generally well addressed by the corporate intranet. Examples of corporate information include policies and procedures, HR information, online forms, phone directory, etc. Interestingly, there may be a limited amount of truly global information, and it may not deliver the greatest (measurable) business benefits.

Team, division, business unit (Middle level) : The middle level is perhaps the most important, as it covers all the information shared within teams, divisions, business units, etc. This information may be critical to the day-to-day activities of the group, but of little interest to the rest of the organization. Examples include project documentation, business unit specific content, meeting minutes, etc. This level is generally poorly-served within organizations, although collaboration tools are increasingly being used to address team information needs.

It is also being recognized that it is the 'local' information that may be the most valuable, in terms of driving the day-to-day activity of the organization.

Individual (Low Level): At the lowest level the personal information need of staff exists throughout the organization. Examples include correspondence, reports and spreadsheets. In most organizations, staff must struggle with using email to meet their information management needs. While staff generally recognizes the inadequacy of e-mail, they have few other approaches or technologies at their disposal.

ACTIVITIES

Q: 1 Give 3 reasons for using computers for MIS in the organization?

Q: 2 Can you think of an MIS which could be user independent and business dependent?

1.5 Problems and Solutions in Implementing MIS

Management process issues speak to the functional operation of an organization such as budgeting, personnel, and general management creating problems in the implementation of an MIS.

- *Organizational environment issues* are identified as factors which are less tangible such as organizational culture, change, and behavior.
- *Leadership issues* relate to the areas which involve the interaction and direction of the organization executive.
- *Technical systems issues* are mainly those referring to the hardware and software considerations of information technologies.
- *Personnel issues* are those issues surrounding each individual in the organization.

1.6 Benefits of MIS

The BENEFITS OF MIS for an organization are as follows:

1. It helps to provide timely, accurate, scientific, reliable and permanent information.
2. It avoids duplication of efforts
3. It helps to coordinate the whole organization.
4. It helps to provide information to information seeker.
5. It helps in better decision making.
6. It helps in scientific decision making.
7. It helps in fast and speedy retrieval of data.

It helps to widen the scope of use of information system

1.7 Limitations of MIS

The dynamic nature of MIS makes it difficult for some organizations to keep up with the principles, strategies, propositions or even ideas. The limitations with MIS are as follows:

- Different situations call for different decisions to be made. This poses challenges to MIS theorists since some MIS tend to not be adaptable.
 - The institutionalization, programming, monitoring and evaluating MIS requires a lot of expertise—something which numerous organizations lack.
 - The running of MIS programs tends to be relatively costly for some organization—especially small ones who are not well-endowed financially.
 - MIS is more of a science-oriented field while business is art-oriented. Consequently, finding a middle ground where the two can be linked is quite challenging to some people.
 - Most organizations do not have a well-defined decision making system. So even with the right MIS tools, very little can be achieved in terms of improving decision-making.
1. MIS cannot replace managerial judgments in decision making. It is merely an effective tool for the managers in decision making and problem solving
 2. The quality of output of MIS is directly proportional to the quality of input and processes.
 3. MIS cannot provide tailor made information packages. It is required to analyze the available information before decision making
 4. In a fast changing and complex environments, MIS may not have enough flexibility to update itself quickly.
 5. MIS takes only quantitative factors into account
 6. MIS is less useful for making non-programmed decisions
 7. MIS is less effective in organizations where information is not being shared with others
 8. MIS is less effective due to frequent changes in top management or organizational structure and operational staff.

Further limitations:

1. Aggression - The people may hit back at the system and may even sabotage it by using equipment incorrectly by putting incomplete information into the system or by actual destruction of hardware or software.

2. Projection - It is a psychological mechanism of blaming difficulties on someone or

something else. When employees blame the management information system for problems caused by human error or other factors unrelated to the system, projection is taking place.

3. Avoidance - It occurs when individuals defend themselves by withdrawing from or avoiding a frustrating situation. Managers may avoid the system by ignoring its output, in favour of their own information sources.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

A. Management information systems (MIS):

1. create and share documents that support day-today office activities
2. process business transactions (e.g., time cards, payments, orders, etc.)
3. capture and reproduce the knowledge of an expert problem solver
4. use the transaction data to produce information needed by managers to run the business
5. none of the above

B. The term used to describe those people whose jobs involve sponsoring and funding the project to develop, operate, and maintain the information system is

1. information worker
2. internal system user
3. systems owner
4. external system user
5. systems builder

C. The person who ensures that systems are developed on time, within budget, and with acceptable quality is a

1. systems designer
2. project manager
3. systems owner
4. external system user
5. systems builder

1.8 Sub-System of MIS

The system approach applies equally to management information system as well. The management information system receives input from various internal and external sources. These inputs are processed through the MIS to produce the desired output, which may be in turn used for different managerial tasks within the organization. MIS has several subsystems which are interdependent, interrelated and interacting.

The Sub-Systems within the MIS are :

- **Computer System:** The computer system as a subsystem of MIS includes the hardware, the operating system and the software.
- **Management:** The management system as a subsystem of MIS includes the managerial task relating to the effective functioning. It includes planning, control and co-ordination, human resource development etc.
- **System Engineering:** The system engineering subsystem of MIS includes system design and development as well as system maintenance. The synergistic combination of hardware and system engineering is evolved into software engineering. Software engineering as defined by Fritz Bauer, as the establishment and use of engineering principles in order to obtain economically feasible software that is reliable and works efficiently on real machines.
- **Application:** The application subsystem of MIS includes various applications system, which are developed and implemented to the desired outputs. This process of integration of business system with management information system involves three key elements. They are :
 - a) Technology
 - b) People
 - c) Business

Technology: Technology provides the bridge between the business systems, their information needs on one side, the means of providing these information needs on the other. Technology provides the tools and techniques that help to generate the information that are required for the business system. Selection of the appropriate technology has got bearing on effectiveness of the bridge.

People: People generate the required information and apply the same for business planning, control and decision making. The attitude and aspiration of the people involved in generating and utilizing the information has a bearing on effective use of integrated system.

Business: The business function and the environment in which the business organization have an impact on the entire integration exercise.

1.9 IMPACT OF THE MANAGEMENT INFORMATION SYSTEM

Since the MIS plays a very important role in the organization, it creates an impact on the organization's functions, performance and productivity. The impact of MIS on the functions is in its management. With a good support, the management of marketing, finance, production and personnel become more efficient. The tracking and monitoring of the functional targets becomes easy.

The functional managers are informed about the progress, achievements and shortfalls in the probable trends in the various aspects of business. This helps in

forecasting and long-term perspective planning. The manager's attention is brought to a situation which is exceptional in nature, inducing him to take an action or a decision in the matter. A disciplined information reporting system creates a structured data and knowledge base for all the people in the organization. The information is available in such a form that it can be used straight away or by blending analysis, saving the managers valuable time.

The MIS creates another impact in the organization which relates to the understanding of the business itself. The MIS begins with the definition of a data entity and its attributes. It uses a dictionary of data, entity and attributes, respectively, designed for information generation in the organization. Since all the information systems use the dictionary, there is common understanding of terms and terminology in the organization bringing clarity in the communication and a similar understanding even of the organization.

The MIS calls for a systemization of the business operation for an effective system design. A well designed system with a focus on the manager makes an impact on the managerial efficiency. The fund of information motivates an enlightened manager to use a variety of tools of the management. It helps him to resort to such exercises as experimentation and modeling. The use of computers enables him to use the tool techniques which are impossible to use manually. The ready-made packages make this task simpler. The impact is on the managerial ability to perform. It improves the decision making ability considerably.

Since the MIS works on the basic systems such as transaction processing and databases, the drudgery of the clerical work is transferred to the computerized system, relieving the human mind for better work. It will be observed that a lot of manpower is engaged in this activity in the organization. If you study the individual's time utilization and its application; you will find that seventy per cent of the time is spent in recording, searching, processing and communication. This is a large overhead in the organization. The MIS has a direct impact on this overhead. It creates an information-based work culture in the organization.

The impact of the Management Information System: The impact of MIS on the functions is in its management. With a good MIS support, the management of marketing, finance, production and personnel becomes more efficient, the tracking and monitoring the functional targets becomes easy. The functional managers are informed about the progress, achievements and

shortfalls in the activity and the targets. The manager is kept alert by providing certain information indicating the probable trends in the various aspects of business. This helps in forecasting and long-term perspective planning. The manager's attention is brought to a situation which is exceptional in nature, inducing him to take an action or a decision in the matter. A disciplined information reporting system creates a structured database and a knowledge base for all the people in the organization. The information is available in such a form that it can be used straight away or by blending and analysis, saving the manager's valuable time. The MIS creates another impact in the organization which relates to the understanding of the business itself. The MIS begins with the definition of a data entity and its attributes. It uses a dictionary of data, entity and attributes, respectively, designed for information generation in the organization. Since all the information systems use the dictionary, there is common understanding of terms and terminology in the organization bringing clarity in the communication and a similar understanding of an event in the organization.

The MIS calls for a systemization of the business operations for an effective system design. This leads to streamlining of the operations which complicate the system design. It improves the administration of the business by bringing a discipline in its operations everybody is required to follow and use systems and procedures. This process brings a high degree of professionalism in the business operations. Since the goals and objective of the MIS are the products of business goals and objectives, it helps indirectly to pull the entire organization in one direction towards the corporate goals and objectives by providing the relevant information to the people in the organization. A well -designed system with a focus on the manager makes an impact on the managerial efficiency. The fund of information motivates an enlightened manager to use a variety of tools of the management. It helps him to resort to such exercises as experimentation and modeling. The use of computers enables him to use the tools and techniques which are impossible to use manually. The ready-made packages make this task simpler. The impact is on the managerial ability to perform. It improves the decision making ability considerably.

1.10 Objectives of MIS

Objectives of MIS are as follows:

Data Capturing: MIS capture data from various internal and external sources of organization. Data capturing may be manual or through computer terminals.

Processing of Data: The captured data is processed to convert into required information. Processing of data is done by such activities as calculating, sorting, classifying, and summarizing.

Storage of Information: MIS stores the processed or unprocessed data for future use. If any information is not immediately required, it is saved as an organization record, for later use.

Retrieval of Information: MIS retrieves information from its stores as and when required by various users.

Dissemination of Information: Information, which is a finished product of MIS, is disseminated to the users in the organization. It is periodic or online through computer terminal.

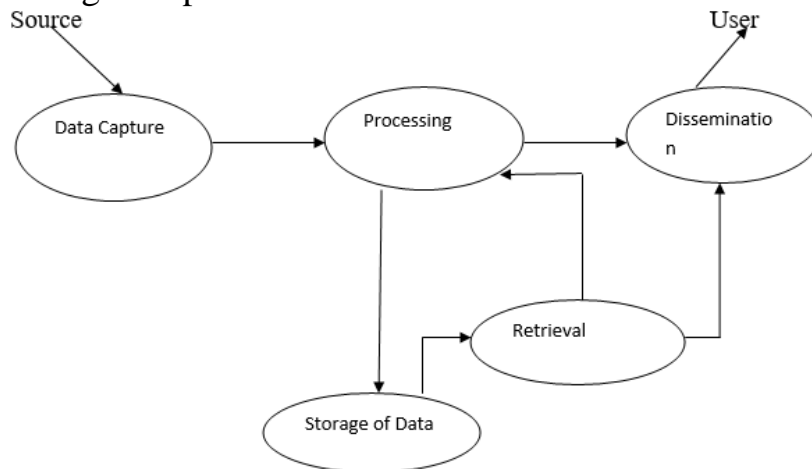


Fig: Objectives of MIS

1.11 Factors responsible for Development of MIS

Factors Responsible for the development of MIS are numerous and have been a prime concern for many Researchers and Practitioners. Both Internal and external factors must be taken into account when trying to understand and organization's criteria for deciding about technology. The following are the factors which are responsible for development of MIS :

1. External
2. Internal

External Factors : External Factors are conditions that exist in organization's external environment. The factors can be found at the industry level or national policies.

(a) **Industry level :** At the industry level, we are looking at characteristics as degree of diffusion of certain technologies, the availability of external know-how, for example, technology suppliers, the degree of innovativeness of the

industry, the requirements imposed by major customers and external markets and overall levels of competition and technology sophistication in the industry.

(b) **National Policies** : For the external factors the national policies also affect the organization that indirectly affects the subsystems of the organization.

Internal Factors : Internal factors internal of the firm that may affect the development of MIS can be grouped into three categories:

i) **Past Experience with Technology** : The organizations past experience about the technology in terms of exposure and organizational learning ultimately affects its future in developing technology.

ii) **Organizational Characteristics** : An organization's characteristic like size, influence the adoption of MIS application in organization. The adoption of certain technologies may appear more appropriate for the larger firms because of the large capital investments and the skilled human resources involve in the implementation and operation of such technologies. Smaller firms are less affected by organizational inertia and they show a greater degree of involvement of organizational member's especially top management during implementation. Ready to use software and less expensive equipments of MIS application are more attractive to smaller firms.

iii) **Organizational Pursued strategy** : Internal factors deal with the organizations pursued strategy on both orientation and technology policy. An organization's strategy reflects its action with market and technology, which ultimately modify its experience and consequently its overall characteristics and capabilities. The need for a strong technology has been advocated by a number of authors and investments in MIS should therefore be closely aligned with overall corporate strategy.

1.12 Models/ Types of Management Information Systems

1. **Accounting management information systems** - All levels of accounting managers share all accounting reports. 2. **Financial management information systems** - It provide financial information to all financial managers within an organization include the chief financial officer. The chief financial officer. The chief financial officer analyzes historical and current financial activity.

3. **Manufacturing management information systems** - More than any functional area great advance in technology have impacted operations, as a result manufacturing operations have changed. For instance, inventories are provided just in time so that great amounts of money are

not spent for warehousing huge inventories in some instance raw material are even proceeds on rail load cars waiting to be sent directly to the factory thus there is no need for warehousing.

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

5. Human resource management information system - It concern with activity related workers, managers and other individual employed by an organization because the personnel function relates to all other areas in business the human resource management information system plays a valuable role in ensuring organization system include work-force analysis and planning, hiring, training, and job assignment.

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

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

8. Physical structure - The physical structure of an management information system would be identical to the conceptual structure of all applications consisting of completely separate programs used by only one function but this is frequently not the case substantial information can be achieved from:

1 - Integrated processing

2 - Use of common modules

Integrated processing is achieved by designing several related applications as a single system in order to simplify the interconnection and reduce the duplication of input. A good example is an order entry system. The recording of an order initiates a sequence of processing. Each step using new data but also most of the data from prior processing. In other words, an integrated order entry system crosses functional boundaries.

Other Factors :

Customer Satisfaction : Development of MIS is affected by customer satisfaction. Customer of the services should be satisfied by the presented system.

Effective : Development should be effective in terms of organizational benefit & user satisfaction.

Efficient : Development should use all the resources, organization values efficiently.

1.13 Summary

To facilitate the management decision making at all levels of company, the MIS must be integrated. MIS units are company-wide. MIS is available for the Top management. The top management of company should play an active role in designing, modifying and maintenance of the total organization wide management information system.

MIS can be defined as consisting of people, equipment and procedures to gather, sort, analyze , evaluate and distribute timely and accurate information to decision makers.

An efficient MIs has the following characteristics:

- Management oriented
- Management directed
- Integrated
- Common data flow
- Heavy planning elements
- Subsystem concept

- Common data base
- User friendly

The advantages of MIS are as follows

- Timely
- Accurate system
- Scientific and reliable information for better and effective decision making
- Avoids duplication of efforts
- Co-ordination of whole organization

1.14 Glossary

Management

Management (or **managing**) is the administration of an organization, whether it is a business, a not-for-profit organization, or government body. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or of volunteers) to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. The term "management" may also refer to those people who manage an organization.

Management Information System

A management information system (MIS) is a computerized database of financial information organized and programmed in such a way that it produces regular reports on operations for every level of management in a company. It is usually also possible to obtain special reports from the system easily. The main purpose of the MIS is to give managers feedback about their own performance; top management can monitor the company as a whole. Information displayed by the MIS typically shows "actual" data over against

"planned" results and results from a year before; thus it measures progress against goals.

Decision support systems (DSS) are computer program applications used by middle and higher management to compile information from a wide range of sources to support problem solving and decision making. A DSS is used mostly for semi-structured and unstructured decision problems.

Executive information systems (EIS) is a reporting tool that provides quick access to summarized reports coming from all company levels and departments such as accounting, human resources and operations.

Marketing Information Systems are Management Information Systems designed specifically for managing the marketing aspects of the business

Office automation systems (OAS) support communication and productivity in the enterprise by automating workflow and eliminating bottlenecks. OAS may be implemented at any and all levels of management.

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Laudon, Kenneth C.; Laudon, Jane P. (2009). Management Information Systems: Managing the Digital Firm (11 ed.). Prentice Hall/CourseSmart. p. 164.

Transaction processing systems (TPS) collect and record the routine transactions of an organization. Examples of such systems are sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

1.16 Further Readings

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1.17 Model Questions

1. Define the term Management Information System. Also describe its various features?
2. What are the various advantages and disadvantages of an MIS?
3. Why is MIS important for an organization?
4. Is MIS a product of various academic disciplines?

ANSWERS TO SELF ASSEMENT QUESTIONS

- A. 4
- B. 3
- C. 2

LESSON 2: MIS AND OTHER DISCIPLINE

Structure

- 2.0 Objectives
- 2.1 Introduction -MIS and Marketing
- 2.1 MIS and accounting
- 2.2 MIS and computer science
- 2.3 MIS and OR
- 2.4 MIS and OB
- 2.5 MIS and Management
- 2.6 Summary
- 2.7 Glossary
- 2.8 References
- 2.9 Further Reading
- 2.10** Model Questions

2.0 Objectives

After studying this lesson you will be able to:

1. Understand the concept of MIS and Marketing
2. Understand the concept of MIS and Accounting
3. Understand the concept of MIS and Computer science
4. Understand the concept of MIS and Operation Research
5. Understand the concept of MIS and Organization Behavior
6. Understand the concept of MIS and Management

2.1 INTRODUCTION

MIS for Marketing: In order to pursue market opportunities as well as anticipate marketing problem, manager need to collect comprehensive and reliable information. Managers cannot carry out marketing analysis, planning, implementation and control without monitoring and researching customers, competitors, dealers and their sales and cost data. Every firm has many information flows of interest to marketing management. Many companies are studying their executive's information needs and design information system for marketing to meet these needs. Instead of plethora of unrelated data, an MIS combines various inputs and present integrated reports.

Definition : Marketing Information System is a continuing and interacting structure of people, equipments and procedures to gather, sort, analyze, evaluate, and distribute pertinent, timely and accurate information for use by marketing decision makers to improve their marketing planning, implementation and control activities.

Components of Marketing Information System : As shown in figure below, the box on the left shows components of the marketing environment that manager must monitor. Trends in the marketing environment are picked up and analyzed through four subsystems making up the marketing information system- Internal Accounting System, Marketing Intelligence System, Marketing Research System and Analytical Marketing System.

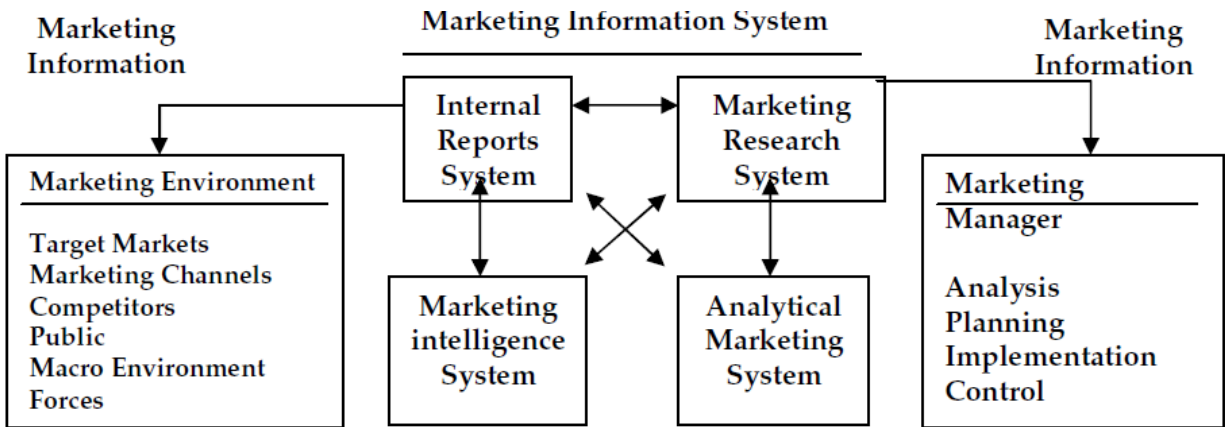


Fig: MIS and Marketing Information

Internal Accounting System is the most basic information system used by marketing executives. It is the system that reports orders, sales inventory levels, receivable, payable. By analyzing the information, marketing managers can spot important opportunities and problems.

_ The Order Shipping Cycle : Sales representatives, dealers and customers dispatch orders to the firm. The order department prepares multi-copy invoice and sends them to various departments. Out of stock items are back ordered. Shipped items are accompanied and sent to various departments. The company wants to carryout these steps quickly and accurately. The computer is harnessed to expedite the order shipping billing cycle.

_ Improving the Timeliness or Sales Reports : Marketing executives receive sales reports some times, after the sales have taken place. Many companies complain that sales are not reported fast enough in their company. Marketing information system can improve these things rapidly.

_ Designing a User Oriented Report System : In designing an advanced sales information system, the company should avoid certain pitfalls. The marketing information system should represent a cross between what managers think they need, what managers really need and what is economically feasible. Management information system should provide the reports for all marketing departments. Information system can delete the unwanted system from the survey and from other departments and prepare reports which are required by different persons of marketing department.

Marketing consists of individual and organizational activities that facilitate and expedite satisfying exchange relationships in a dynamic environment through the creation, distribution,

promotion and pricing of goods, services and ideas. In 1966 Professor Philip Kotler of Northwestern University used the term 'marketing nerve center' to describe a new unit within marketing to gather and process marketing information. He identified the three types of marketing information.

Table: Marketing Mix representing elements of Marketing Management

4 P	4 C	4 R	4 R
Product	Customer	Relevance	Relevance
Price	Cost	Resources	Resources
Place	Convenience	Relationship	Relationship
Promotion	Communication	Return	Return

- Market Intelligence- It represents information that flows into the firm from the environment.
- Internal Marketing information- It is information that is gathered within the firm.
- Marketing Communications- It is information that flows from the firm outward to the environment.
- Management Information System- A set of efficient procedures and techniques that help organization to collect, evaluate, sort and generate reports for making effective marketing decisions. It helps to provide an organized flow of information and support marketing activities of an organization.

Types of Information

- Recurrent: Information required by an organization on day-to-day basis. Customer expectations, changing needs and market share of the product
- Monitoring: Market-related information collected by scanning information sources on a regular basis such as Magazines, articles, government reports, annual reports
- Requested: Such information generates in response to explicit request by marketing department. For example Competition strategies and market share. Marketing information system can be defined as a computer based system that works in conjunction with other functional information systems to support the firm's management in solving problems that relate to marketing the firm's products. During the period of 1967-1974, no fewer than five models of MKISs were described in the literature. Brien and Stafford were among the first modelers, basing their design on four Ps and emphasizing the development of strategic marketing programs. King

and Cleland stressed strategic planning; whereas Kotler, Montgomery and Urban, and Crissy and Mossman emphasized decision support. These modeling efforts began in the 1960s and continued into the 1970s, laying a strong theoretical foundation for functional information systems that followed in the all areas.

- Marketing Information System Model- It consists of a combination of input and output subsystems connected by a database.

- Input Subsystems- The marketing research subsystem conducts special studies of marketing operations for the purpose of learning customer needs and improving marketing efficiency. Marketing intelligence subsystem gathers information from the firm's environment that has a bearing on marketing operations.

- Marketing Research Subsystem- In this subsystem a systematic gathering, recording and analyzing data relevant to marketing of goods and services takes place. Data can be collected from internal sources, government publications, periodicals and books, marketing research agencies and conducting field research, both primary data and secondary data collected for the purpose.

- Marketing Intelligence Subsystem- It is a Set of procedures and sources used by managers to obtain everyday information about development in marketing environment. By reading books, trade publications, business newspapers: talking to customers, suppliers and distributors. The term marketing intelligence may bring to mind visions of one firm spying on other- industrial espionage. There is really no reason to break the law to obtain the information, because it is so easy to obtain legally

Model of MIS

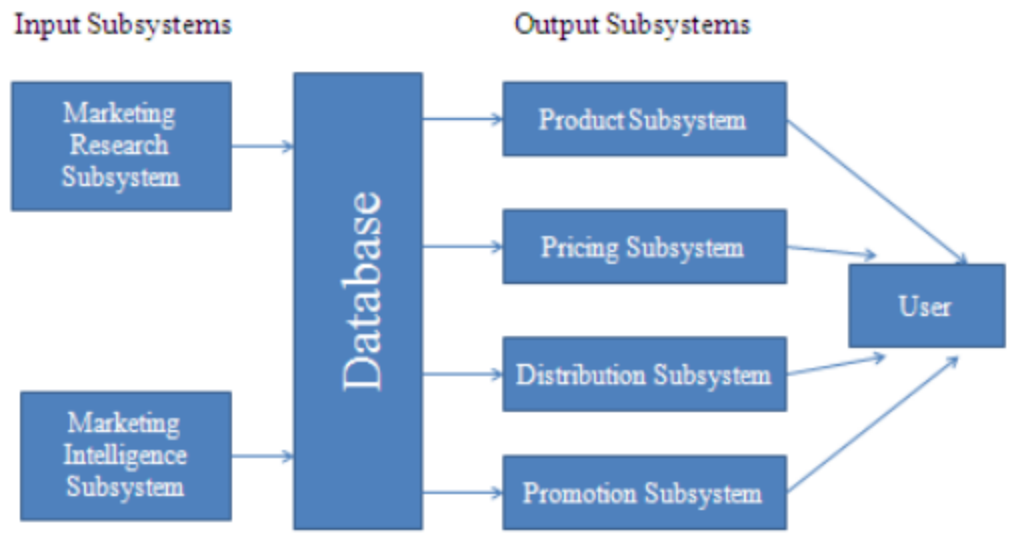


Figure: Model of Marketing Management Information System

- Database- The data used by the output subsystems come from the database. Some of the data in the database is unique to the marketing functions, but much is shared with other functional Areas.
- Output Subsystems- Each output subsystem provides information about its part of mix.
- Product Sub System- To assess whether different products or product lines are contributing to objectives of organization; SFA: Sales force automation software provides information relating to performance of each product. Market segmentation and Product positioning related information are also provided by product subsystem.
- Pricing Sub System- Information related to Price fixation, Value for money, Competitors' price, Cost plus price, Price change, upward revision and downward revision are part of pricing subsystem.
- Distribution Sub System- Identification of channels, Evaluation of channels and Channel selection related important information is provided by this subsystem.
- Promotion Sub System- Promotion mix (Advertising, Sales promotion and Personal selling) and Promotion budget related information could be obtained through this output subsystem.

- Integrated-Mix Subsystem- The integrated mix subsystem supports the manager as the ingredients of the marketing mix are combined to form a particular strategy. This goal is accomplished by projecting the possible

outcomes of various mixes. Descriptions of integrated mix subsystems in the literature are rare. The integrated mix model receiving the most publicity is BRANDAID, developed by MIT professor John D.C. Little. BRANDAID includes sub models for advertising, promotion, price, personal selling and retail distribution. The basic approach of this model is to estimate the effect of various influences on the manufacturer's sale. Software Packages

- BRANDAID: Flexible marketing-mix model focuses on packaged goods, contains sub models for advertising, pricing and competition

- CALLPLAN: Determine no. of calls to make per person to each prospect and current client, takes into account travel time and selling time

- DETAILER: Determine which customers to call on and which products to represent on each call

- GEOLINE: Helpful in designing sales and service territories

- MEDIAC: Helps advertisers in media planning • PROMOTER: Helps in evaluating sales promotion

- ADCAD: Determine type of advertisement that can be used

- COVERSTORY: Helps in analyzing sales data and writing reports According to paper "Marketing information systems for consumer products companies: a management overview" by O'brien, Terrence V., Schoenbachler, Denise d., Gordon, Geoffrey L, to prepare the organization successfully for the implementation of an MKIS, the following steps must be taken:

(1) Attain top management support.

(2) Communicate:

- MKIS purpose and objectives;

- MKIS requirements;

- MKIS advantages;

- Changes in decision making and procedures;

- Impact on organization structure and culture;

- Elements of the MKIS;

- MKIS impact on people in the organization and the relationship with its task environment.

(3) Provide training:

- To desensitize fears that organization members hold related to the MKIS;
- On technically operating the MKIS system;
- On new procedures that follow the MKIS.

(4) Invest the necessary financial and human resources to prepare and implement the MKIS.

Advantages of MIS:

- Market Monitoring: Identify emerging market segments with respect to various changes.
- Strategy Development: Helps in formulating new marketing strategies.
- Functional Integration: Helps in coordinating the activities of marketing department with other department.

2.2 MIS and accounting

Financial accounting systems and subsystems are just one type of institutional MIS. Financial accounting systems are an important functional element or part of the total MIS structure. However, they are more narrowly focused on the internal balancing of an institution's books to the general ledger and other financial accounting subsystems. For example, accrual adjustments, reconciling and correcting entries used to reconcile the financial systems to the general ledger are not always immediately entered into other MIS systems.

Accordingly, although MIS and accounting reconciliation totals for related listings and activities should be similar, they may not necessarily balance.

Financial management function has a primary objective of meeting the financial needs of the business. The second objective of FM is to meet the statutory compliance by way of declaring the auditing financial result, submitting reports and returns to the govt. and Tax authorities and fulfill the obligations to the shareholders.

FM uses variety of tools and techniques like Break Even Analysis, ABC Analysis, Ratio Analysis, Management Accounting and Cost Analysis.

Input Documents :

- o Receipts from customers, authorities, employees, share holders, financial institution and others.
- o Payment to suppliers, authorities, share holders, financial institutions and others.
- o Data from stock exchange on the shares prices consolidated financial results of the other companies etc.

Transactions are payments and receipts and they are documented through journal vouchers, bills, debit notes, credit notes, receipts and transfer documents.

Application of Financial Management Information System : The major application of financial management information system includes financial accounting system, which 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 govt. The system is made so comprehensive that it not only collects financial data but also collects data on different matters such as job, department, and division and so on. It forms a basis for certain reports which are required by the top level management. The users of the financial data base are finance managers, cost controller, auditors, material managers, marketing managers, company secretaries and the top management.

2.3 MIS and computer science

MIS evolution corresponding to five phases in the development of computing technology:

- 1) Mainframe and minicomputer computing,
- 2) Personal computers
- 3) client/server networks
- 4) Enterprise computing
- 5) Cloud computing.

2.4 MIS and OR

MIS is widely used in operation research to

1. To calculate the least cost time
2. Decision making
3. To solve transportation problem
4. To know the longest/shortest path to deliver goods to the destination etc.

MIS supports operations of a business organization by giving timely information, maintenance and enhancement which provides flexibility in the operation of an organization.

The objective of production management function is to provide manufacturing services to the organization. This involves the manufacturing of products of a certain specified quality and within certain costs in a stipulated time, fulfilling the promises given to the customer.

The production management function is supported by other functions like production, planning and control, industrial engineering, maintenance and quality control. It has a very strong interface with materials management function. The organization of production management differs according to the types of production i.e. job shop or continuous. It also varies with the production policy of the organization, like whether the production is initiated against a customer order or for stock.

The system methodology differs with respect to the manufacturing technology the organization has adopted. The goals of the production management are fuller utilization of the manufacturing capacity, minimal rejection, maximum uptime of plant and equipments meeting the delivery promises. The function is of key importance when business strength is in technology and manufacturing, and the market for product and services exist. The function is pegged with the responsibility of managing high investment in plant, equipment and machinery. It also has to control the large labor force at its disposal.

Inputs of Production Management Information System: The production management is conducted through innumerable transaction. They relate to planning, issuing and controlling the various task involved in the course of production.

- i) Process Planning Sheet
- ii) quality Assurance Rating Form
- iii) Production Schedule
- iv) Process Planning Sheet
- v) Job Cards
- vi) Finished Goods Advice
- vii) Material Requisition
- viii) Customer Order
- ix) Breakdown Advice
- x) Material requirement
- xi) Production Program

2.5 MIS and OB

The following serve as the input in personnel information system:

- o Productivity Data on the Job
- o Industry Data on Manpower, Skills, Qualification
- o Bio-Data of Self and Family
- o Personnel Application Form
- o Attendance and Leave Record
- o Appraisal Form
- o Appointment Letter
- o Wage/ Agreement
- o Record Sources of Manpower, University, Institutes, and Companies

ACTIVITIES

1. Take an organization of your knowledge and give a conceptual view of MIS and physical view of MIS.
2. Identify the nature of impact of MIS on people, organization and the management style.

2.6 MIS and Management

Personnel management has the primary objective of providing suitable manpower in number and with certainability, skills and knowledge, as the business organization demands from time to time. Its goal is to control personnel cost through continuous increase in manpower productivity resorting to the following techniques:

- a) Motivation through Leadership and Job Enrichment
- b) Grievance Handling
- c) Structuring the Organization
- d) Promotion and Rewards through Performance Appraisal
- e) HRM through Training and Upgrading the Skills

The information and scope of personnel function have resulted in greater complexity in field. There is need to cope with incredible volume of information and maintaining it. There is need to classify, reclassify and cross this information. This can be achieved by computerized personnel system which enables personnel management to manage more efficiently and effectively and to provide more positive services to the organization.

Components of Personnel Information : A computer based personnel information system is designed to support the operational, managerial and decision making functions of the personnel division in an organization.

Following are the components of the personnel management information system:

i) **Establishment Records** : Establishment relates to the setting up of budgets for appropriate staff levels and grades throughout the organization. The system should encompass these budgeted posts and report on variations between actual staff numbers and the budget numbers.

ii) **Recruitment Records** : Details of all vacancies and applicants should be held by the system. These should show the status of each vacancy and of each applicant and should perform as much as possible of the administrative process. This will generally mean that the system should interface with a word processing system.

iii) **Personnel Records** : These relate to identification data, current and historical salary and allowances data and various employee attributes such as grades and key dates.

iv) **Pensions Records** : The system maintains all details of service entitlements of employees, contribution by both the employee and the organization to pension scheme, details of dependents, spouse and children, data required for actuarial purpose to verify the availability of the scheme and details and entitlements of employees who have become pensioners.

v) **Training Records**: These include data relating to each employee's qualification, skills and experience. The system would also hold details of internal and external training courses and its relevant details.

vi) **Absence records**: The system should allow for the recording of various absence types like sick leave, special leave etc. Input of this sub-system should be automatically reflected in the establishment sub-system.

vii) **Industrial relations records**: The system should hold data to assist management in negotiations and planning for alternative strategies. Much of this would be held for normal administrative purpose. It is the facility to extract the data in meaningful terms, to be able to project forward and to test the impact of applying various rules and scenarios.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. Which one of the following is not a business driver for an information system? 1. business process redesign 2. knowledge asset management 3. proliferation of networks and the Internet 4. security and privacy 5. collaboration and partnership
- B. A task of developing a technical blueprint and specifications for a solution that fulfills the business requirements is undertaken in the following phase of the system development process 1. system initiation 2. system implementation 3. system analysis 4. system design 5. feasibility analysis
- C. If a university sets up a web-based information system that faculty could access to record student grades and to advise students, that would be an example of a/an 1. CRM 2. intranet 3. ERP 4. extranet 5. none of the above
- D. Which of the following is not a technology driver for an information system? 1. enterprise applications 2. object technologies 3. knowledge asset management 4. collaborative technologies 5. networks and the Internet

2.7 Summary:

Marketing Information System is a continuing and interacting structure of people, equipments and procedures to gather, sort, analyze, evaluate, and distribute pertinent, timely and accurate information for use by marketing decision makers to improve their marketing planning, implementation and control activities.

By analyzing the information, marketing managers can spot important opportunities and problems like -The Order Shipping Cycle, Improving the Timeliness or Sales Reports and Designing a User Oriented Report System.

The goal of MIS for personal management is to control personnel cost through continuous increase in manpower productivity resorting to the following techniques :

- a) Motivation through Leadership and Job Enrichment
- b) Grievance Handling
- c) Structuring the Organization

- d) Promotion and Rewards through Performance Appraisal
- e) HRM through Training and Upgrading the Skills

MIS for Financial Management include Receipts from customers, authorities, employees, share holders, financial institution and others, Payment to suppliers, authorities, share holders, financial institutions and others and Data from stock exchange on the shares prices consolidated financial results of the other companies etc.

2.8 Glossary

Management Information System: A management information system (MIS) is a computerized database of financial information organized and programmed in such a way that it produces regular reports on operations for every level of management in a company. It is usually also possible to obtain special reports from the system easily. The main purpose of the MIS is to give managers feedback about their own performance; top management can monitor the company as a whole. Information displayed by the MIS typically shows "actual" data over against "planned" results and results from a year before; thus it measures progress against goals.

Personal Management: **Personnel management** includes - obtaining, using and maintaining a satisfied workforce. It is a significant part of **management** concerned with employees at work and with their relationship within the organization.

Marketing Research: **Marketing Research** is systematic problem analysis, model building and fact finding for the purpose of important decision making and control in the **marketing** of goods and services.

Management records: Records management, also known as records and information management, is an organizational function devoted to the management of information in an organization throughout its life cycle, from the time of creation or inscription to its eventual disposition. This includes identifying, classifying, storing, securing, retrieving, tracking and destroying or permanently preserving records.

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2.13 Model Questions

1. what is the important of MIS in maintaining personal management
2. State the importance of MIS in Financial Management.
3. The organizations understand the need of MIS in context to Operation Research. how?

ANSWERS TOSELF ASSESSMENT QUESTIONS

- A. 3
- B. 4
- C. 2
- D. 3

LESSON 3: INFORMATION CONCEPTS

Structure

- 3.0 Objectives
- 3.1 Concept of Information
- 3.2 Definition of information
- 3.3 Features of Information
- 3.4 Types of Information
- 3.5 Process of generation and communication
- 3.6 Dimension of Information
- 3.7 Quality of information
- 3.8 Information Overloading
- 3.9 Techniques for managing overloading
- 3.10 Difference between Data Processing and Information Processing
- 3.11 Different methods for Data Collection
- 3.12 Summary
- 3.13 Glossary
- 3.14 references
- 3.15 Further References
- 3.16 Model Questions

3.0 Objectives

After studying this chapter, you will be able to:

1. Understand the concept of Information
2. Understand the Features of Information
3. Understand the types of information
4. Understand the concept of information overloading

3.1 INTRODUCTION:

Concept of Information and Definition of information

Data : Data is raw facts. Data is like raw material. Data does not interrelate and also it does not help in decision making. Data is defined as groups of nonrandom symbols in the form of text, images, voice representing quantities, action and objects.

Information : Information is the product of data processing. Information is interrelated data. Information is equivalent to finished goods produced after processing the raw material. The information has a value in decision making. Information brings clarity and creates an intelligent human response in the mind.

Harsh and colleague define information as one of four types and all these types are important component of a management information system. Furthermore, the various types build upon and interact with each other. A common starting level is Descriptive information. (See Figure).

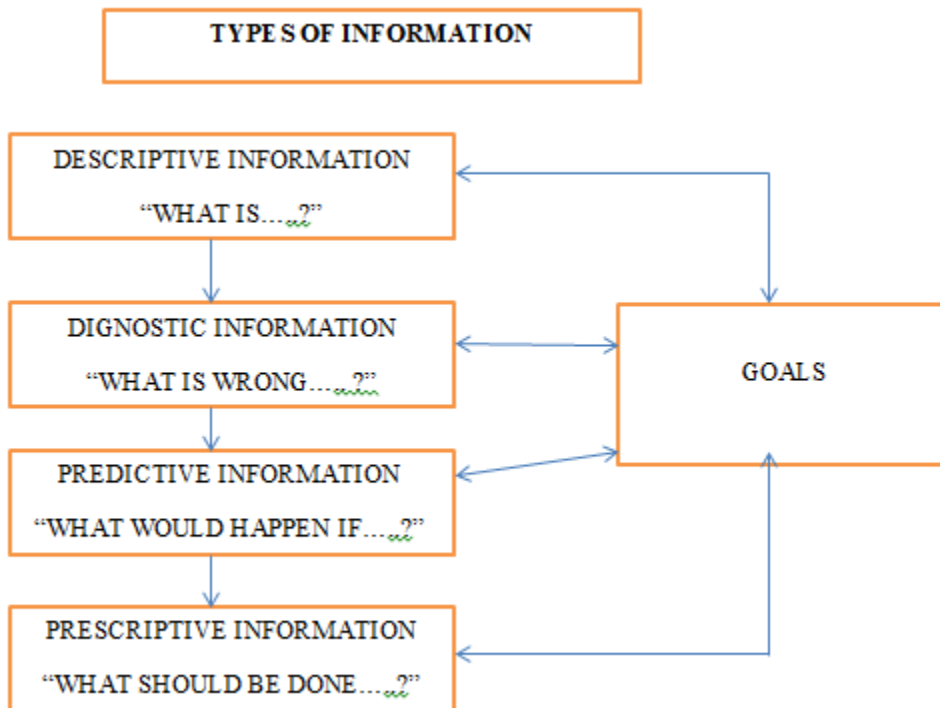


Fig: types of Information

This information portrays the “what is” condition of a business, and it describes the state of the business at a specified point in time. Descriptive information is very important to the business manager, because without it, many problems would not be identified. Descriptive information includes a variety of types of information including financial results, production records, test results, product marketing, and maintenance records.

Descriptive information can also be used as inputs to secure other needed types of information. For example, “what is” information is needed for supplying restraints in analyzing farm adjustment alternatives. It can also be used to identify problems other than the “what is” condition. Descriptive information is necessary but not completely sufficient in identifying and addressing farm management problems.

The second type of information is diagnostic information. This information portrays this “what is wrong” condition, where “what is wrong” is measured as the disparity between “what is” and “what ought to be.” This assessment of how things are versus how they should be (a fact-value conflict) is probably our most common management problem.

Diagnostic information has two major uses. It can first be used to define problems that develop in the business. Are production levels too low? Is the rate earned on investment too low? These types of question cannot be answered with descriptive information alone (such as with financial and production records). A manager may often be well supplied with facts about his business, yet be unable to recognize this type of problem.

The manager must provide norms or standards which, when compared with the facts for a particular business, will reveal an area of concern. Once a problem has been identified, a manager may choose an appropriate course of action for dealing with the problem (including doing nothing).

Corrective measures may be taken so as to better achieve the manager’s goals. Several pitfalls are involved for managers in obtaining diagnostic information. Adequate, reliable, descriptive information must be available along with appropriate norms or standards for particular business situations. Information is inadequate for problem solving if it does not fully describe both “what is” and “what ought to be.” As description is concerned with “what is” and diagnostics with “what is wrong,” prediction is concerned with “what if...?”

Predictive information is generated from an analysis of possible future events and is exceedingly valuable with “desirable” outcomes. With predictive information,

one either defines problems or avoids problems in advance. Prediction also assists in analysis. When a problem is recognized, a manager will analyze the situation and specify at least one alternative (including doing nothing) to deal with it.

Predictive information is needed by managers to reduce the risk and uncertainty concerning technology, prices, climate, institutions, and human relationships affecting the business. Such information is vital in formulating production plans and examining related financial impacts. Predictive information takes many forms. What are the expected prices next year? What yields are anticipated? How much capital will be required to upgrade production technologies? What would be the difference in expected returns in switching from a livestock farm to a cropping farm? Management has long used various budgeting techniques, simulation models, and other tools to evaluate expected changes in the business.

Without detracting from the importance of problem identification and analysis in management, the crux of management tasks is decision making. For every problem a manager faces, there is a “right” course of action. However, the rightness of a decision can seldom, if ever, be measured in absolute terms. The choice is conditionally right, depending upon a farm manager’s knowledge, assumptions, and conditions he wishes to impose on the decision.

Prescriptive information is directed toward answering the “what should be done” question. Provision of this information requires the utilization of the predictive information. Predictive information by itself is not adequate for decision making. An evaluation of the predicted outcomes together with the goals and values of the manager provides that basis for making a decision.

For example, suppose that a manager is considering a new changing marketing alternative. The new alternative being considered has higher “predicted” returns but also has higher risks and requires more management monitoring. The decision as to whether to change plans depends upon the manager’s evaluation of the worth of additional income versus the commitment of additional time and higher risk. Thus, the goals and values of a farm manager will ultimately enter into any decision.

3.2 Features of Information

The parameters of a good quality are difficult to determine for information. Quality of information refers to its fitness for use, or its reliability.

Following are the essential characteristic features :

i) **Timeliness** : Timeliness means that information must reach the recipients within the prescribed timeframes. For effective decision-making, information must reach the decision-maker at the right time, i.e. recipients must get information when they need it. Delays destroy the value of information. The characteristic of timeliness, to be effective, should also include up-to-date, i.e. current information.

ii) **Accuracy**: Information should be accurate. It means that information should be free from mistakes, errors &, clear. Accuracy also means that the information is free from bias. Wrong information given to management would result in wrong decisions. As managers decisions are based on the information supplied in MIS reports, all managers need accurate information.

iii) **Relevance**: Information is said to be relevant if it answers especially for the recipient what, why, where, when, who and why? In other words, the MIS should serve reports to managers which are useful and the information helps them to make decisions.

iv) **Adequacy**: Adequacy means information must be sufficient in quantity, i.e. MIS must provide reports containing information which is required in the deciding processes of decision-making. The report should not give inadequate or for that matter, more than adequate information, which may create a difficult situation for the decision-maker. Whereas inadequacy of information leads to crises, information overload results in chaos.

v) **Completeness**: The information which is given to a manager must be complete and should meet all his needs. Incomplete information may result in wrong decisions and thus may prove costly to the organization.

vi) **Explicitness**: A report is said to be of good quality if it does not require further analysis by the recipients for decision making.

vii) **Impartiality** : Impartial information contains no bias and has been collected without any distorted view of the situation

3.3 Types of Information

Managers in an organization require information to perform various activities for achieving various targets. The information is mostly differentiated on the basis of its source of origin, source of generating information and types of decision taken at different levels.

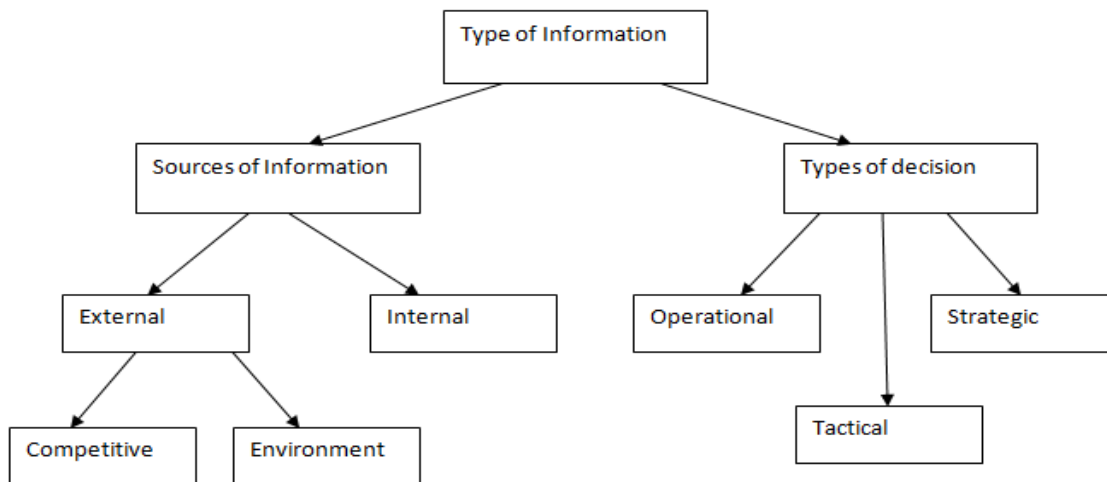


Fig: 3.1 Types of information

Much of the information used by management concerns the **internal** operations of the company. However, **external** information about the environment in which the organization exists is crucial to all organizations. This may include

- Intelligence gathering about competitors' activities;
- Information about population shifts;
- Economic and social factors;
- Government legislation.

This type of information is of great importance to managers who are trying to shave production costs, find new markets, develop new products, or have strategic decisions to make about the future direction of the company.

Information is collected in many ways – through conversations and interpersonal ‘networking’, reading newspapers, trade reviews and magazines, attending conferences and meetings, browsing the Internet.

A **formal information system** relies on procedures for the collecting, storing, processing and accessing of data in order to obtain information.

Classification of Information : The information can be classified in a number of ways provide to better understanding. Jhon Dearden of Harvard University classifies information in the following manner :

- (1) **Action Verses No-Action Information** : The information which induces action is called action **Information**. ‘No stock ‘report calling

a purchase action is an action information. The information which communicates only the status is **No-Action Information**. The stock balance is no-action information.

- (2) **Recurring Verses No-Recurring Information** : The information generated at regular intervals is **Recurring Information**. The monthly sales reports, the stock statement, the trial balance, etc are recurring information. The financial analysis or the report on the market research study is **no-recurring** information.
- (3) **Internal and external information** : The information generated through the internal sources of the organization is termed as **Internal Information**, while the information generated through the govt. reports, the industry survey etc., termed as **External Information**, as the sources of the data are outside the organization.

The information can also be classified, in terms of its application :

- **Planning Information** : Certain standard norms and specifications are used in planning of any activity. Hence such information is called the **Planning Information**. e. g. Time standard, design standard.
- **Control Information** : Reporting the status of an activity through a feedback mechanism is called the **Controlling Information**. When such information shows a deviation from the goal or the objective, it will induce a decision or an action leading to control.
- **Knowledge Information** : A collection of information through the library records and the research studies to build up a knowledge base as an information is known as **Knowledge Information**.
- **Organization Information** : When the information is used by everybody in the organization, it is called **Organization Information**. Employee and payroll Information is used by a number of people in an organization.
- **Functional/ Operational Information** : When the information is used in the operation of a business it is called **Functional/ Operational Information**.
- **Database Information** : When the information has multiple use and application, it is called as **database information**. Material specification or supplier information is stored for multiple users.

ACTIVITIES

- 1.** Analyze the business as a system and identify the components of a business system.
- 2.** Discuss the characteristics of information systems in various levels of your organization.

3.4 Process of generation and communication

According to Davis and Olson : “Information is a data that has been processed into a form that is meaningful to recipient and is of real or perceived value in the current or the prospective action or decision of recipient.”

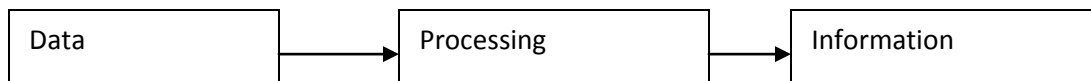


Fig:3.2 Information Generation

It is a most critical resource of the organization. Managing the information means managing future. Information is knowledge that one derives from facts placed in the right context with the purpose of reducing uncertainty.

3.5 Quality of information

Information quality" is a measure of the value which the information provides to the user of that information. "Quality" is often perceived as subjective and the quality of information can then vary among users and among uses of the information. Nevertheless, a high degree of quality increases its objectivity or at least the inter subjectivity. Accuracy can be seen as just one element of Information Quality but, depending upon how it is defined, can also be seen as encompassing many other dimensions of quality.

A list of dimensions or elements used in assessing subjective Information Quality is:

- Intrinsic Information Quality: Accuracy, Objectivity, Believability, Reputation
- Contextual Information Quality: Relevancy, Value-Added, Timeliness, Completeness, Amount of information
- Representational Information Quality: Interpretability, Format, Coherence, Compatibility

- Accessibility Information Quality: Accessibility, Access security

While information as a distinct term has various ambiguous definitions, there's one which is more general, such as "description of events". While the occurrences being described cannot be subjectively evaluated for quality, since they're very much autonomous events in space and time, their description can—since it possesses a garnishment attribute, unavoidably attached by the medium which carried the information, from the initial moment of the occurrences being described.

3.6 Dimensions of Information :

There are three most common dimensions of information for MIS :

(i) **Economic Dimension:** Economic dimension of information refers to the cost of information and its benefits. Generation of information costs money. Measuring cost and benefit of information is difficult because of intangible characteristic of information.

Cost of Information: Cost of information may include: Cost of acquiring data, Cost of maintaining data, Cost of generating information and Cost of communication information. Cost related to the response time require to generate information and communicating it. Thus, for **system with low response time, the cost is high.** The cost is depends on accuracy, speed of generation etc.

Value of Information : Information has a cost for its acquisition and maintenance. Thus before a particular piece of information is acquired, decision maker must know its value. The information has a perceived value in terms of decision making. The decision maker feels more secured when additional information is received in case of decision making under uncertainty or risk.

Perfect Information : The information is called a **Perfect Information**, if it wipes out uncertainty or risk completely. However, perfect information is a myth. The value of information is the value of the change in decision behavior because of the information. The change in the behavior due to new information is measured to determine the benefit from its use. To arrive at the value of information, the cost incurred to get this information is deducted from the benefit.

Value of information = Cost to get information-benefit

Given a set of possible decisions, a decision maker will select one on the basis of the available information. If the new information causes a change in the decision,

then the value of information is the difference in the value between outcome of the old decision and that of new decision, less the cost of obtaining the new information.

The value of the additional information making the existing information perfect (VPI) is:

$$\text{VPI} = (\text{V2} - \text{V1}) - (\text{C2} - \text{C1})$$

Where V is the value of the information and C is the cost of obtaining the information. V1 and C1 relate to one set of information V2, C2 relate to the new set. In MIS, the concept of the value of information is used to find out the benefit of perfect information and if the value is significantly high, the system should provide it. If the value is insignificant, it would not be worth collecting the additional information.

(ii) **Business Dimension** : Different types of information are required by managers at different levels of the management hierarchy. The information needs of managers at strategic planning level are altogether different than those of operational control managers. It is because of the fact that managers at different levels are required to perform different functions in an organization.

(iii) **Technical Dimension** : This dimension of information refers to the technical aspects of the database. It includes the capacity of database, response time, security, validity, data interrelationship etc.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. Which of the following is a deliverable of the system implementation phase in a formal system development process?
1. technical hardware and software solution for the business problem
 2. business problem statement
 3. statement of the system users' business requirements
 4. technical blueprint and specifications for a solution that fulfills the business requirements
 5. none of the above
- B. An information system that supports the planning and assessment needs of executive management is:
1. DSS
 2. TPS
 3. ERP
 4. MIS

5. none of the above

C. Decision makers who are concerned with tactical (short-term) operational problems and decision making are:

1. middle managers
2. executive managers
3. supervisors
4. mobile managers
5. none of the above

D. The application of information to scan an organisation's environment is:

1. external communication.
2. information overload.
3. sensing.
4. internal communication.
5. none of the above.

E. When a bank uses information to launch a personalised credit card product this:

1. manages risks.
2. creates a new opportunity.
3. adds value.
4. reduces costs.
5. none of the above.

3.7 Information System and its types

A business has several information systems :

- (A) Formal Information System
- (B) Informal Information System
- (C) Computer Based Information System

Formal Information System :

It is based on organizational chart represented by the organization.

Informal Information System :

It is an employee based system designed to meet personal and vocational needs and to help in the solution of work-related problems. It also funnels information upward through indirect channels. It works within the framework of the business and its stated policies.

Computer Based Information System (CBIS) :

This category of information system depends mainly on the computer for handling business application. System analysis develops different types of information system to meet variety of business needs. There is class of system collectively known as computer based information system. They can be classified as:

- Transaction Processing System (TPS)
- Management Information System (MIS)
- Decision Making System (DSS)
- Office Automation System (OAS)

3.8 Information Overloading

"**Information overload**" is a term popularized by Alvin Toffler. It refers to the difficulty a person can have understanding an issue and making decisions that can be caused by the presence of too much information.

The point where information processing has reached its peak, and just prior to declining, is the individual's capacity for information processing. This definition of information overload is represented by the inverted "U" curve shown below in Figure 1

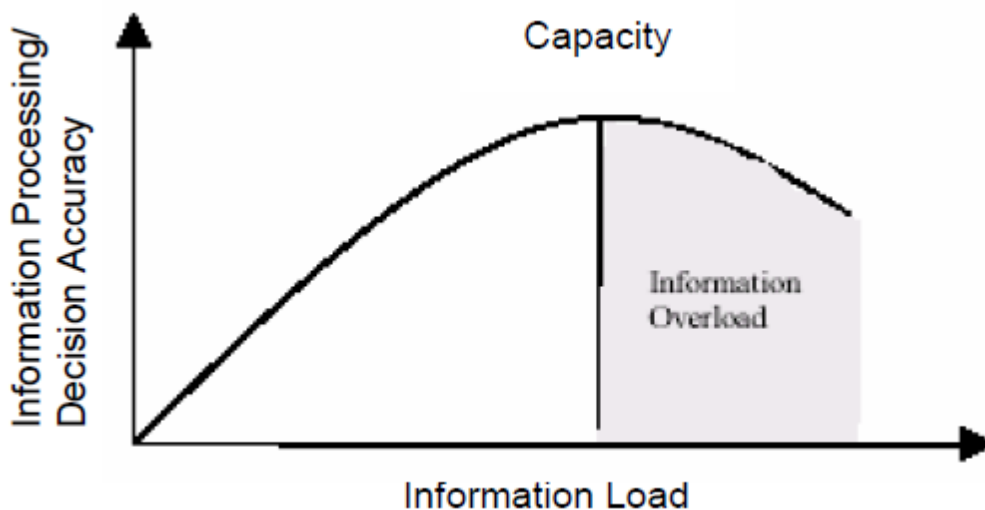


Fig :3.2 information Overload

The general causes of information overload include:

- A rapidly increasing rate of **new information** being produced

- The ease of duplication and transmission of data across the Internet
- An increase in the available channels of incoming information (e.g. telephone, e-mail, instant messaging)
- Large amounts of historical information to dig through
- Contradictions and inaccuracies in available information
- A low signal-to-noise ratio
- A lack of a method for comparing and processing different kinds of information
- The pieces of information are unrelated or do not have any overall structure to reveal their relationships

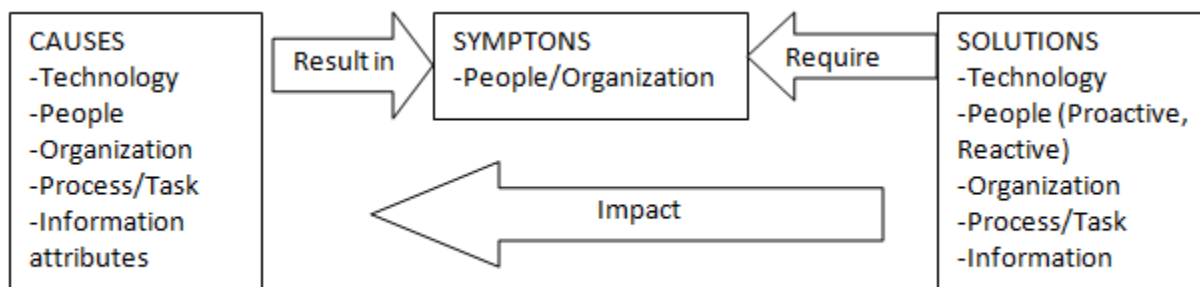


Fig: 3.3 Information Overload Analytic

3.9 Techniques for managing overloading and routing

the techniques to manage information overloading are:

1. **Visualize where you want to be**
2. **Reduce multi-tasking**
3. **Create Knowledge Files**
4. **Improve your Reading Skills**
5. **Only check email twice a day, use filters and folders**
6. **Use Mind Maps to take and make notes**
7. **Be more effective in meetings**
8. **Improve your memory**
9. **Be strategic with Social Networking**

3.10 Methods of Filtering

The filtering process blocks the unwanted or the inconsistent data or the data which

does not match the frame of reference. An inexperienced manager or a less knowledgeable manager through filtering may omit data, distort data responses and, therefore, may draw incorrect inferences.

The information processor establishes the filters based on experience, knowledge and know-how. The choice of filters may be changed due to stress, urgency of decision making and the confidence in a particular method of decision making.

Many a times a processor is required to perceive process and evaluate probabilistic information. The processor may be deficient in the intuitive understanding of the information, in the ability to identify the correlation and the causality, and in the capability for integrating the information.

3.11 difference between Data Processing and Information Processing

Data Processing :

Data Processing is a process that converts data into information or knowledge. The processing is usually assumed to be automated and running on a computer. Because data are most useful when well-presented and actually informative, data-processing systems are often referred to as information systems to emphasize their practicality. Nevertheless, both terms are roughly synonymous, performing similar conversions; data-processing systems typically manipulate raw data into information, and likewise information systems typically take raw data as input to produce information as output.

Data processing is that a business has collected numerous data concerning an aspect of its operations and that this multitude of data must be presented in meaningful, easy-to-access presentations for the managers who must then use that information to increase revenue or to decrease cost. That conversion and presentation of data as information is typically performed by a data-processing application.

Information Processing :

Information processing is the change or processing of information in any manner detectable by an observer. Information processing may more specifically be defined in terms by Claude E. Shannon as the conversion of latent information into manifest information. Latent and manifest information is defined through the terms of equivocation, remaining uncertainty, what value the sender has actually chosen, dissipation uncertainty of the sender, what the receiver has actually received and transformation saved effort of questioning - equivocation minus dissipation.

Practical Information Processing can be described as a cycle, where data which may have no inherent meaning to the observer is converted into information, which does have meaning to the observer.

3.12 Different methods for Data Collection

Methods of Data and Information Collection :

Several methods are available for the collection of data. The choice of method will have an impact on the quality of information. Similarly the design of data collection method also decides the quality of data and information.

Following are the **methods** of data collection:

- i) Observation
- ii) Experiment
- iii) Survey
- iv) Subjective Estimation
- v) Transaction Processing
- vi) Purchase from Outside
- vii) Publication
- viii) Government Agencies

3.12 Decision Making: the nature and characteristics of Decision

The word “**decision**” is derived from the Latin word “decido”. Which means “A decision, therefore it is

- A Settlement
- A fixed intuition to bringing to a conclusive result
- A judgment
- A resolution

Decision: A decision is the choice out of several options made by the decisionmaker to achieve some objective in a given situation.

Business Decision: Business decisions are those which are made in the process of conducting business to achieve its objective in a given situation.

Characteristic of Business Decision Making :

- a) Sequential in nature.
- b) Exceedingly complex due to risk and trade off.
- c) Influenced by personal values.

d) Made in institutional setting and business environment.

Rational Decision Making : A rational decision is the one which, effectively and efficiently, ensure the achievement of the goal for which the decision is made. In reality there is no right or wrong decision but a rational decision or irrational decision which depends on situation.

Type of Rationality:

Objectively: Maximum the value of the objectives.

Subjective: If it is minimize the attainment of value in relation to the knowledge and awareness of subject.

Consciously: Extent the process of the decision making is a conscious one

Organizationally: degree of the orientation towards the organization.

Personal: Rational to the extent is achiever's an individual's personal reason (goals).

Type of Decision Making System : There are two types of decision making system on the basis of knowledge about the environment.

(i) **Closed:** If the manager operates in a known environment then it is called closed decision making system.

Conditions:

a) Manager knows the set of decision alternative and know their outcome in term of values.

b) Manager has a model, by which decision alternatives can be generated, tested and ranked.

c) The manager can choose one of them, based on some goal or objective.

(ii) **Open:** If the manager operates in unknown environment then it is called open decision making.

Conditions:

a) Manager does not know all alternatives.

b) Outcome is not known.

c) No methods or models are used.

d) Decide objective or goal; select one where his aspirates or desire are met best.

Types of Decision: Types of decision are based on the degree of knowledge about the outcome of the events which are yet to take place.

- **Certainty:** If the manager has full knowledge of event or outcome then it is a situation of certainty.
- **Risk :** If the manager has partial knowledge or probabilistic knowledge then it is decision under risk.
- **Uncertainty :** If the manager does not have any knowledge, it is decision making under uncertainty

MIS converts the uncertainty to risk and risk to certainty. The decision at the low level management is certain, at middle level of the management the decision is under risk and at the top level management the decision is in under uncertain.

Nature of decision : Decision making is a complex task. To resolve the complexity the nature of decision are of two types :

Programmed and Non-Programmed Decision :

- a) If a decision can be based on a rule, methods or even guidelines, it is called the programmed decision.
- b) A decision which cannot be made by using a rule or model is the nonprogrammed decision.

3.13 DSS and the purpose of Decision Support System in MIS

Decision Support System refers to a class of systems which support in the process of decision making and does not always give a decision itself.

Decision Support Systems (DSS) are a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

DSS is an application of Herbert Simon model, as discussed, the model has three Phases:

- i) Intelligence
- ii) Design
- iii) Choice

The DSS basically helps in the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution. The choice of selection criteria varies from problem to problem.

It is therefore, required to go through these phases again and again till satisfactory solution is found. In the following three phase cycle, you may use inquiry, analysis, and model and accounting system to come to rational solution.

These systems are helpful where the decision maker calls for complex manipulation of data and use of several methods to reach an acceptable solution using different analysis approach. The decision support system helps in making a decision and also in performance analysis. DSS can be built around the rule in case of programmable decision situation. The rules are not fixed or predetermined and requires every time the user to go through the decision making cycle as indicated in Herbert Simon model.

Attribute:

- i) DSS should be adaptable and flexible.
- ii) DSS should be interactive and provide ease of use.
- iii) Effectiveness balanced with efficiency (benefit must exceed cost).
- iv) Complete control by decision-makers.
- v) Ease of development by (modification to suit needs and changing environment) end users.
- vi) Support modeling and analysis.
- vii) Data access.
- viii) Standalone, integration and Web-based

DSS Characteristics :

- i) Support for decision makers in semi structured and unstructured problems.
- ii) Support managers at all levels.
- iii) Support individuals and groups.
- iv) Support for interdependent or sequential decisions.
- v) Support intelligence, design, choice, and implementation.
- vi) Support variety of decision processes and styles

3.14 Summary

Information is the product of data processing. Information is interrelated data. Information is equivalent to finished goods produced after processing the raw material. The information has a value in decision making. Information brings clarity and creates an intelligent human response in the mind.

Information can be defined as a data that has been converted into meaningful and useful form for specific context used by a specific user.

The quality of information is high if it leads to attention, decision and an action. So information which is to be quality product must possess characteristic like:

- Promptness in availability
- Accuracy
- Precision
- Unambiguous
- Completeness
- Impartibility
- Exception based

Information has two types of value that is: Quantifiable value and non quantifiable value.

Non quantifiable value of information is that which is not measured in term of money or tangible benefits or we can not separate the impact of information on decision behavior.

The common method used to collect data and information are:

- Old files/historic records
- Observation
- Mass media of communication
- Library research
- Government agencies
- Meetings
- Seminars
- Workshops and conferences
- Interviews etc

Decision Support System refers to a class of systems which support in the process of decision making and does not always give a decision itself.

3.15Glossary

Information: Data that is (1) accurate and timely, (2) specific and organized for a purpose, (3) presented within a context that gives it meaning and relevance, and (4) can lead to an increase in understanding and decrease in uncertainty. Information is valuable because it can affect behavior, a decision, or an outcome.

Data: Information in raw or unorganized form (such as alphabets, numbers, or symbols) that refer to, or represent, conditions, ideas, or objects. **Data** is limitless and present everywhere in the universe

Information overloading: Information overload (also known as infobesity or infoxication) refers to the difficulty a person can have understanding an issue and making decisions that can be caused by the presence of too much information. **Information Overload** is an increasing problem both in the workplace, and in life in general. Those that learn to deal with it effectively will have a major

DSS: A decision support system (**DSS**) is a computer program application that analyzes business data and presents it so that users can make business decisions more easily. A **decision support system (DSS)** is an information system that supports business or organizational decision-making activities. DSSs serve the management, operations and planning levels of an organization (usually mid and higher management) and help people make decisions about problems that may be rapidly changing and not easily specified in advance—i.e. unstructured and semi-structured decision problems. Decision support systems can be either fully computerized or human-powered, or a combination of both.

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3.18 Model Questions

1. Define the term information?
2. Differentiate between information and data?
3. What are the various sources of information collection?
4. Discuss various types of information in detail?
5. Discuss what do you understand by DSS?

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 1
- B. 5
- C. 1
- D. 3
- E. 3

LESSON 4: SYSTEM CONCEPT

Structure

- 4.0 Objectives
- 4.1 Introduction: System concept
- 4.2 System Definition
- 4.3 System Types
- 4.4 System Characteristics
- 4.5 System control
- 4.6 System feedback: positive & negative
- 4.7 Input process and output control
- 4.8 role of a management information system
- 4.9 Factors influencing success or failure of MIS
- 4.10 Summary
- 4.11 Glossary
- 4.12 References
- 4.13 Further Readings
- 4.14 Model Questions

4.0 Objectives

After studying this lesson, you will be able to:

1. Define the term system
2. Understand the types of system
3. Understand the concept of sub system
4. Understand input and output process

4.1 INTRODUCTION

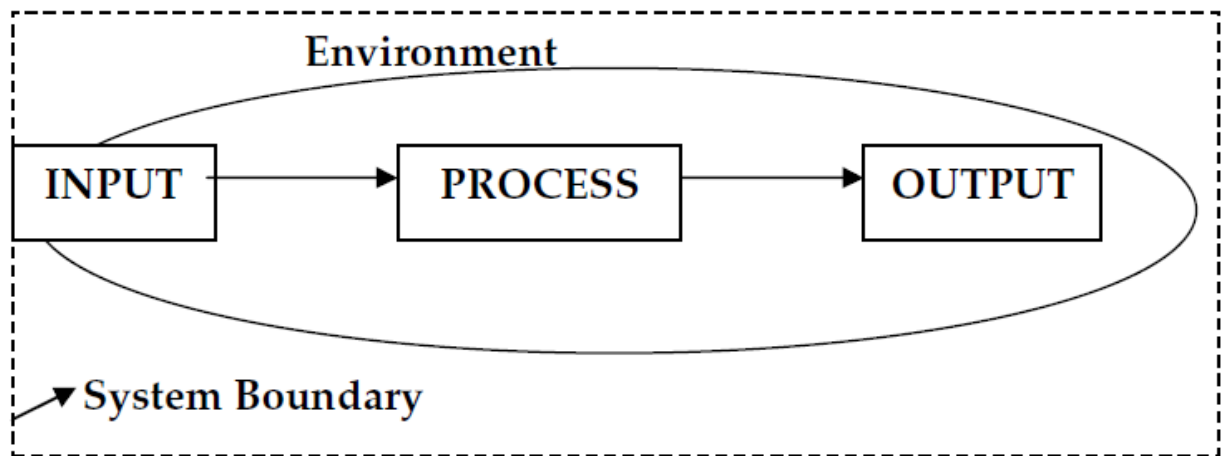
System concept

“A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal.”

The word component may refer to physical parts (engine, wheels of cars), management steps (planning, organizing, controlling) or a sub subsystem in a multi level structure. It is to be noted that a system is not a randomly arranged set. It is arranged with some logic governed by rules, regulation, principles and policies.

In MIS we are usually concerned with man-made system involving input, process and output, as represented in figure. A system may have multiple inputs and multiple outputs.

All systems operate in an environment. The environment may influence the system in its design and performance. When a system is designed to achieve certain objective, it automatically sets the boundaries for itself. The understanding of boundaries of the system is essential to bring clarity in explaining the system components and their arrangement.



4.2 System Definition

“A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal.”

Overview of the systems life cycle

Large systems development projects may involve dozens of people working over several months or even years, so they cannot be allowed to proceed in a haphazard fashion. The goals of an information system must be thoroughly understood, and formal procedures and methods applied to ensure that the project is delivered on time and to the required specification.

The systems life cycle methodology approaches the development of information systems in a very methodical and sequential manner. Each stage is composed of certain well-defined activities and responsibilities, and is completed before the next stage begins. This approach was popular in the 1960s and 70s, when systems were largely transaction-processing systems and had a much heavier reliance on programming than most modern information systems, which are database-oriented.

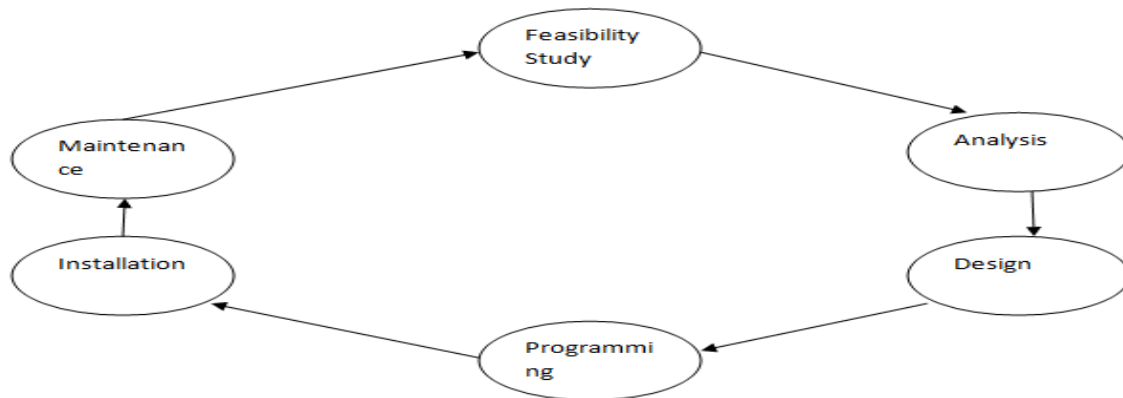


Fig: the system life cycle

4.3 System Types

Physical or Abstract: Physical system is tangible entities that may be static or dynamic in nature. Abstract system is conceptual or non-physical. The abstract is conceptualization of physical situations.

Open and Closed: An open system continually interacts with its environment. It receives input from the outside and delivers output to outside. A closed system is isolated from environment influences

Sub System and Super System: Each system is part of a large system. The business firm is viewed as the system or total system when focus is on production, distribution of goal and sources of profit and income. The total system consists of all the objects, attributes and relationship necessary to accomplish an objective given a number of constraints. Sub systems are the smaller systems within a system. Super system denotes extremely large and complex system

Permanent and Temporary System: A permanent system is a system enduring for a time span that is long relative to the operation of human. Temporary system is one having a short time span.

Natural and Man Made System: System which is made by man is called manmade system. Systems which are in the environment made by nature are called natural system.

Deterministic and Probabilistic: A Deterministic system is one in which the occurrence of all events is perfectly predictable. If we get the description of the system state at a particular time, the next state can be easily predicted.

Probabilistic system is one in which the occurrence of events cannot be perfectly predicted.

Man-made Information System: It is generally believed that the information reduces uncertainty about a state or event. An information system is the basis for interaction between the user and the analyst. It determines the nature of relationship among decision makers. An information system may be defined as a set of devices, procedures and operating system designed around user-base criteria to produce information and communicating it to the user for planning control and performance.

4.4 System Characteristics

Following characteristics are present in all systems :

- a) Organization
- b) Interaction
- c) Interdependence
- d) Integration
- e) Central Objective

Organization : Organization implies structure and order. It is the arrangement of components that helps to achieve objectives. Hierarchical relationship starting with the president on top and leading down ward to the blue collar worker represent the organization structure

Interaction : Interaction refers to the procedure in which each component interact with other components of the system. In an organization, for example purchasing must interact with product, advertising with sales and payroll with personnel.

Interdependence : Interdependence is concerned with how a system is tied together; it is more than sharing a physical part or location. It means that parts of the system part or location within the system, even through each part performance. A unique function successful integration will typically produce a better result as whole rather than if each component works independently.

Central Objective : Objective may be real or stated. Objective is determined by higher management and user must be aware about the central objective well in advance.

ACTIVITIES

1. As an entrepreneur, you decide to open a fast food restaurant. You can purchase a franchise from one of the established corporations or create your own restaurant. Compare the choices by identifying the decisions you will face with each approach. What data will you need to collect?
2. Can value of information overload? How does it occur? And how would you control it?

4.5 System control

The control system would be effective; it continuously monitors the performance and sends the information to the control centre for action. It should not only highlight the progress but also the deviations

4.6 System feedback: positive & negative

The feedback both positive and negative should be accurate in terms of results and should be communicated on time for corrective action.

The system should have the information flow aligned with the organization structure and the decision makers should ensure that the right people get the right information for action and decision making.

4.7 Input process and output control

An open system continually interacts with its environment. It receives input from the outside and delivers output to outside. A closed system is isolated from environment influences

4.8 Role of a management information system

The role of a management information system is to convert data from internal and external sources into information that can be used to aid in making effective decisions for planning, directing and controlling the activities for which they are responsible. An organization may have dozens of different information systems, some of which are useful for the day-to-day operational decisions, and some of which are used in making tactical and strategic decisions.

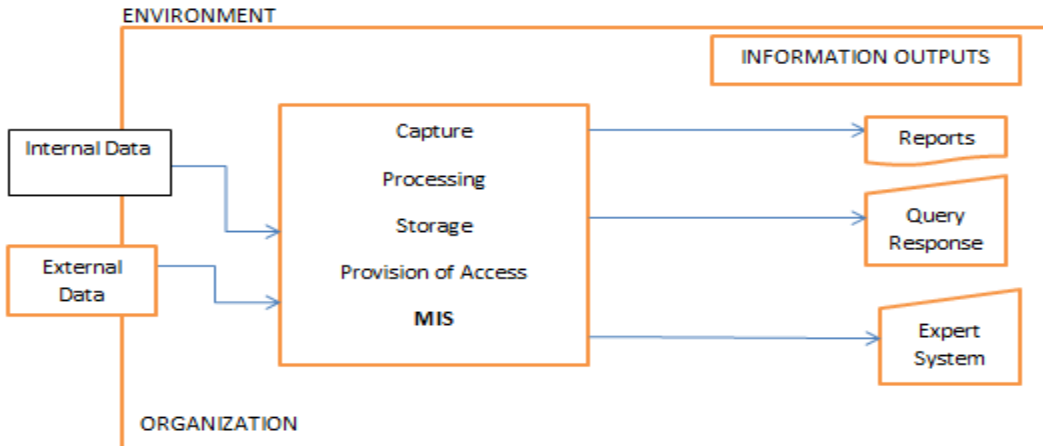


Fig: Role of MIS

4.9 Factors influencing success or failure of MIS

Management information systems are generally enormously complex, and their selection, design and implementation will involve dozens of people from both within and outside the organization. The managers and directors who are ultimately responsible for ensuring the success of the system need to have not only an intimate knowledge and appreciation of exactly what they want out of the system. They must be aware of the possibilities that ICT systems can offer, the difficulties that may be encountered and the importance of having in place the proper procedures to ensure the smooth functioning of the system

Failure of management information systems can be attributed to a number of reasons such as:

- **Inadequate analysis.** The potential problems, exact needs and constraints are not fully understood before the design or selection of a new system;
- **Lack of management involvement in design.** It is essential that all those expecting and needing to benefit from a new system are involved in its design. Without this involvement, any system is doomed to failure either by providing information which nobody needs (or, worse still, nobody understands) or management having expectations from a new system which cannot be delivered.
- **Emphasis on the computer system.** Selecting the right hardware and software is clearly essential as the basis for a modern computer system but appropriate procedures for handling both data input and output must be established before a system is implemented. The objectives of the new

system need to be clearly thought out. Users often request the population of fields on a database for no explained reason and often request management reports which are neither useful nor read

- **Concentration on low-level data processing.** One of the fundamental functions of a system within a company is the day-to-day processing of transactions, including sales and purchase orders, invoices, goods receipts and credit notes. When designing a basic system, the management information available from the system must be both easily accessible and easily understandable by users who maybe neither computer literate nor managers.
- **Lack of management knowledge of ICT systems and their capabilities.** Managers require information for running companies or departments, and among other things, for producing budgets and forecasts. Managers must know what they want from a system but it cannot be assumed that these same managers have a full (or even a slight) grasp of the technology which will provide the information they need.
- **Lack of teamwork.** The needs of the accounts department, the marketing department, the sales department (home and export), and the storage and dispatch departments are all likely to differ and an ICT manager needs not only to lead his team but also to be able to take on board the whole company's requirements. Teamwork needs leadership and a good leader is one who can convince all the members of a company team that the ICT system being designed is going to meet everybody's needs – but not necessarily in quite the way that the different players may have pictured.
- **Lack of professional standards.** Clear documentation written in a language that not only the ICT manager can understand is essential for training, implementation and daily use of a new system. Operators need to know exactly what to do in their work (including what to do if they need to undo some action); managers need to feel reassured that, if necessary, explanations are available to help them to interrogate the system for the information they require, and all people using the system must feel confident enough to be able to help others.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. When a bank uses business performance management software to monitor its performance in differences regions this:
1. reduces costs.
 2. manages risks.
 3. adds value.
 4. creates a new opportunity.
 5. none of the above.
- B. When a bank offers web self-service for customers to answer their questions, the primary outcome is:
1. adds value.
 2. manages risks.
 3. reduces costs.
 4. creates a new opportunity.
 5. none of the above.
- C. The general transformation cycle for information is:
1. information to data to knowledge.
 2. knowledge to data to information.
 3. data to knowledge to information.
 4. data to information to knowledge.
 5. none of the above.
- D. The most important attribute of information quality that a manager requires is:
1. relevance.
 2. media.
 3. presentation.
 4. timeliness.
 5. none of the above.

4.9 Summary

A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal.

The term system describes various characteristics, components, merits and demerit of a particular subject that may be biological like human body as a system or commercial like a business organization and natural like solar system.

The relationship of input and output in a system may be different from others. A system may have a single input but various outputs and vice versa.

A system stakeholder means any person who has an interest in an existing or proposed information system.

The system should have the information flow aligned with the organization structure and the decision makers should ensure that the right people get the right information for action and decision making.

An open system continually interacts with its environment. It receives input from the outside and delivers output to outside. A closed system is isolated from environment influences

4.10 Glossary

- System
- System analyst
- System users
- Open system
- Closed system
- System feedback: positive and negative

4.11 Referencess

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4.13 Model Questions

1. Define in detail the term 'system'.
2. Every system exists in a congenial environment. Discuss
3. What are the characteristics of a system?
4. Discuss different types of system?
5. Discuss factors influencing success or failure of MIS?

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 2
- B. 3
- C. 4
- D. 1

LESSON 5 : STRUCTURE OF MIS

Structure

5.0 Objectives

5.1 Introduction

5.2 Formal and informal Information System

5.3 Public and Private Information System

5.4 Multiple approaches to structure of MIS

5.5 Operational Elements

5.6 Activity subsystem

5.7 Functional and DSS

5.8 Synthesis of multiple approaches into conceptual structure of MIS

5.9 Summary

5.10 References

5.11 Further Readings

5.12 Model Questions

5.0 Objectives

After studying this lesson, you will be able to:

1. Understand the Formal and informal Information System
2. Understand the concept of Public and Private Information System
3. Understand the Multiple approaches to structure of MIS
4. Concept of DSS

5.1 Basic structure

Formal and informal Information System

Formal Information System:

A formal information system is based on the organization represented by the organization chart. The chart is a map of position and their authority relationship, indicated by boxes and connected by straight lines. it is concerned with the pattern of authority, communication and work flow.

Informal Information System:

The informal information system is employee based system design to meet personnel and vocational needs and to help in the solution of work-related problems. it also funnels information upward through indirect channels. In this

way, it is considered to be a useful system because it works within the framework of the business and its stated policies.

Computer Based Information System (CBIS) : This category of information system depends mainly on the computer for handling business applications. System analyst develops different types of information systems to meet variety of business needs. There is a class of system collectively known as computer based information system.

They can be classified as

- Transaction Processing System (TPS)
- Management Information System(MIS)
- Decision Support System (DSS)
- Office Automation System (OAS)

Transaction Processing System (TPS) : The most fundamental computer based system in an organization pertains to the processing of business transactions. A transaction processing system can be defined as a system that captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and input to the other types of CBIS. Transaction Processing System is aimed at improving the routine business activities. A transaction is any event or activity that affects the whole organization. Placing order, billing customers, hiring of employees and depositing cheques are some of the common transactions. Types of transactions that occur vary from organization to organization but this is true that all organizations process transaction as a major part of their daily business activities. Transaction Processing System provides speed and accuracy and can be programmed to follow routines without any variance.

Management Information System (MIS) : Data processing by computers has been extremely effective because of several reasons. The main reason is that huge amount of data relating to accounts and other transactions can be processed very quickly. MIS are more concerned with levels of management with information essential to the running of smooth business. This Information must be as relevant, timely, accurate, complete and concise as is economically feasible.

Decision Support System (DSS) : It is an information system that offers the kind of information that may not be predictable. Business professionals may need such information only once. These systems do not produce regularly scheduled management reports. Instead, they are designed to respond to wide range of requests. It is true that all the decisions in an organization are not of a recurring nature. Decision support systems assist managers, who make decisions that are not

highly structured, often called unstructured or semi structured decision. The decision support systems support, but do not replace, judgments of managers.

Office Automation System (OAS) : Office Automation Systems are among the newest and most rapidly expanding computer based information systems. They are being developed with the hope and expectation that they will increase the efficiency and productivity of office workers, typists, secretaries, administrative assistants, staff professionals, managers and others.

5.2 Public and Private Information System

Public information system help to provide information to public agencies like census, hospitals etc to take decisions whereas private information system provide information to private agencies to understand the customer feedback, competitors analysis etc helpful for the companies to understand the market trend.

5.3 Multiple approaches to structure of MIS

MIS is a part of all the three level of management:

- Top Level(Strategic Decision)
- Middle Level(Tactical Decision)
- Lower Level(Operational Decision)

The word organization means two things. The first meaning of the word organization is an institution or a functional group. A business organization a hospital, a school a university is some such institution keeping in view the concept of division of labor, authority, responsibility and decision making so that the institution as a stable system, works coherently towards the achievement of goals.
.the level at which a person is holding position.

The authority is measured on the basis of command on control of resources, the risk of business, and the decision making power to manage the risk and reward. When the authority. Is distributed in a vertical order in terms of levels, the organization is built on the principle of hierarchy of authority.

The effectiveness of the authority is based on the span of control, i.e., the number of person being managed and controlled by a person. Depending on the organization, and business, the span may differ from four to seven. The span outside this range has proved to be unproductive and inefficient.

The organization structure is built by arrangement of organizational subsystems. The organization structure is built on four basic principles, viz. hierarchy of authority, specialization, standardization or formalization and, centralization. The structure is built to achieve goals and objectives fitting into the environment. The

structure built on any principle shows division of work, managerial and non-managerial manpower allocation as well as flows of decision responsibility and exchange of information.

The organization is structured on the basis of the above four principles. The blend of these principal is decided on the nature of business, risk of business, size of business, management style and the environment of business. The blending of these principles would undergo a change as the business grows. The organization is under a continuous process of change to meet the changing needs of business, the organization will have a different structure in its various business stages namely, inception, growth, maturity, and decline. The structure of organization affects organizational productivity, individual performance, growth of human resource, and the manpower itself. A considerable amount of saving in manpower and overhead expenses is possible, if the organization is properly structured to the business needs and towards fulfilling the objectives.

There are four modifications to the basic model of organization as under.

1. Functional; 2.Product / Market / Service; 3. Project; and 4. Matrix. Organisation

1.The functional organization is most suitable where the organization business can be split into clear divisions of activity and all of them are equally important. For example, the business organization can be functionally organized into four or five functions such as marketing manufacturing, finance, personnel, and materials. Functional organization (Emphasis on functional Management).

The strength of the people and the hierarchy in each of the functional organizations would vary depending upon the size and the number of activities. Decision making in any functional organization is at the level of the functional head with accountability to the chief of the organization. The implications of the decisions are largely on the functions themselves. A decision affecting other functions of the business, however, is referred to the top management. The information flow is from the top to the bottom and in the reverse order. The information flow across the functions is not expected. Accumulation of information is at the chief executives level and is shared by the others.

The functional organization is most suited where each function is a specialty and calls for an expertise in the field; and where coordination is of a very low order and can be handled easily through the management process. The organization works efficiently when the business is stable and is expected to grow in a steady manner. When the business becomes competitive and develops threats to its growth, the functional structure undergoes a change. The development of people is on the specialized functions and hence they are not equipped to handle other functions if required. The people in a functional organization develop a narrow outlook

restricted to their own functions and responsibilities. The corporate culture is difficult to imbibe in a functional set-up. Most of the manufacturing, selling organizations in their initial period are structured on the functional lines. The government departments and agencies are organized on the functional principle.

2. Product / Market / service Organization

When the organization grows large in turnover and strength, and when the decisionmaking relates to either the product or the market or the service the organizing structure is built around one of these factors. In this structure the total responsibility rests with the product / market / service head. He is expected to take all the decisions regarding finance material, etc. The people in the organization report to the product head. The decision making in this structure is faster and to some extent centralized. The inter functional conflicts are avoided resulting in speedy business progress.

In this structure, people work more for product goals than the corporate goals. The contribution to profit by product can be easily measured as profit is earned by product business unit. In this structure, the manpower requirement is higher and the people develop specializations in the specific technology and management.

A project organization is a special case of product organization where the common service like finance, purchase etc. are organized at the functional level. But project resources are allocated to the project manager. This type of organization structure helps in making quick decisions for project control in terms of cost resource and time. In a project organization some of the functions are of corporate responsibility and some of them are the project manager's responsibility.

In a project business, the activity is one at a time and has implications on the subsequent activities in the project. Therefore, any problem or conflict relating to the activity needs to be resolved immediately. This calls for quick decisions. This is possible by organizing all the functional resources under one command of the project manager.

3. Matrix Organization

In all the three organization structures discussed so far, the communication protocol is vertical in the hierarchy. The information flow is within the hierarchy. The lateral communication between the functions is not permitted. In a matrix organization in a vertical as well as a lateral communication and information flow is allowed.

The matrix organization integrates functional responsibility with product responsibility. It is a combination of the functional and the product organization structure. A product manager is responsible for the total performance of the product and he will have the production manager, the marketing manager, the accounts manager as his counterparts in the manufacturing, marketing and accounting functions respectively.

These functional managers report to the functional head vertically and the product manager laterally. The matrix organization structure is used in big companies having diverse business activities. The business units, known as strategic business units, are organized with a unit head at the top. The structure enjoys the advantages of a functional as well as of a product organization. It should be noted that the organization structure is a dynamic model. It is effective for the purpose it is set to fulfill under certain conditions. The moment the business conditions change, the structure should undergo a suitable change. The structural change does not limit them from one type to the other but many other qualitative changes are also desirable.

There has to be a change in the people in terms of strengths, skills and abilities. A functional head in the functional organization may not be suitable to shoulder the responsibility of the Product Manager in a product organization structure, because of inherent limitations of narrow specialized experience as a functional head.

With the standardization and formalization drive in the organization, the span of control can be enlarged than before. With the delegation of authority, backed by the rules and policies the junior level personnel become more knowledgeable, experienced and capable of shouldering higher responsibility. This would affect the levels in hierarchy.

There are two basic approaches for development of MIS :

- a) **System development life cycle** : The system development life cycle have following steps of development :
 - i) Systems Planning
 - ii) Systems Analysis
 - iii) Systems Design
 - iv) Systems Implementation
 - v) Systems Operation and Support (System Maintenance)

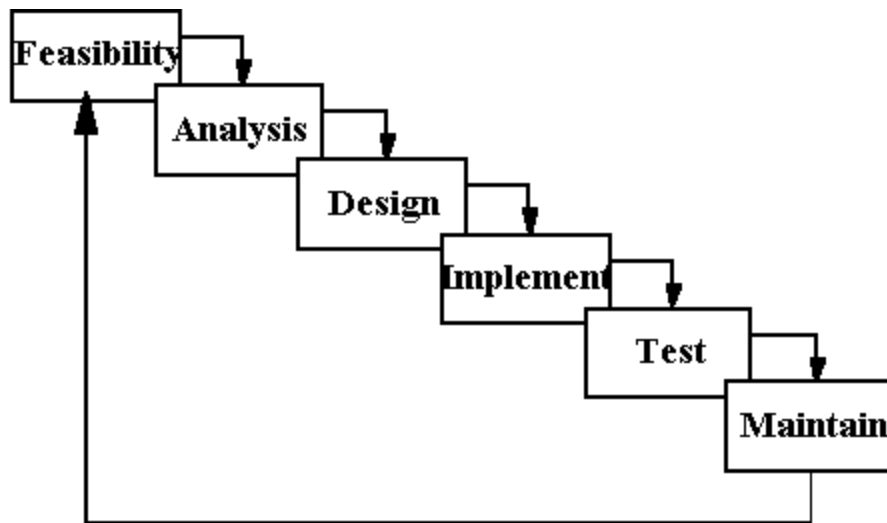


FIG: The SDLC(Waterfall Model)

The systems life cycle approach to development is also known as the ‘waterfall model’, and a variation on the basic diagram as shown in Figure. Note that the arrows go up and down the ‘waterfall’, reflecting the fact that developers often have to rework earlier stages in the light of experience gained as development progresses.

A project milestone terminates each stage of a life-cycle-oriented approach. At this stage, the ‘deliverable’ resulting from that stage – such as the documentation for the analysis or the design, or the program code or finished database application, is *signed off* by all concerned parties and approval is given to proceed. The ‘concerned parties’ usually include the end-users, the management and the developers, as well as other experts such as database administration personnel. This sequence continues until the evaluation stage has been completed and the finished system is delivered to the end-users.

In this model, the end-user has very little say in the development process, which is carried out by technical specialists such as systems analysts and programmers. He or she is presented with the finished system at the end of the development cycle and if it is not quite what was wanted, it is generally too late to make changes. Therefore, it is extremely important that the system requirements are very clearly specified and understood by all parties before being signed off.

Such levels of certainty are difficult to achieve and this is one of the major drawbacks of the ‘waterfall model’.

What prompts a new system?

The development of a new information system is a major undertaking and not one to be undertaken lightly. Wal-Mart, an American discount store, spent \$700m on its new computerized distribution system in the 1980s. Tesco, Sainsbury's and Marks and Spencer have spent massive sums of money on their computer systems in the past decade. Businesses must adapt to remain competitive. Some of the reasons for introducing a new system may be:

1. **The current system may no longer be suitable for its purpose.** Changes in work processes, expansion of the business, changes in business requirements or the environment in which the organization operates may all lead to a reassessment of information system requirements.

2. **Technological developments may have made the current system redundant or outdated.** Advances in hardware, software and telecommunications bring new opportunities which an organization cannot ignore if it is to keep ahead of its rivals.

3. **The current system may be too inflexible or expensive to maintain,** or may reduce the organization's ability to respond quickly enough to customer's demands.

Feasibility study

This is the first stage of the systems life cycle. The **scope** and **objectives** of the proposed system must be written down. The aim of the feasibility study is to understand the problem and to determine whether it is worth proceeding. There are five main factors to be considered:

- **Technical feasibility** means investigating whether the technology exists to implement the proposed system, or whether this is a practical proposition.
- **Economic feasibility** has to do with establishing the cost-effectiveness of the proposed system – if the benefits do not outweigh the costs, then it is not worth going ahead.
- **Legal feasibility** determines whether there is any conflict between the proposed system and legal requirements – for example, will the system contravene the Data Protection Act?
- **Operational feasibility** is concerned with whether the current work practices and procedures are adequate to support the new system. It is also concerned with social factors – how the organizational change will affect the working lives of those affected by the system.

- **Schedule feasibility** looks at how long the system will take to develop, or whether it can be done in a desired time-frame.

The completion of this stage is marked by the production of a feasibility report produced by the systems analyst. If the report concludes that the project should go ahead, and this is agreed by senior managers, detailed requirements analysis will proceed.

Requirements analysis

The second phase of systems analysis is a more detailed investigation into the current system and the requirements of the new system.

Gathering details about the current system will involve:

- Interviewing staff at different levels of the organization from the end-users to senior management.
- Examining current business and systems documents and output. These may include current order documents, computer systems procedures and reports used by operations and senior management.
- Sending out questionnaires and analyzing responses. The questions have to be carefully constructed to elicit unambiguous answers.
- Observation of current procedures, by spending time in various departments. A time and motion study can be carried out to see where procedures could be made more efficient, or to detect where bottlenecks occur.

The systems analyst's report will examine how data and information flow around the organization, and may use **data flow diagrams** to document the flow. It will also establish precisely and in considerable detail exactly what the proposed system will do (as opposed to how it will do it). It will include an in-depth analysis of the costs and benefits, and outline the process of system implementation, including the organizational change required. It must establish who the end-users are, what information they should get and in what form and how it will be obtained.

Alternative options for the implementation of the project will be suggested. These could include suggestions for:

- Whether development should be done in-house or using consultants;
- What hardware configurations could be considered;
- What the software options are.

The report will conclude with a recommendation to either proceed or abandon the project.

System design

The design specifies the following aspects of a system:

- The hardware platform – which type of computer, network capabilities, input, storage and output devices;
- The software – programming language, package or database;
- The outputs – report layouts and screen designs;
- The inputs – documents, screen layouts and validation procedures;
- The user interface – how users will interact with the computer system;
- The modular design of each program in the application;
- The test plan and test data;
- Conversion plan – how the new system is to be implemented;
- Documentation including systems and operations documentation. Later, a user manual will be produced.

Implementation

This phase includes both the coding and testing of the system, the acquisition of hardware and software and the installation of the new system or conversion of the old system to the new one. The installation phase can include:

- Installing the new hardware, which may involve extensive recalling and changes in office layouts;
- Training the users on the new system;
- Conversion of master files to the new system, or creation of new master files.

Methods of conversion

There are several different methods of conversion:

- **Direct changeover.** The user stops using the old system one day and starts using the new system the next — usually over a weekend or during a slack period. The advantage of this system is that it is fast and efficient, with minimum duplication of work involved. The disadvantage is that normal operations could be seriously disrupted if the new system has errors in it or does not work quite as expected.
- **Parallel conversion.** The old system continues alongside the new system for a few weeks or months. The advantage is that results from the new system can be checked against known results, and if any difficulties occur, operations can continue under the old system while the errors or omissions are sorted out. The disadvantage of parallel conversion is the duplication of

effort required to keep both systems running, which may put a strain on personnel.

- **Phased conversion.** This is used with larger systems that can be broken down into individual modules that can be implemented separately at different times. It could also be used where for example only a few customer accounts are processed using the new system, while the rest remain for a time on the old system. Phased conversion could be direct or parallel.
- **Pilot conversion.** This means that the new system will be used first by only a portion of the organization, for example at one branch or factory.

Post-implementation review

An important part of the implementation is a review of how the new system is performing, once it has been up and running for a period of time. Minor programming errors may have to be corrected, clerical procedures amended, or modifications made to the design of reports or screen layouts. Often it is only when people start to use a new system that they realize its shortcomings! In some cases they may realize that it would be possible to get even more useful information from the system than they realized, and more programs may be requested. The process of **system maintenance**, in fact, has already begun, and the life cycle is complete.

ACTIVITIES

1. Discuss various approaches used in your organization to understand the MIS structure.
2. Differentiate between programmable decisions and non-programmable decisions with examples from your organization.

System maintenance

All software systems require maintenance, and in fact the vast majority of programmers are employed to maintain existing programs rather than to write new ones. There are differing reasons for this, and different types of maintenance.

- **Perfective maintenance.** This implies that while the system runs satisfactorily, there is still room for improvement. For example, extra management information may be needed so that new report programs have to be written. Database queries may be very slow, and a change in a program may be able to improve response time.
- **Adaptive maintenance.** All systems will need to adapt to changing needs within a company. As a business expands, for example, there may be a requirement to convert a standalone system to a multiuser system. New and better hardware may become available, and changes to the software may

benecessary to take advantage of this. New government legislation may mean that different methods of calculating tax, for example, are required. Competition from other firms may mean that systems have to be upgraded in order to maintain a competitive edge.

- **Corrective maintenance.** Problems frequently surface after a system has been in use for a short time, however thoroughly it was tested. Some part of the system may not function as expected, or a report might be wrong in some way; totals missing at the bottom, incorrect sequence of data, wrong headings, etc. Frequently errors will be hard to trace, if for example a file appears to have been wrongly updated.

b) **Prototyping :** Prototyping is the process of creating an incomplete model of the future full-featured system, which can be used to let the users have a first idea of the completed program or allow the clients to evaluate the program.

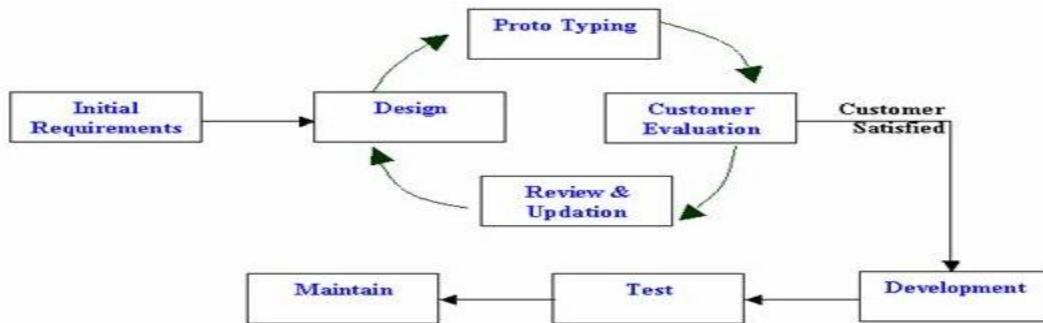
The waterfall model of the system life cycle has major shortcomings and often bears little relation to what happens in practice.

One reason for this is that it doesn't allow for modifications to the design as the project proceeds, with both user and developer learning as they go along. Users frequently have difficulty in explaining their requirements at the start of a proposed system since they do not know what is possible and cannot visualize how the final system will work. This can result in a system which does not really match their requirements. (See Figure)

Using the **prototyping** approach, a model of a new system is built in order to evaluate it or have it approved before building the production model. Applied to software projects, this means, for example, using special software to quickly design input screens and create a program to input and validate data.

This gives the user a chance to experience the 'look and feel' of the input process and suggest alterations before going any further. The earlier a user is involved, the easier it will be to make changes.

Fig: Prototyping Model



Proto Type Model

Benefits of prototyping

The benefits of prototyping are:

- Misunderstandings between software developers and users can be identified when the prototype is demonstrated;
- Missing functions may be detected;
- Incomplete or inconsistent user requirements may be detected and can be completed or corrected;
- A prototype version will be quickly available to demonstrate the feasibility and usefulness of the proposed system to management;
- The prototype can sometimes be used for training before the final system is delivered.

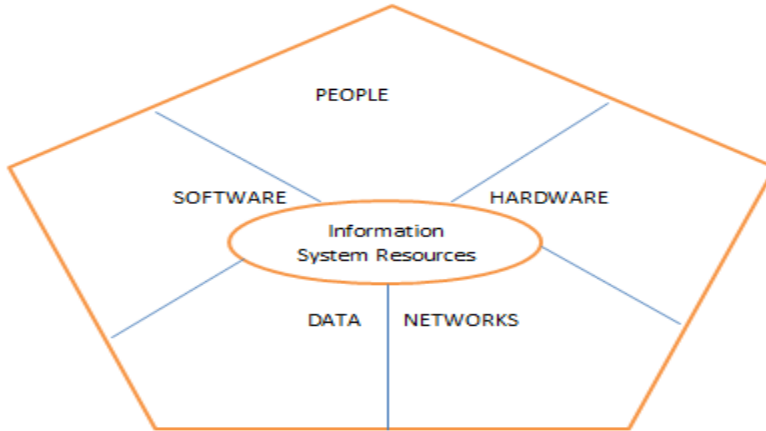
Prototyping may be used in a number of different ways, and various terms have been coined to describe them:

- **Piloting** – using a prototype to test the feasibility of a design proposal;
- **Modeling** – building to develop an understanding of the user's requirements;
- **Throw-away prototyping** – both piloting and modeling are 'throw-away prototypes': once they have achieved their purpose the real system is built;
- **Evolutionary prototyping** – each prototype built represents a step closer to the final solution.

5.4 Operational Elements

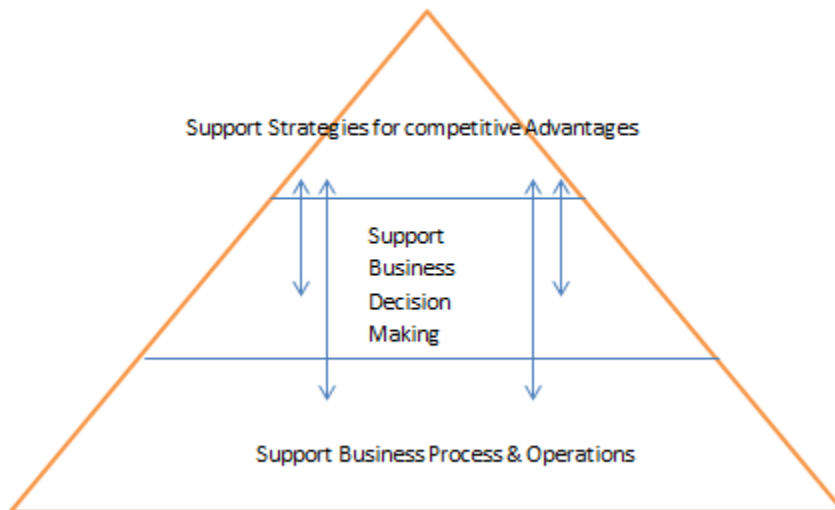
The various operational elements of MIS include:

- People Resources (End Users and IS Specialist)
- Software Resources (Programs and Procedures)
- Hardware Resources (Machines and Works)
- Network Resources (Communication Media and Network Supports)
- Data Resources (Data and management)

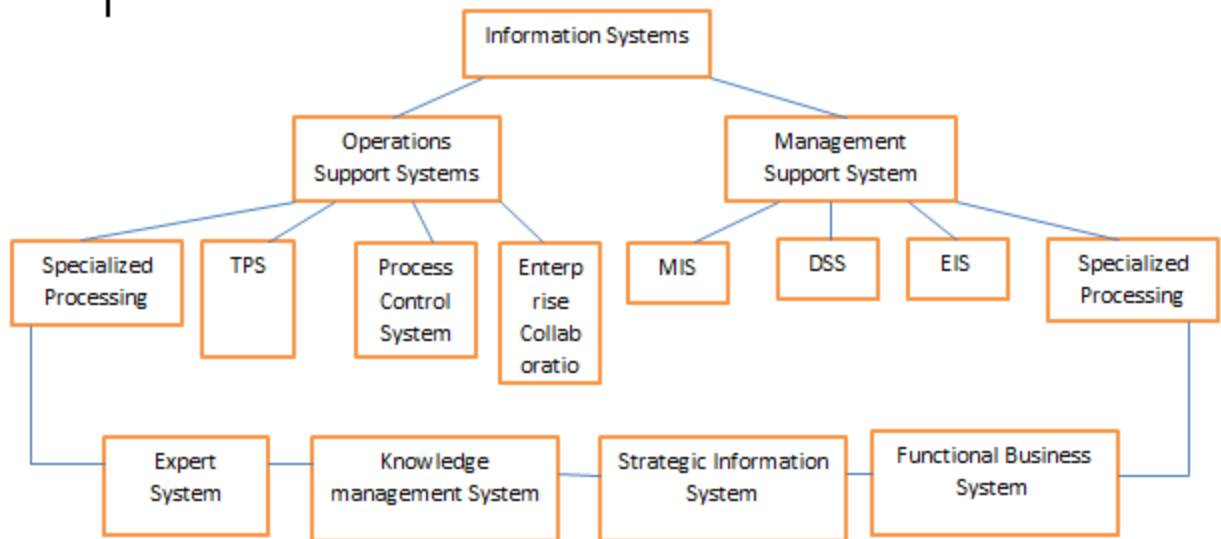


5.5 Activity subsystem

The mis Information system is present at all the three levels of management i.e at the Top level for strategic decision making, middle level for tactical decision making and at the low level for operational decision making.



5.6 Functional and DSS



5.7 MIS AND THE USER

Every person in the organization is a user of the MIS. The people in the organization operate at all levels in the hierarchy. A typical user is a clerk, an assistant, an officer, an executive or a manager. Each of them has a specific task and a role to play in the management of business. The MIS caters to the needs of all persons.

The main task of a clerk is to search the data, make a statement and submit it to the higher level. A clerk can use the MIS for a quick search and reporting the same to the higher level. An assistant has the task of collecting and organizing the data, and conducting a rudimentary analysis of integrating the data from different disciplines to analyze it and make a critical comment if anything adverse is found.

The MIS offers the methods and facilities to integrate the data and report the same in a proper format. An executive plays the role of a decision maker. He is in a position of responsibility and accountability a planner and a decision maker. He is responsible for achieving the target and goals of the organization. The MIS provides facilities to analyze the data and offers the decision support systems to perform the task of execution. The MIS provides an action oriented information.

The manager has a position of responsibility and accountability for the business results. His management role expands beyond his management function. He is a strategist and a long-term planner. He is a person with a foresight, an analytical ability and is expected to use these abilities in the functions of top management.

The MIS provides information in a structured or unstructured format for him to react. The MIS caters to his constant changing needs of information. The user of the MIS is expected to be a rational person and the design of the MIS is based on this assumption.

However, in reality the impact created on individuals by MIS is difficult to explain. The nature of the impact in a few cases is negative. However, this negative impact can be handled with proper training and counseling. It is observed that at lower level, is a sense of insecurity. As the MIS takes away the drudgery of search, collection, writing and reporting the data, the work vacuum, so created is not easily filled, thus creating a sense of insecurity. To some extent the importance of the person is also lost, giving rise to a fear of non-recognition in the organization.

At the level of an officer and an executive, the MIS does the job of data manipulation and integration. It analyses the data in a predetermined manner. This means that the knowledge of business is transferred from an individual to the MIS and is made available to all in the organization. This change arising out of the MIS creates a sense of being neglected for knowledge, information and advice. The psychological impact is larger if the person is not able to cope up with this change by expanding or enriching the job and the position held by him.

The manager holding a position in the top or middle management suffers from fear of challenge and exposure. The MIS makes these competitors more effective as they have access to the information and have an ability to interpret. This leads to a situation where he is afraid that his position, decision and defense will be challenged and may be proved wrong sometime. The risk of adverse exposure to the higher management also increases. The effects so far pointed out are all negative and they are seen only in few cases.

The positive effects on the individuals at all levels are that they have become more effective operators. The time and energy which was spent earlier in unproductive work is now applied for a productive work. Some are able to use their analytical skills and knowledge with the information support for improving their position in the organization. Managers, having improved their decision making ability, are able to handle the complex situations with relative ease. Some are benefited by improving their performance and being held in high esteem by the higher management.

The enterprising managers are able to use the systems and the models for trying out a number of alternatives in a given problem situation. The impact of the MIS

one people of the organization is phenomenal as it has made the same body of people collectively more effective and productive.

The recent major technological advances in communication such as Multimedia, Imaging. Graphical User Interfaces (GUI), Internet, Web etc. and the ability to access the data stored at different locations on the variety hardware of platforms would make MIS more attractive and efficient proposition. An intelligent user of information can demonstrate the ability of decision making, since his manipulative capability is considerably increased, with the information now being available on his desktop.

Through the MIS, the information can be used as a strategic weapon to counter the threats to business, make business more competitive, and bring about the organizational transformation through integration. A good MIS also makes an organization seamless by removing all the communication barriers.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. Information systems that support the business functions that reach out to suppliers are known as:
 - 1. back office information systems
 - 2. decision support systems
 - 3. expert information systems
 - 4. front office information systems
 - 5. none of the above

- B. Which of the following is not a class of information system applications?
 - 1. database management system
 - 2. decision support system
 - 3. expert system
 - 4. management information system
 - 5. office automation system

- C. Who are the people that actually use the system to perform or support the work to be completed?
 - 1. system analysts
 - 2. system designers
 - 3. system owners
 - 4. system builders

5. none of the above

D. Which is not a typical business function?

1. Sales
2. Service
3. Manufacturing
4. Accounting
5. Benefits and Compensation

5.8 Architecture of the MIS

The architecture of the MIS plan provides a system structure and their input, output and linkages. It also provides a way to handle the systems or subsystems by way of simplification, coupling and decoupling of subsystems by way of simplification, coupling and decoupling of subsystems. It spells out in detail the subsystems from the data entry to processing, analysis to modeling, and storage to printing.

The system development schedule

A schedule is made for the development of the system. While preparing the schedule due consideration is given to the importance of the system in the overall information requirement. Due regard is also given to logical system development. For example, it is necessary to develop the accounting system first and then the analysis. Further, unless the systems are fully developed their integration is not possible.

This development schedule is to be weighed against the time scale for achieving a certain information requirement linked to a business plan. If these are not fully met, it is necessary to revise the time schedule and also the development schedule, whenever necessary.

Hardware and software plan

Giving due regard to the technical and operational feasibility, the economics of investment is worked out. Then the plan of procurement is made after selecting the hardware and software. One can take the phased approach of investment starting from the lower configuration of hardware going over to higher as development takes place. The process is to match the technical decision with the financial decision. The system development schedule is linked with the information requirement which in turn, is linked with the goals and objectives of the business. The selection of the architecture, the approach to the information system development and the choice of hardware and software are the strategic decision in

the design and development of the MIS in the organization. The organizations which do not care to take proper decisions in these areas suffer from over-investment, under-utilization and are not able to meet the critical information requirement.

It is important to note the following points:

1. The organization strategic plan should be the basis for the MIS strategic plan
2. The information system development schedule should match with the implementation schedule of the business plan.
3. The choice of information technology is a strategic business decision and not a financial decision.

5.8 Summary

A formal information system is based on the organization represented by the organization chart.

The informal information system is employee based system design to meet personnel and vocational needs and to help in the solution of work-related problems.

Computer Based Information System (CBIS) :This category of information system depends mainly on the computer for handling business applications. System analyst develops different types of information systems to meet variety of business needs.

The organization strategic plan should be the basis for the MIS strategic plan.

The MIS Information system is present at all the three levels of management i.e at the Top level for strategic decision making, middle level for tactical decision making and at the low level for operational decision making

Prototyping may be used in a number of different ways, and various terms have been coined to describe them: Piloting, Modeling, and Throw-away and Evolutionary prototyping

The various operational elements of MIS include:

- People Resources (End Users and IS Specialist)
- Software Resources (Programs and Procedures)
- Hardware Resources (Machines and Works)

- Network Resources (Communication Media and Network Supports)
- Data Resources (Data and management)

5.9 Glossary

Transaction Processing System (TPS) : The most fundamental computer based system in an organization pertains to the processing of business transactions. A transaction processing system can be defined as a system that captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and input to the other types of CBIS. Transaction Processing System is aimed at improving the routine business activities.

Management Information System (MIS) : Data processing by computers has been extremely effective because of several reasons. The main reason is that huge amount of data relating to accounts and other transactions can be processed very quickly. MIS are more concerned with levels of management with information essential to the running of smooth business. This Information must be as relevant, timely, accurate, complete and concise as is economically feasible.

Decision Support System (DSS) : It is an information system that offers the kind of information that may not be predictable. Business professionals may need such information only once. These systems do not produce regularly scheduled management reports. Instead, they are designed to respond to wide range of requests. It is true that all the decisions in an organization are not of a recurring nature. Decision support systems assist managers, who make decisions that are not highly structured, often called unstructured or semi structured decision. The decision support systems support, but do not replace, judgments of managers.

Office Automation System (OAS) : Office Automation Systems are among the newest and most rapidly expanding computer based information systems. They are being developed with the hope and expectation that they will increase the efficiency and productivity of office workers, typists, secretaries, administrative assistants, staff professionals, managers and others.

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5.12 Model Questions

- 1) What is the scope of information system and Management Information system?
- 2) Give three reasons for using computer for MIS in the organization?
- 3) Designing an MIS for an organization?
- 4) Can you think of an MIS which could be user independent and business dependent?
- 5) State the difference between MIS and a computer system.
- 6) Take an organization of your knowledge and give a conceptual view of MIS and physical view of MIS.

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 1
- B. 1
- C. 5
- D. 5

LESSON 6: INFORMATION SYSTEMS

Structure

6.0 Objectives

6.1 TPS

6.2 OAS

6.3 Information Reporting System

6.4 ESS

6.5 Expert System

6.6 Computerized MIS

6.7 DSS

6.8 Decision

6.9 Hebert A. Simon 'Decision Support System Model'

6.10 MIS and Computer

6.11 Management as a Control System

6.12 MIS: A Support to the management

6.13 Evolution of Support System

6.14 Summary

6.15 Glossary

6.16 References

6.17 Further Readings

6.18 Model Questions

6.0 Objectives

After studying this lesson you will be able to

1. Understand TPS, OAS, IRS system.
2. Understand ESS and Expert system.
3. Understand DSS and its components.
4. Understand 'Management as a Control System'.

6.1 TPS(Transaction Processing System)

The most fundamental computer based system in an organization pertains to the processing of business transactions. A transaction processing system can be defined as a system that captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and input to the other types of CBIS. Transaction Processing System is aimed at improving the routine business activities. A transaction is any event or activity that affects the whole organization.

Placing order, billing customers, hiring of employees and depositing cheques are some of the common transactions. Types of transactions that occur vary from organization to organization but this is true that all organizations process transaction as a major part of their daily business activities. Transaction Processing System provides speed and accuracy and can be programmed to follow routines without any variance.

It is a type of information system. TPSs collect, store, modify, and retrieve the transactions of an organization. A transaction is an event that generates or modifies data that is eventually stored in an information system. It is recommended that a transaction processing system should pass the ACID test. The essence of a transaction program is that it manages data that must be left in a consistent state, e.g. if an electronic payment is made, the amount must be both withdrawn from one account and added to the other; it cannot complete only one of those steps. Either both must occur, or neither. In case of a failure preventing transaction completion, the partially executed transaction must be 'rolled back' by the TPS. While this type of integrity must be provided also for batch transaction processing, it is particularly important for online processing: if e.g. an airline seat reservation system is accessed by multiple operators, after an empty seat inquiry, the seat reservation data must be locked until the reservation is made, otherwise another user may get the impression a seat is still free while it is actually being booked at the time. Without proper transaction monitoring, double bookings may occur. Other transaction monitor functions include deadlock detection and resolution (deadlocks may be inevitable in certain cases of cross-dependence on data), and transaction logging (in 'journals') for 'forward recovery' in case of massive failures.

Types of TPS

Contrasted with batch processing

Batch processing is a form of transaction processing. Batch processing involves processing several transactions at the same time, and the results of each transaction are not immediately available when the transaction is being entered, there is a time delay. Transactions are accumulated for a certain period (say for day) where updates are made especially after work. Online transaction processing is the form of transaction processing that processes data as it becomes available.

Real-time and batch processing

There are a number of differences between **real-time** and **batch processing**. These are outlined below:

Each transaction in real-time processing is unique. It is not part of a group of transactions, even though those transactions are processed in the same manner. Transactions in real-time processing are stand-alone both in the entry to the system and also in the handling of output.

Real-time processing requires the master file to be available more often for updating and reference than batch processing. The database is not accessible all of the time for batch processing.

Real-time processing has fewer errors than batch processing, as transaction data is validated and entered immediately. With batch processing, the data is organised and stored before the master file is updated. Errors can occur during these steps.

Infrequent errors may occur in real-time processing; however, they are often tolerated. It is not practical to shut down the system for infrequent errors.

More computer operators are required in real-time processing, as the operations are not centralised. It is more difficult to maintain a real-time processing system than a batch processing system.

Features Of TPS

- **Rapid response**

Fast performance with a rapid response time is critical. Businesses cannot afford to have customers waiting for a TPS to respond, the turnaround time from the input of the transaction to the production for the output must be a few seconds or less.

- **Reliability**

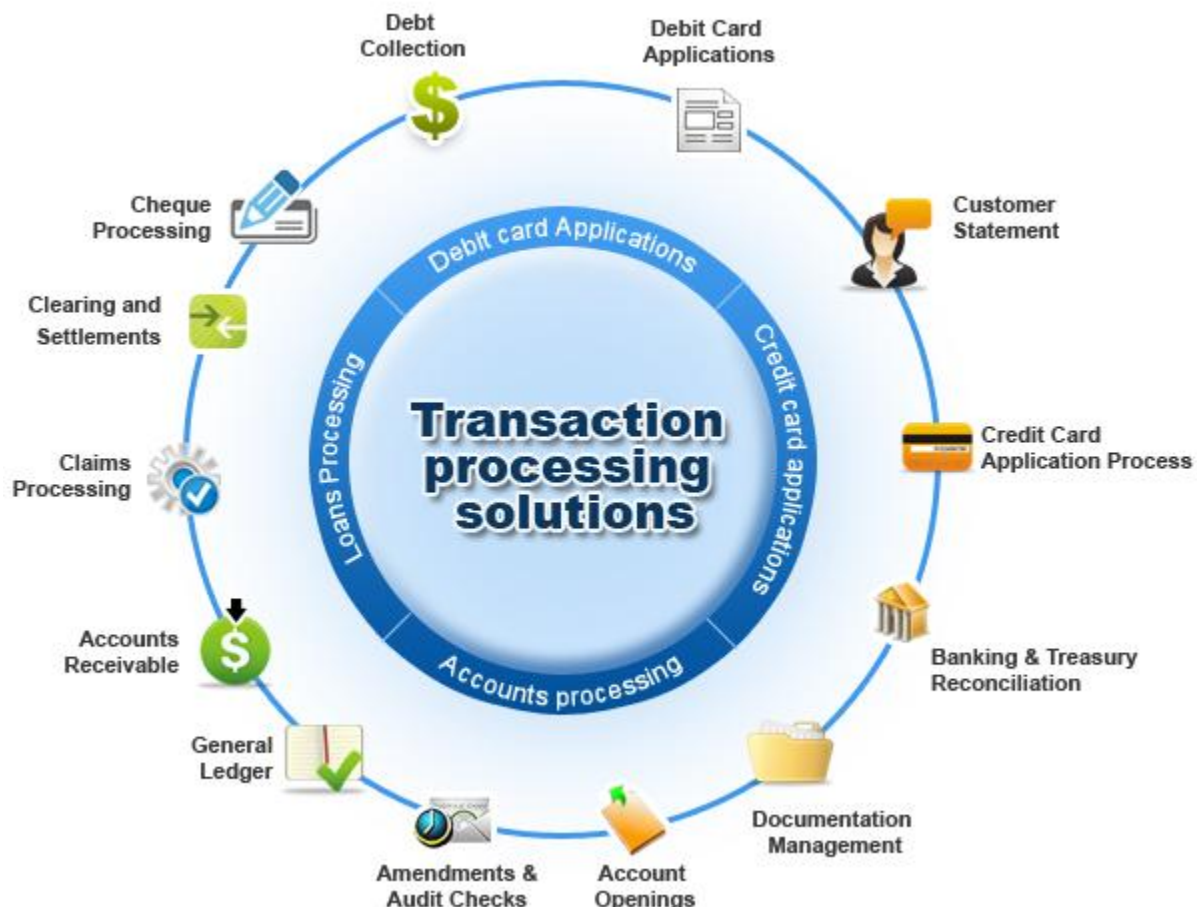
Many organizations rely heavily on their TPS; a breakdown will disrupt operations or even stop the business. For a TPS to be effective its failure rate must be very low. If a TPS does fail, then quick and accurate recovery must be possible. This makes well-designed backup and recovery procedures essential.

- **Inflexibility**

A TPS wants every transaction to be processed in the same way regardless of the user, the customer or the time for day. If a TPS were flexible, there would be too many opportunities for non-standard operations, for example, a commercial airline needs to consistently accept airline reservations from a range of travel agents, accepting different transactions data from different travel agents would be a problem.

- **Controlled processing**

The processing in a TPS must support an organization's operations. For example if an organization allocates roles and responsibilities to particular employees, then the TPS should enforce and maintain this requirement. An example of this is an ATM transaction



6.2 OAS(Office Automation System (OAS))

Office Automation Systems are among the newest and most rapidly expanding computer based information systems. They are being developed with the hope and expectation that they will increase the efficiency and productivity of office workers, typists, secretaries, administrative assistants, staff professionals, managers and others.

Office automation refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.

The backbone of office automation is a LAN, which allows users to transmit data, mail and even voice across the network. All office functions, including dictation, typing, filing, copying, fax, Telex, microfilm and records management, telephone and telephone switchboard operations, fall into this category. Office automation was a popular term in the 1970s and 1980s as the desktop computer exploded onto the scene. **ADVANTAGES** are:- 1.office automation can get many tasks accomplished faster. 2.it eliminates the need for a large staff. 3.less storage required for data to store. 4.multiple people can update data simultaneously in the event of schedule change

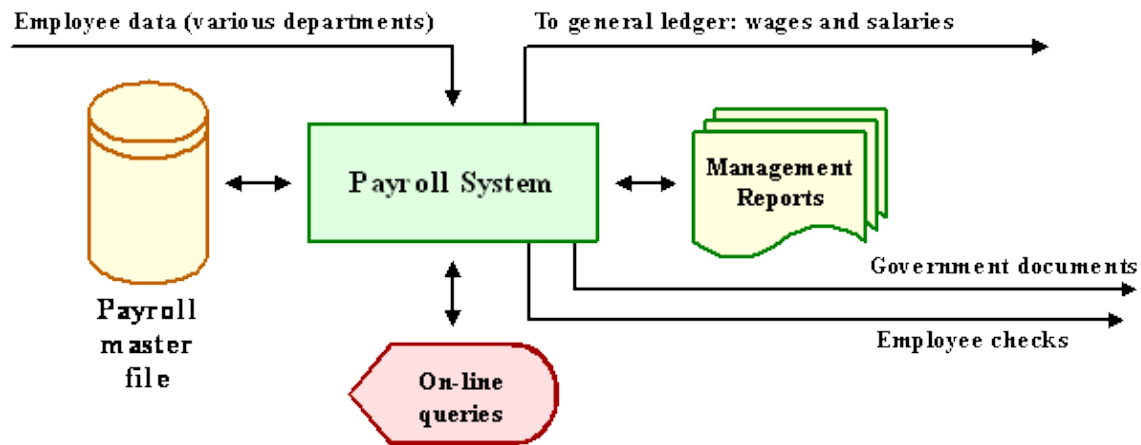


Fig: Office Automation System

Office Automation system collects, processes, stores and transmits data and information in the form of electronic office communication.

OAS could also be considered as computer-based information system that collects, process, store and transmit electronic message, document and other form of communication among individual, work group and organizations.

6.3 Information Reporting System

Information Reporting System is used by manager for generating reports and displays helpful in understanding the market trend, to analysis the customer preferences and feedback. It is important as it helps in decision making and taking long term decisions or to formulate strategies. It is further helpful to get a strategic advantage over customer

Examples: shipment tracking, e-commerce Web systems etc.

Information Reporting Systems: also referred to as *Management Information Systems*, or *Management Reporting Systems* produce reports that have been defined in advance for day-today decision-making needs. Management Reporting Systems-obtains summarized data from Transaction Processing Systems (TPS) to produce feedback reports on operation.

The quality of management decision-making depends on the quality of information available. Being in an ideal position to help clients evaluate their management reporting systems and to recommend possible areas where the business owners would benefit from improved reporting is of great importance to every information or support system.

Management reporting is therefore seen as complex, multistage activity which takes place in the context of other business processes and makes use of the multiple information systems that may have been provided for other purposes - general documentation, project management, financial control, email communication and business presentation.

Managers treat information from these sources as “harvestable, contextual sable data”, which is combined, summarized, and reinterpreted in management reports. However, most of the activities employed in report creation are only frequently supported only peripherally by an organization’s IT infrastructure. It is important that information systems are designed to provide information needed for effective decision making by managers.

The Management Reporting Systems is hence seen as a formal system for providing management with accurate and timely information necessary for decision making.

The MRS provides information on the past, present and project future and on relevant events inside and outside the organization. It may be defined as a planned and integrated system for gathering relevant data, converting it in to right information and supplying the same to the concerned executives. Its main purpose is to provide the right information to the right people at the right time within an organization.

The IRS/ MRS concept is imperative to efficient and effective computer use in business of two major reasons:

It serves as a systems framework for organizing business computer applications. Business applications of computers should be viewed as interrelated and integrated computer-based information systems and not as independent data processing job.

It emphasizes the management orientation of electronics information processing in business. The primary goal of computer based information systems should be the processing of data generated by business operations.

Types of IRS

A large category of information systems comprises those designed to support the management of an organization. Those systems rely on data obtained by transaction processing systems, as well as data acquired outside the organization (such as business intelligence gleaned on the Internet) and data provided by business partners, suppliers, and customers.

There are two main types of report that these systems produce:

Periodic Reports - These are predefined reports that are required by decision makers at regular intervals. Examples include a monthly financial statement and a weekly sales analysis.

Exception Reports - These are reports produced only when required. They can be generated automatically by the information system when a performance measure moves outside a predefined range. Examples include sales falling below a certain level and customers exceeding their credit limits. Exception reports can also be generated manually when a decision maker does not want to wait until the next scheduled periodic report or the information is only occasionally required.

Information Reporting System Functions

Generally, as Information Reporting System is also referred to as Management Reporting Systems or Management Information Systems, it has all the ingredients that are employed in providing information support to manager to making planning and control decisions. Managers more often than not use historical data resulting from an organization's activities as well as current status data in planning and control decisions. Such data comes from a database which is contained in files maintained by the organization. These databases are essential component of an Information Reporting System.

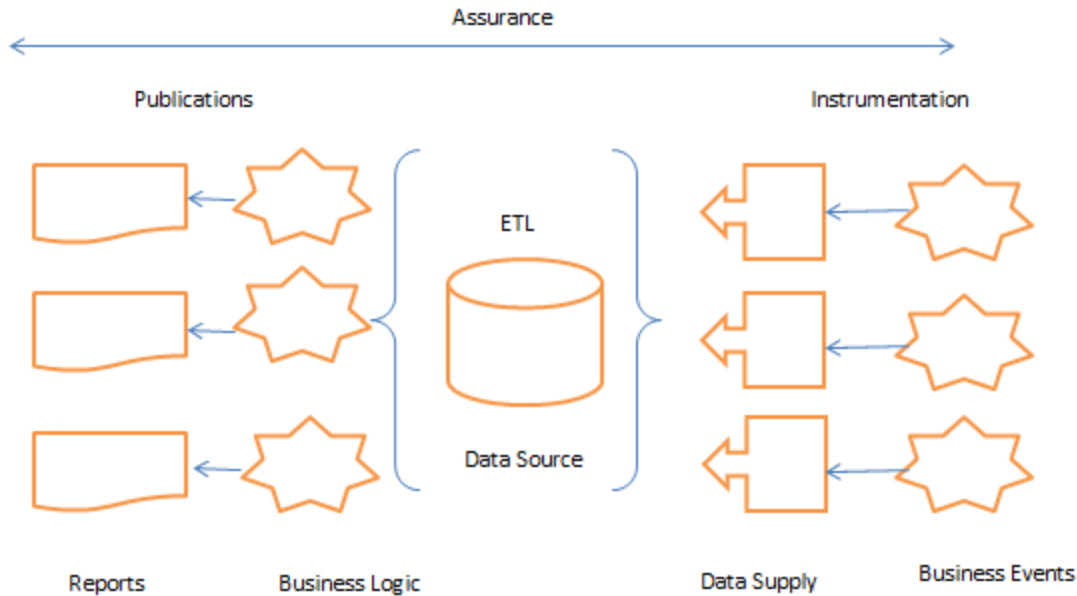
Moreover, the manual procedures used to collect and process information and computer hardware are ingredients of an Information Reporting System. These also form part of the Information Reporting System.

In summary, we say that, "an Information Reporting System is an integrated man-machine system that provides information to support the planning and control function of managers in an organization. Such system provides the following functions.

Sub serves managerial function like Collects stores, evaluates information systematically and routinely. Supports planning and control decisions Includes files, hardware, software, software and operations research models.

Management Reporting Systems Components

While no two environments are going to be the same, there is a generic pattern that is common across organizations and technology architectures. A map or overview is provided here:



Overview of Reporting System

Note that report the user needs (or business requirements) go from left to right, while data flows back from right to left. As such, the assurance process covers the entire value chain and moves back and forth, ensuring that reporting requirements and information delivery are properly aligned.

The reporting components are described below:

Instrumentation - A device that measures some aspect of the real-world as events and records them. *Examples:* Cash register, web server, handheld GPS, thermometer, card reader.

Data Supply - A system that takes recorded events and delivers them reliably to another system. The data supply can be “push” or “pull”, depending on whether or not it is responsible for initiating delivery. It can also be “polled” (or batched) if the data are transferred periodically, or “triggered” (or online) if data are transferred in case of a specific event. *Examples:* Log file FTP script, SQL process, EDI, web service.

Extract Transform and Load (ETL) - The step where these recorded events are checked for quality put into the appropriate format and inserted into the data store. *Examples:* Most data warehouse and Enterprise Application Integration (EAI) vendors sell this as part of their suite.

Data Store - The repository for the data and metadata. Could be a flat file or spreadsheet, but usually a relational database management system (RDBMS) setup as a data mart, data warehouse, operational data store (ODS), sometimes employing cubes (OLAP). *Examples:* MySQL, MS SQL, Oracle, Lotus Notes. 4

Business Logic - The explicit steps for how the recorded events are to be converted into metrics, often implemented in a script (eg Perl) or query (eg. SQL). *Examples:* Minute-by-minute temperature readings yield the "monthly average daily maximum" by adding and dividing in the correct sequence.

Publication - The system that builds the various reports and hosts them (for users) or disseminates them (to users). Users may also require notification, annotation, collaboration and other services. *Examples:* PHP, Crystal Decisions, Lotus Domino.

Assurance - Any reporting system must offer a quality service to its user-base. This includes determining if and when the right information is delivered to the right people in the right way. *Examples:* Service monitoring and alarming, user surveys, audits, focus groups, change requests and fault management.

ACTIVITIES

1. Reflect back to an office that you are familiarized with, if the office was using office automation systems, do you think that the use of OAS increased or decreased printed papers? Why?
2. What are the primary factors that facilitate or inhibit the trend towards a paperless office?
3. Take an organization of your knowledge and give a conceptual view of MIS and physical view of MIS.

Information Reporting Systems Advantages

Effective management information systems are needed by all business organization because of the increased complexity and rate of change of today's business environment.

For Example, Marketing manager need information about sales performance and trends, financial manger returns, production managers needs information analyzing resources requirement and worker productivity and personnel manager require information concerning employee compensation and professional development.

Thus, effective management information systems must be developed to provide modern managers with the specific marketing, financial, production and personnel information products they required to support their decision making responsibilities.

For these and other reasons, MRS provides the following advantages.

1. *It Facilitates planning*: MRS improves the quality of plans by providing relevant information for sound decision – making. Due to increase in the size and complexity of organizations, managers have lost personal contact with the scene of operations.

2. *In Minimizes information overload*: IRS change the larger amount of data in to summarized form and there by avoids the confusion which may arise when managers are flooded with detailed facts.

3. *It Encourages Decentralization*: Decentralization of authority is possibly when there is a system for monitoring operations at lower levels. MIS is successfully used for measuring performance and making necessary change in the organizational plans and procedures.

4. *It brings Co-ordination*: MRS facilities integration of specialized activities by keeping each department aware of the problem and requirements of other departments. It connects all decision centres in the organization.

5. *It makes control easier*: IRS serves as a link between managerial planning and control. It improves the ability of management to evaluate and improve performance. The used computers has increased the data processing and storage capabilities and reduced the cost.

6. *In Minimizes information overload*: MIS change the larger amount of data into summarized form and there by avoids the confusion which may arise when managers are flooded with detailed facts.

7. MRS assembles, process, stores, Retrieves, evaluates and disseminates the information.

Information Reporting Systems Disadvantages

1. The feasibility of such a system has to be determined and there are a number of implementation issues to be resolved.

2. Some organization might find it expensive implement.

3. There is the believe that there is more trouble with electronic systems which might require you to enter your personal information with each new request than traditional paper.

4. Hardware, software and other technical problems associated with management reporting systems.

6.4 ESS

Senior managers use executive support systems (ESS) to help them make decisions. ESS serves the strategic level of the organization. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.

Executive support systems (ESS's) are designed to incorporate data about external events, but they also draw summarized information from internal MIS and DSS. They filter, compress, and track critical data, displaying the data of greatest importance to senior managers.

ESS employs the most advanced graphics software and can present graphs and data from many sources. Often the information is delivered to senior executives through a portal, which uses a Web interface to present integrated personalized business content from a variety of sources.

Unlike the other types of information systems, ESS is not designed primarily to solve specific problems. Instead, ESS provides a generalized computing and communications capacity that can be applied to a changing array of problems. Although many DSS are designed to be highly analytical, ESS tends to make less use of analytical models.

Schematic Diagram of an ESS/ EIS

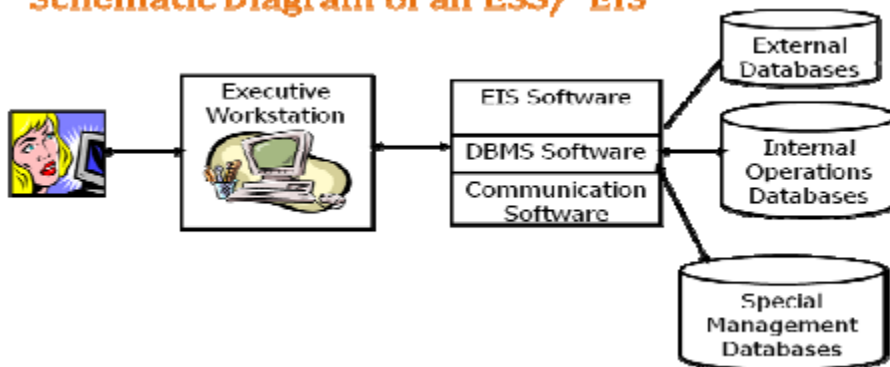


fig: Executive Support System

It consists of workstations with menus, interactive graphics, and communications capabilities that can be used to access historical and competitive data from internal corporate systems and external databases such as Dow Jones News/Retrieval or Standard & Poor's. Because ESS are designed to be used by senior managers who often have little, if any, direct contact or experience with computer-based information systems, they incorporate easy-to-use graphic interfaces. This system

pools data from diverse internal and external sources and makes them available to executives in an easy-to-use form.

6.5 Expert System

This MIS is used to provide expert advice to the end user for decision making. It is further used for providing critical information for executives and managers

Example: credit application advisor

An expert system is a knowledge-based information system; that is, it uses its knowledge about a specific area to act as an expert consultant to users. The components of an expert system are a knowledge base and software modules that perform inferences on the knowledge and offer answers to a user's questions.

Expert systems provide answers to questions in a very specific problem area by making human like inferences about knowledge contained in a specialized knowledge base. Expert systems can provide decision support to end users in the form of advice from an expert consultant in a specific problem area.

Expert systems are being used in many different fields, including medicine, engineering, the physical sciences, and business. For example, expert systems now help diagnose illnesses, search for minerals, analyze compounds, recommend repairs, and do financial planning. Expert systems can support either operations or management activities.

Expert Systems Structure

The components of an expert system include a knowledge base and software modules that perform inferences on the knowledge in the knowledge base and communicate answers to a user's questions.

The knowledge base of an expert system contains Facts about a specific area, Heuristics (thumbs of rule) that express the reasoning procedures of an expert on the subject. There are many ways that knowledge is represented in expert systems:-

Case-based reasoning: Representing knowledge in an expert system's knowledge base in the form of cases.

- **Frame-based knowledge:** Knowledge represented in the form of a hierarchy or network of frames. A frame is a collection of knowledge about an entity consisting of a complex package of data values describing its attributes.
- **Object-based knowledge:** Knowledge represented as a network of objects. An object is a data element that includes both data and the methods or processes that act on those data.

- **Rule-based knowledge:** Knowledge represented in the form of rules and statements of fact. Rules are statements that typically take the form of a premise and a Summary such as: IF (condition), Then (Summary).
- **Software resources:** An expert system software package contains an inference engine and other programs for refining knowledge and communicating with users. The inference engine program processes the knowledge (such as rules and facts) related to a specific problem. It then makes associations and inferences resulting in recommended courses of action for a user. User interface programs for communicating with end-users are also needed, including an explanation program to explain the reasoning process to a user if requested.

Differences between DSS and ES

It is possible to integrate ES with DSS. There may be some components which may look similar in DSS and ES. But one should understand the differences between them. It then becomes clear as to how integration of ES with DSS can be realized.

- A DSS helps manager to take a decision whereas an ES acts as a decision maker or an advisor to the manager.
- A DSS is meant only for decision making whereas an ES provides expertise to the manager.
- The spectrum of complexity is high in DSS and low in ES since ES addresses issues related to specific areas only.
- DSS does not capability to reason whereas an ES has.
- A DSS cannot provide detailed explanation about the results whereas an ES can.

Hence by integrating the two it is possible the blend their advantages and derive the best out of the two.

Expert Systems Business Applications

Expert systems help diagnose illness, search minerals, analyze compounds, recommend repairs, and do financial planning. So from a strategic business point, expert systems can and are being used to improve every step of the product cycle of a business, from finding customers to shipping products to providing customer service. ES provides a cost reduced solution, consistent advice with low level of errors, solution to handle equipments without the interference of human. It provides a high degree of reliability and faster response time. It helps to solve complex problem with in a small domain.

It is capable of analyzing the problem and can construct a business model appropriate to the characteristics of the application. Based on the model necessary objectives and constraints are identified. It identifies appropriate tools to solve the

model. It uses the tools to solve the problem and also does the what –if analysis aimed at understanding the sensitivity of the model.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

A. The flow of transactions through business processes to ensure appropriate checks and approvals are implemented is called:

1. procedures
2. work flow
3. process flow
4. process requirements
5. procedures

B. Language-based, machine-readable representations of what a software process is supposed to do, or how a software process is supposed to accomplish its task is known as:

1. prototyping
2. software specifications
3. application programs
4. human engineering
5. none of the above

C. A specification of how the user moves from window to window, interacting with the application programs to perform useful work is called:

1. interface specifications
2. software specifications
3. user dialog
4. prototyping specifications
5. navigation specification

D. The first CMM level at which measurable goals for quality and productivity are established is

1. Level 1
2. Level 2
3. Level 3
4. Level 4
5. Level 5

E. Project Management ensures that:

1. project's risk is assessed
2. project's feasibility is assessed
3. system is developed at minimum cost
4. both A and B
5. none of the above

6.5 Characteristics of Computerized MIS :

(i) Ability to process data into information with accuracy and high speed. It involves complex computation, analysis, comparisons and summarization.

(ii) Organizing and updating of huge amount of raw data of related and unrelated nature, derived from internal and external sources at different periods of time.

(iii) The information processing and computer technology have been so advanced that managers are able to obtain real time information about ongoing activities and events without any waiting period.

(iv) The input data in computer can be converted into different output formats for a variety of purpose. The system is so organized that managers at different levels and in different activity units are in a position to obtain information in whatever form they want, provided that relevant "programs" or instructions have been designed for the purpose.

(v) Super-human memory, tremendous volume of data and information and the set of instructions can be stored in the computer and can be retrieved as and when needed. Management can get bit of stored information from the computer in seconds.

Advantages of Computer : The usage of computer gives following advantages in comparison to manual MIS :

a) **Speed:** The speed of carrying out the given instructions logically and numerically is incomparable between computers and human beings. A computer can perform and give instructions in less than a millionth of second

b) **Accuracy:** Computer can calculate very accurately without any errors.

c) **Reliability:** The information stored in the computer is in digital format. The information can be stored for a long time and have long life. A user may feel comfortable and be rely on, while using information stored in computer.

d) **Storage** : Computer can store huge data for a long time in comparison to human brain.

e) **Automaticity** : Computers perform work automatically through userfriendly and menu driven program.

f) **Repetitiveness** : Computer can be used repetitively to process information without any mental fatigue as in case of human brain.

g) **Diligence** : A computer is an electronic device. It does not suffer from the human traits of lack of concentration.

h) **No Feeling** : Computers are devoid of any emotions. They have no feelings and no instincts because they are machines.

Limitations of Computer :

a) **Lack of Common Sense** : Computer is only an electronic device. It cannot think. If we provide an incorrect data, it does not have a common sense to question the correctness of the data.

b) **Memory Without Brain** : Computer can store data in its memory; however, if a wrong instruction is given to computer it does not have a brain to correct the wrong instruction.

6.6 DSS

The word “**decision**” is derived from the Latin word “decido”. Which means “A decision, therefore is

- A Settlement
- A fixed intuition to bringing to a conclusive result
- A judgment
- A resolution

6.7 Decision

A decision is the choice out of several options made by the decisionmaker to achieve some objective in a given situation.

Business Decision : Business decisions are those which are made in the process of conducting business to achieve its objective in a given situation.

Characteristic of Business Decision Making :

- a) Sequential in nature.
- b) Exceedingly complex due to risk and trade off.

- c) Influenced by personal values.
- d) Made in institutional setting and business environment.

Rational Decision Making : A rational decision is the one which, effectively and efficiently, ensure the achievement of the goal for which the decision is made. In reality there is no right or wrong decision but a rational decision or irrational decision which depends on situation.

Type of Rationality

Objectively: Maximum the value of the objectives.

Subjective: If it is minimize the attainment of value in relation to the knowledge and awareness of subject.

Consciously: Extent the process of the decision making is a conscious one

Organizationally: degree of the orientation towards the organization.

Personal: Rational to the extent is achiever's an individual's personal reason(goals).

Type of Decision Making System

There are two types of decision making system on the basis of knowledge about the environment.

(i) **Closed :** If the manager operates in a known environment then it is called closed decision making system.

Conditions:

- a) Manager knows the set of decision alternative and know their outcome in term of values.
- b) Manager has a model, by which decision alternatives can be generated, tested and ranked.
- c) The manager can choose one of them, based on some goal or objective.

(ii) **Open :** If the manager operates in unknown environment then it is called open decision making.

Conditions:

- a) Manager does not know all alternatives.
- b) Outcome is not known.
- c) No methods or models are used.
- d) Decide objective or goal; select one where his aspirates or desire are met best.

Types of Decision : Types of decision are based on the degree of knowledge about the outcome of the events which are yet to take place.

Certainty: If the manager has full knowledge of event or outcome then it is a situation of certainty.

Risk : If the manager has partial knowledge or probabilistic knowledge then it is a decision under risk.

Uncertainty: If the manager does not have any knowledge, it is a decision making under uncertainty. MIS converts the uncertainty to risk and risk to certainty. The decision at the low level management is certain, at middle level of the management the decision is under risk and at the top level management the decision is in under uncertain.

Nature of decision: Decision making is a complex task. To resolve the complexity the nature of decision are of two types:

Programmed and Non-Programmed Decision :

a) If a decision can be based on a rule, methods or even guidelines, it is called the programmed decision.

b) A decision which cannot be made by using a rule or model is the nonprogrammed decision.

DSS:

Decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance. Decision support systems can be either fully computerized, human or a combination of both.

DSSs include knowledge-based systems. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.

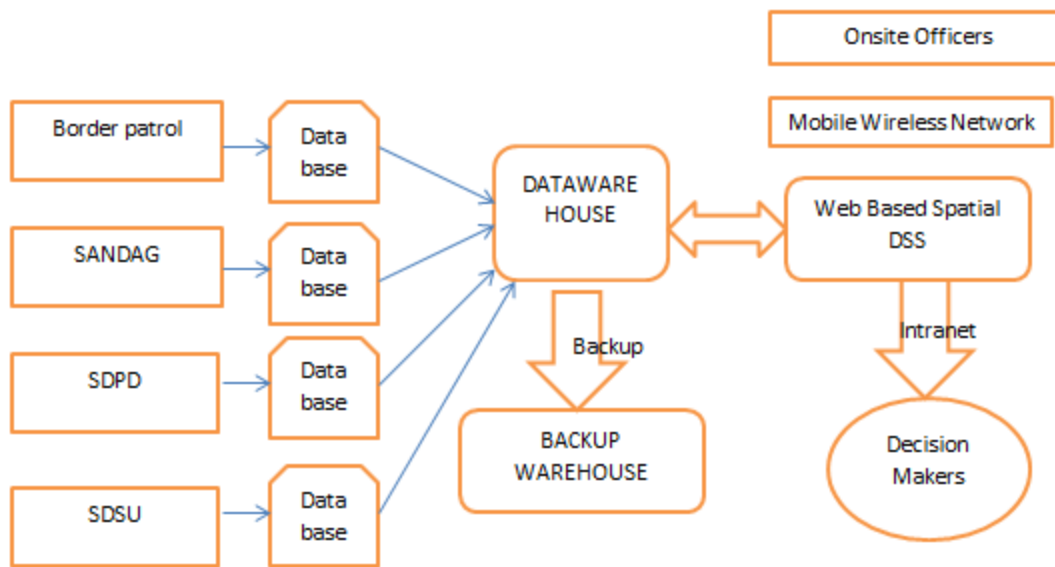


Fig: DSS

Typical information that a decision support application might gather and present includes:

- inventories of information assets (including legacy and relational data sources, cubes, data warehouses, and data marts),
- comparative sales figures between one period and the next,
- projected revenue figures based on product sales assumptions

Decision Support System refers to a class of systems which support in the process of decision making and does not always give a decision itself.

Decision Support Systems (DSS) are a specific class of computerized information system that supports business and organizational decision-making activities. A properly designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

DSS is an application of Hebert Simon model, as discussed, the model has three Phases:

i) Intelligence

- ii) Design
- iii) Choice

The DSS basically helps in the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution. The choice of selection criteria varies from problem to problem.

It is therefore, required to go through these phases again and again till satisfactory solution is found. In the following three phase cycle, you may use inquiry, analysis, and models and accounting system to come to rational solution.

These systems are helpful where the decision maker calls for complex manipulation of data and use of several methods to reach an acceptable solution using different analysis approach. The decision support system helps in making a decision and also in performance analysis. DSS can be built around the rule in case of programmable decision situation. The rules are not fixed or predetermined and requires every time the user to go through the decision making cycle as indicated in Herbert Simon model.

Attribute:

- i) DSS should be adaptable and flexible.
- ii) DSS should be interactive and provide ease of use.
- iii) Effectiveness balanced with efficiency (benefit must exceed cost).
- iv) Complete control by decision-makers.
- v) Ease of development by (modification to suit needs and changing environment) end users.
- vi) Support modeling and analysis.
- vii) Data access.
- viii) Standalone, integration and Web-based

DSS Characteristics :

- i) Support for decision makers in semi structured and unstructured problems.
- ii) Support managers at all levels.
- iii) Support individuals and groups.
- iv) Support for interdependent or sequential decisions.
- v) Support intelligence, design, choice, and implementation.
- vi) Support variety of decision processes and styles

6.8 Hebert A. Simon ‘Decision Support System Model’

There are three phases in Hebert Simon model :

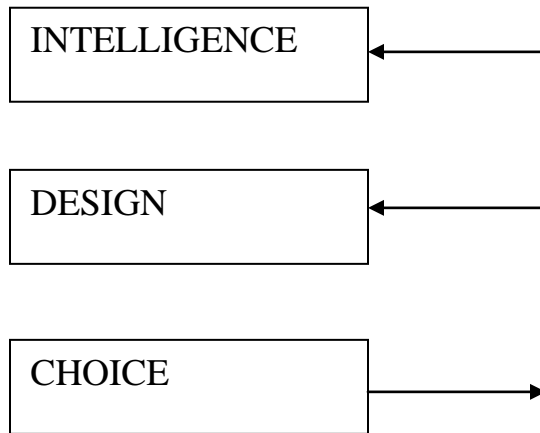


Fig: Hebert Simon Model

Intelligence: In this phase MIS collects the raw data. Further the data is sorted and merged with other data and computation are made, examined and presented. In this phase, the attention of the manager is drawn to the entire problem situation, calling for a decision.

Design: Manager develops a model of problem situation on which he can generate and test, summarizing the different decision alternatives and test the feasibility of implementation. Assess the value of the decision outcome.

Choice: In this phase the manager evolves a selection criterion and selects one alternative as decision based on selection criteria.

In these three phases if the manager fails to reach a decision, he starts the process all over again from intelligence phase where additional data and information is collected, the decision making process is refined, the selection criteria is changed and a decision is arrived at.

The Law of Requisite Variety

In programmed decision making, it is necessary for the manager, to enumerate all the stages of the decision making situation, and provide the necessary support through rules and a formula for each one of them. The failure to provide the decision making rule, in each of them, will lead to a situation where the system will not be able to make a decision.

It is, therefore, necessary to cover a requisite variety of situations with the necessary decision response. The requisite variety of situations means that for efficient programmed decision making, it is necessary for the manager to provide.

- (a) All the decision alternatives and the choices in each state.
- (b) The decision rules to handle the situation; and

(c) The system or the method to generate a decision choice.

It has been found that in a closed-decision-making situation, the programmed decision making system works efficiently, while in the open-decision-making situation, it is not efficient. With the advent of expert systems and the knowledge-based artificial intelligence systems, it is now possible for a computer to develop the alternatives, test them and handle them on the criteria of selection leading to a decision. The MIS is expected to provide the necessary information and knowledge support to the computer based system.

6.9 MANAGEMENT INFORMATION SYSTEM AND COMPUTER

Translating the real concept of the MIS into reality is technically, an infeasible proposition unless computers are used. The MIS relies heavily on the hardware and software capacity of the computer and its ability to process, retrieve communicate with no serious limitations.

The variety of the hardware having distinct capabilities makes it possible to design the MIS for a specific situation. For example, if the organization needs a large database and very little processing, a computer system is available for such a requirement. Suppose the organization has multiple business location at long distances and if the need is to bring the data at one place, process, and then send the information to various location, it is possible to have a computer system with a distributed data processing capability. If the distance is too long, then the computer system can be hooked through a satellite communication system.

The ability of the hardware to store data and process it at a very fast rate helps to deal with the data volumes, its storage and access effectively. The ability of the computer to sort and merge helps to organize the data in a particular manner and process it for complex lengthy computations. Since the computer is capable of digital, graphic, word image, voice and text processing, it is exploited to generate information and present it in the form which is easy to understand for the information user.

The ability of a computer system to provide security of data brings a confidence in the management in the storage of data on a magnetic media in an impersonal mode. The computer system provides the facilities such as READ ONLY where you cannot delete to UPDATE. It provides an access to the selected information through a password and layered access facilities. The confidence nature of the data

and information can be maintained in a computer system. With this ability, the MIS becomes a safe application in the organization.

The software, an integral part of a computer system, further enhances the hardware capability. The software is available to handle the procedural and nonprocedural data processing. For example, if you want to use a formula to calculate a certain result, an efficient language is available to handle the situation. If you are not use a formula but have to resort every time to a new procedure, the nonprocedural languages are available. The software is available to transfer the data from one computer system to another.

Hence, you can compute the results at one place and transfer them to a computer located at another place for some other use. The computer system being able to configure to the specific needs helps to design a flexible MIS. The advancement in computers and the communication technology has the distance, speed, volume and complex computing an easy task. Hence, designing the MIS for a specific need and simultaneously designing a flexible and open system becomes possible, thereby saving a lot of drudgery of development and maintenance and maintenance of the system.

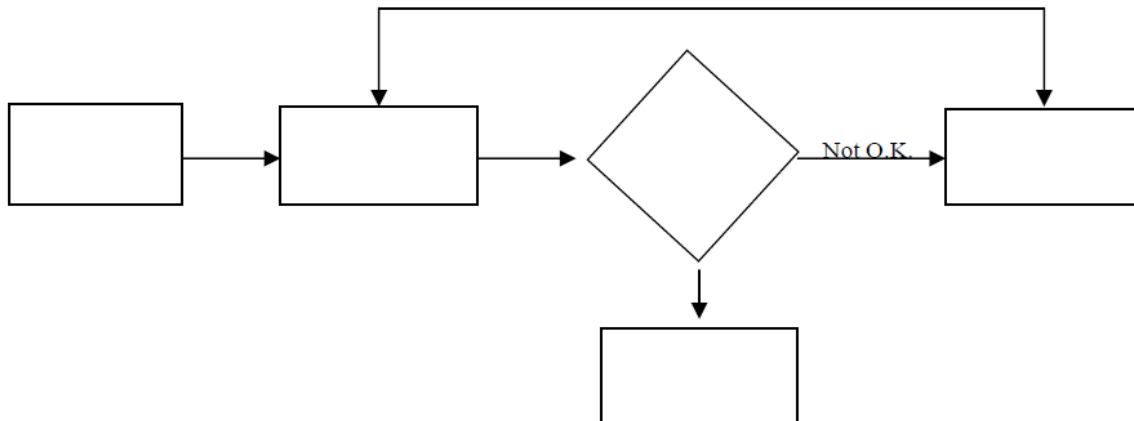
The concept of user friendly systems and the end user computing is possible, making information processing a personalized function. However, the application of the management principles and practices in today's complex business world is possible only when the MIS is based on computer systems support.

6.10 MANAGEMENT AS A CONTROL SYSTEM

Planning, organizing, staffing, coordinating, directing and controlling are the various steps in a management process. All the steps prior to a control are necessary but are not necessarily self-assuring the results unless it is followed by a strong control mechanism. The management experts have viewed these steps as Management Control System. They postulate the hypothesis that unless a control is exercised on the process, the goals will not be achieved. They advocate a system of effective control to ensure the achievement of the business objectives.

A definition of control is the process through which managers assure that actual activities conform to the planned activities, leading to the achievement of the stated common goals. The control process measures a progress towards those goals, and enables the manager to detect the deviations from the original plan in time to take corrective actions before it is too late. Robert J Mockler defines and points out

the essential elements of the control process. The basic steps of the control process are given in Figure below:



The management is a systematic effort to set the performance standards in line with the performance objectives, to design the information feedback systems, to compare the actual performance with these predetermined standards, to identify the deviations from the standards, to measure its significance and to take corrective actions in case of significant deviations. This systematic effort is undertaken through the management control system.

The control system is essential to meet the environmental changes discussed earlier, to meet the complexity of today's business, to correct the mistakes made by the people, and to effectively monitor the delegation process. A reliable and effective control system has the following features.

Early Warning Mechanism:

This is a mechanism of predicting the possibility of achieving the goals and the standards before it is too late and allowing the manager to take corrective actions.

Performance Standard:

The performance standard must be measurable and acceptable to all the organization. The system should have meaningful standards relating to the work areas, responsibility, and managerial functions and so on. For example, the management would have standards relating to the business performance, such as production, sales, inventory, quality, etc.

The operational management would have standards relating to the shift production, rejections, down time, utilization of resources, sale in a typical market segment and so on. The chain of standards, when achieved, will ensure an achievement of the goals of the organization.

Strategic Controls:

In every business there are strategic areas of control known as the critical success factors. The system should recognize them and have controls instituted on them.

Feedback:

The control system would be effective; it continuously monitors the performance and sends the information to the control centre for action. It should not only highlight the progress but also the deviations.

Accurate and Timely:

The feedback should be accurate in terms of results and should be communicated on time for corrective action.

Realistic:

The system should be realistic so that the cost of control is far less than the benefits. The standards are realistic and are believed as achievable. Sufficient incentives and rewards are to be provided to motivate the people.

The Information Flow:

The system should have the information flow aligned with the organization structure and the decision makers should ensure that the right people get the right information for action and decision making.

Exception Principle:

The system should selectively approve some significant deviations from the performance standards on the principle of management by exception. A standard is control system has a set of objectives, standards to measure, a feedback mechanism and an action centre as elements of the system. They need to be properly evolved and instituted in the organization with due recognition to the internal and the external environment. The system as a whole should be flexible to be changed with ease so that the impact of a changed environment is handled effectively.

6.11 MIS: A SUPPORT TO THE MANAGEMENT

The management process is executed through a variety of decisions taken at each step of planning, organizing, staffing, directing, coordinating and control. As discussed earlier, MIS aids decision making. If the management is able to spell out the decisions required to be taken in these steps, they are tabulated below:

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

The objective of the MIS is to provide information for a decision support in the process of management. It should help in such a way that the business goals are achieved in the most efficient manner. Since the decision making is not restricted to a particular level, the MIS is expected to support all the levels of the management in conducting the business operations. Unless the MIS becomes a management aid, it is not useful to the organization.

6.12 EVOLUTION OF SUPPORT SYSTEM

Systems	Employee Systems	Description
TPS	All employees	Processes an organizations basic business transactions
MIS	All employees	Provide routine information for planning, organization and controlling operations in functional areas
OAS(office Automation System)	Office Workers	Increase productivity of office workers,

CAD/CAM	Engineers, draft People	Allows engineers to design and test prototype, transfers specifications to manufacturing facilities
DMS(Document Management System)	Office Workers	Automates flow of electronic documents
ESS(Executive Support System)	Executive senior managers	Supports decisions of top managers
GSS(Group Support System)	People working in groups	Supports working processes of groups of people
ES(Expert System)	Knowledge workers, non-experts	Provide stored knowledge of experts to non-experts and decision recommendations based on built in expertise
KWS(Knowledge Work System)	Managers, Knowledge workers	Supports the gathering, organizing and use of an organizations knowledge
Data Warehouse	Managers, Knowledge workers	Stores huge amount of data that can be easily accessed and manipulated for decision support
Business Intelligence	Decision makers, managers	Gathers and uses large amount of data for analysis by DSS, ESS and Intelligent Systems
Mobile Computing Systems	Mobile employees	Support employees who work with customers or business partners outside the physical boundaries of the organization

6.13Summary

Transaction Processing System (TPS): The most fundamental computer based system in an organization pertains to the processing of business transactions. A transaction processing system can be defined as a system that captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and input to the other types of CBIS.

Office automation refers to the varied compute machinery and software used to digitally create, collect, store, manipulate, and relay office information needed for

accomplishing basic tasks. Raw data storage, electronic transfer, and the management of electronic business information comprise the basic activities of an office automation system. Office automation helps in optimizing or automating existing office procedures.

Information Reporting Systems: also referred to as Management Information Systems, or Management Reporting Systems produce reports that have been defined in advance for day-today decision-making needs.

ESS serves the strategic level of the organization. They address non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.

An expert system is a knowledge-based information system; that is, it uses its knowledge about a specific area to act as an expert consultant to users. The components of an expert system are a knowledge base and software modules that perform inferences on the knowledge and offer answers to a user's questions.

Decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance. Decision support systems can be either fully computerized, human or a combination of both.

6.14Glossary

TPS: A transaction processing system can be defined as a system that captures, classifies, stores, maintains, updates and retrieves transaction data for record keeping and input to the other types of CBIS. Transaction Processing System is aimed at improving the routine business activities. A transaction is any event or activity that affects the whole organization. Placing order, billing customers, hiring of employees and depositing cheques are some of the common transactions.

OAS:Office Automation Systems are among the newest and most rapidly expanding computer based information systems. They are being developed with the hope and expectation that they will increase the efficiency and productivity of office workers, typists, secretaries, administrative assistants, staff professionals, managers and others.

ESS/ Expert System:

An **expert system** is a computer system that emulates the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if-then rules rather than through conventional procedural code. The first expert systems were created in the 1970s and then proliferated in the 1980s. Expert systems were among the first truly successful forms of artificial intelligence (AI) software.

Programmed and Non-Programmed Decision :

- a) If a decision can be based on a rule, methods or even guidelines, it is called the programmed decision.
- b) A decision which cannot be made by using a rule or model is the non programmed decision.

DSS: Decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs serve the management, operations, and planning levels of an organization and help to make decisions, which may be rapidly changing and not easily specified in advance. Decision support systems can be either fully computerized, human or a combination of both.

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6.17 Model Questions

1. Explain TPS in detail.
2. What do you understand by ESS and Expert System?
3. Differentiate between TPS and DSS.
4. Explain 'Management as control System'.
5. What do you understand by DSS? Explain the Hebert Simon Model.
6. what do you understand by "decision". Differentiate between 'Programmed and Non-Programmed Decision'.

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 2
- B. 3
- C. 3
- D. 4
- E. 3

LESSON 7: SYSTEM DEVELOPMENT AND IMPLEMENTATION

Structure

- 7.0 Objectives
- 7.1 System development methodologies
- 7.2 SDLC approach
- 7.3 Prototyping approach
- 7.4 User Development approach
- 7.5 Summary
- 7.6 Glossary
- 7.7 References
- 7.8 Further Readings
- 7.9 Model Questions

7.0 Objectives

After studying this lesson, you will be able to:

1. understand SAD and its methodologies
2. Understand SDLC Approach
3. Understand and answer Prototyping approach

7.1 System development methodologies

SAD refers to the process of examining a business situation with the intent of improving it through better procedures & methods. System Development generally is thought of as having two major components:

- a) System Analysis
- b) System Design

System Design is the process of planning. We must thoroughly understand the existing system and data mine how computer desk can be used to make its operation more effective. System design specifies how to achieve objectives

System Analysis is the process of gathering and interpreting facts diagnosing problems and using information to recommend improvement to system. It specifies what the system should do. The system analysis is management between techniques which helps us in designing a new system or improving an existing system

7.2 SDLC approach

System Development Life Cycle: System Development life cycle (SDLC) is used to plan and manage the system development process. Although it is primarily identified with structured analysis, the SDLC describes activities and functions that systems developers typically perform, regardless of how those activities and functions fit into a particular methodology.

The SDLC model includes the following steps:

- i) Systems Planning
- ii) Systems Analysis
- iii) Systems Design
- iv) Systems Implementation
- v) Systems Operation and Support

The SDLC is pictured as a waterfall model where the result of each phase, often called an end product or deliverable, flows down into the next phase. In reality, the systems development process is dynamic, and constant change is common.

Systems Planning: A system's planning usually begins with a formal request to the IT department, called a system's request that describes problems or desired changes in an information system or a business process. A system's request can come from a top manager, a planning team, a department head, or the IT department itself. The request can be very significant or relatively minor. A major request might involve a new information system or the replacement of an existing system that cannot handle current requirements. In contrast, a minor request might ask for a new feature or a change to the user interface in current system. The purpose of the planning phase is to identify clearly the nature and scope of the business opportunity or problem by performing a preliminary investigation, often called a feasibility study. The preliminary investigation is a critical step because the outcome will affect the entire development process. The end product, or deliverable, is a report that describes business considerations, reviews anticipated benefits and costs, and recommends a course of action based on economic, technical, and operational factors.

Systems Analysis: The purpose of the systems analysis phase is to understand business requirement and build a logical model of the new system. The first step is requirement modeling, where you define and describe business process. Requirement modeling continues the investigation that began during systems planning and involves various fact-finding techniques, such as interview, surveys,

observation, and sampling. During the next tasks, data modeling, process modeling, and object modeling, you develop a logical model of business process the system must support. The model consists of various types of diagrams, depending on the methodology being used.

The end product for the systems analysis phase is the System Requirements Document. The systems requirements document describes management and user requirements, alternative plans and costs, and analysis your recommendation. Looking ahead to design and implementation, several possibilities exist: develop a new system in-house, purchase a commercial package, or modify an existing system.

Systems Design: The purpose of systems design is or create a blueprint for the new system that will satisfy all documented requirements, whether the system is being developed in-house or purchased as a package. During systems design, identify all necessary outputs, inputs, interfaces, and processes. In addition, design internal and external controls, including maintainable, and secure. The design is documented in the System Design Specification and presented to management and users for their review and approval. Management and user involvement is critical to avoid any misunderstandings about what the new system will do, how it will do it, and what it will cost.

Systems Implementation: During systems implementation, the new system is constructed. Programs are written, tested, and documented, and the system is installed. If the system was purchased as a package, systems analysts perform any necessary modifications and configurations. The objective of the implementation phase is to deliver a completely functioning and documented information system. At the Summary of this phase, the system is ready for use. Final preparations include converting data to the new system's files, training of users, and performing the actual transition to the new system. The systems implementation phase also includes and assessment, called a systems evaluation, to determine whether the system operates properly and its costs and benefits are within expectations.

Systems Operation and Support (Maintenance): During systems operation and support, the IT staff maintains and enhances the system. Maintenance change correct errors and adapt to changes in the environment, such as new tax rates. Enhancements provide new features and benefits. The objective during this phase is to maximize return on the IT investment. A well-designed system will be reliable, maintainable, and scalable. A scalable design can expand to meet new business requirements and volumes. Information systems development is always a

work in progress. Business process change rapidly, and most information systems need to be replaced or significantly updated after several years of operation.

7.3 Prototyping approach

Prototyping is the process of creating an incomplete model of the future full-featured system, which can be used to let the users have a first idea of the completed program or allow the clients to evaluate the program.

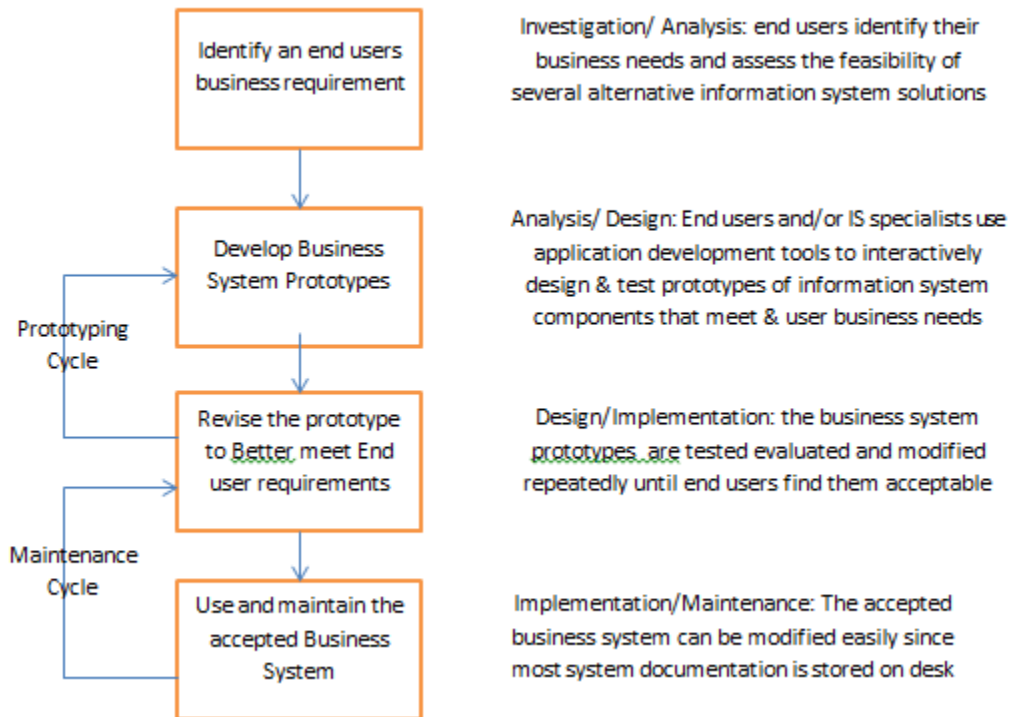


Fig: Prototyping Life Cycle

Types of prototyping : System prototyping are of various kinds.

two major types of prototyping :

- **Throwaway Prototyping :** Throwaway or Rapid Prototyping refers to the creation of a model that will eventually be discarded rather than becoming part of the finally delivered system. After preliminary requirements gathering is accomplished, a simple working model of the system is constructed to visually show the users what their requirements may look like when they are implemented into a finished system. The most obvious reason for using Throwaway Prototyping is that it can be done quickly.

- **Evolutionary Prototyping** : Evolutionary Prototyping (also known as **Breadboard Prototyping**) is quite different from Throwaway Prototyping. The main goal when using Evolutionary Prototyping is to build a very good prototype in a structured manner so that we can refine it or make further changes to it. The reason for this is that the Evolutionary prototype, when built, forms the heart of the new system, and the improvements and further requirements will be built on to it. It is not discarded or removed like the Throwaway Prototype. When developing a system using Evolutionary Prototyping, the system is continually refined and rebuilt.
- **Incremental Prototyping** : The final product is built as separate prototypes. At the end the separate prototypes are merged in an overall design.

Advantages :

- i) The designer and implementer can obtain feedback from the users early in the project development.
- ii) The client and the contractor can compare that the developing system matches with the system specification, according to which the system is built.
- iii) It also gives the engineer some idea about the accuracy of initial project estimates and whether the deadlines can be successfully met.

Disadvantages of Prototyping :

- i) **Insufficient Analysis** : Since a model has to be created, developers will not properly analyze the complete project. This may lead to a poor prototype and a final project that will not satisfy the users.
- ii) **User Confusion of Prototype and Finished System**: Users can begin to think that a prototype, intended to be thrown away, is actually a final system that merely needs to be finished or polished. Users can also become attached to features that were included in a prototype for consideration and then removed from the specification for a final system.
- iii) **Excessive Development Time of the Prototype**: A key property to prototyping is the fact that it is supposed to be done quickly. If the developers forget about this fact, they will develop a prototype that is too complex.
- iv) **Expense of Implementing Prototyping**: The start up costs for building a development team focused on prototyping may be high. Many companies have to train the team for this purpose which needs extra expenses.

The process of prototyping involves the following steps:

- i) Identify basic requirements.
- ii) Develop initial prototype.

- iii) Review : The customers, including end-users, examine the prototype and provide feedback for additions or changes.
- iv) Revise and Enhance the Prototype : Using the feedback both the specifications and the prototype can be improved. If changes are introduced then a repetition of steps 3 and 4 may be needed.

ACTIVITIES

1. What do you mean by system development? What are the steps involved in top down, bottom up and integrative system development?
2. Describe the various tools used in structural analysis.

7.4 User Development approach

It focus on supporting the interactions between end users and their computer based applications. The designers concentrate on the design or attractive and efficient forms of user input and output. The designers produce detailed design specifications for information products such as display screens.

7.5 Systems Approach

Systems approach to planning considers all the factors and their inter-relationship relevant to the subject. It takes a course to an analytical study of the total system, generates alternative courses of action and helps to select the best in the given circumstances. It is used in situation of risk or uncertainty, and examines the various alternative courses of action. It helps to find solutions to problems.

The systems approach helps to understand the situation with clarity. It helps to sort out the factors on the principles of critical and non-critical, significant and insignificant, relevant and irrelevant, and finally controllable and uncontrollable. It tests the solutions for feasibility-technical, operational and economic. It further studies the problems of implementation of the solution.

Broadly, the systems approach has the following characteristic:

1. It uses all the areas and the branches of knowledge.
2. It follows a scientific analysis to identify the problem.
3. It uses a model of a complex situation to handle the problem.
4. It weighs cost against benefit for assessment of the alternatives.
5. It deals with the problems where time context is futuristic.
6. It considers the environment and its impact on the problem situation.
7. Every solution is tested on the grounds of rationality and feasibility, and accepts a given criterion for selection of the most preferred alternative.

8. It uses operations research models if the problem is well defined. Alternately, it uses a simulation approach to solve the problem. It uses tools such as Gantt chart, PERT/CPM, Network analysis for scheduling and coordinating the activities.

The systems approach is a way of looking at a problem in a systematic manner using the scientific methods and applying the principles of a rational decision making to solve the problem.

Sensitivity Analysis

The sensitivity analysis helps to test the validity of the solution in variable conditions. The problem situation is handled with certain assumptions and conditions. Based on these considerations, a rational solution is found. Sensitivity analysis requires to know whether the solution will still remain valid if the assumptions changed, constraints were relaxed and new conditions emerged. It helps to assess the impact of change on the solution in economic terms. If various factors are involved, the sensitivity analysis helps to assess the criticality of the factor against the impact it makes on the solution.

Some factors will be highly sensitive and some will not be so. Most of the decision making problems are resolved on the principle of optimality, where you are trying to balance the two aspects of the problems, such as, inventory carrying cost versus ordering cost, waiting time cost versus idle time cost, costs, versus benefits, opportunity loss versus investment cost and so on.

The sensitivity analysis helps to test the validity of the optimal solution under changed conditions. Sensitivity analysis helps to test the solutions on the principle of utility. A solution which is economically rational and is based on sound business principles may be rejected on the principle of utility. The utility profiles of all the people in the organization are not the same. The utility profile, alternately known as a preference curve, shows the attitude and preference of the decision maker towards the gains and the losses against a time scale. The profile shows indirectly the risk-taking ability of the decision maker. It uses techniques such as the decision tree analysis, methods of discounting, payoff matrix, simulation, and the modeling.

Modeling

A model is a meaningful representation of a real situation on a mini scale, where only the significant factors of the situation are highlighted. The purpose of a model is to understand the complex situation based on only the significant factors.

There are several types of models. The model could be a physical model, like a model of a house, a park, a sports complex, etc. The model could be a scale model reducing a large body to a small one.

The model could be a mathematical model like break even analysis model, linear programming model, queuing model, network model, etc. Here a situation is represented in a mathematical form such as equations, matrices, graphs and polynomials.

A complex situation is represented using variables, constants and parameters which play a significant role in that situation. The model is based on the relations the variables have. The relation among the variables may be linear or non-linear. The model only considers the relation of high significance. The model, when a situation is complex, tries to simplify the complexity by ignoring minor factors and emphasizing only minor important factors.

A model could be static or dynamic. The physical models are static models. Some business models like the break even analysis model, the statistical regression models and some of the O.R. programming models are static models. The static model does not change over a time period.

All the planning models and all the forecasting models are dynamic models. In a dynamic model, in addition to the variables considered, time is a dimension of the variables. The values of these variables change with the change in time. Such variables are called the stochastic variables. A model, physical or mathematical, static or dynamic, needs to be tested for its utility or effectiveness. The model can be tested by using the control results already obtained.

This would show the difference between the result given by the model and the actual result in a real life situation. If the difference is not significant, then one can say that the model represents the real situation. Once the model is proved useful, it is used for testing the various solution alternatives. The selection of a solution, from many alternative solutions, depends on the objective chosen. In a linear programming model, a solution is selected on the principle of maximization of the profit or minimization of the cost. In the queuing model a solution is selected, when the cost of the waiting time of a customer is less than the cost of the idle time of facility.

The selection of a solution is based on the attainment of certain value of some aspect of the business, such as the turnover, the cost and the profit and so on. The planning model considers those business variables which affect the

business prospects and which show a significant impact on the business results. The long-range strategic models are, generally, dynamic models and the short-range management and operations models are mostly static models.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. Which one is NOT a phase of the systems development life cycle?
1. problem analysis
 2. scope definition
 3. requirements analysis
 4. post-implementation review
 5. decision analysis
- B. A cross life-cycle activity of system development is
1. object modeling
 2. prototyping
 3. fact-finding
 4. data modeling
 5. data flow diagram modeling
- C. An ongoing activity of systems support is:
1. assisting users
 2. adapting the system to new requirements
 3. recovering the system
 4. fixing software defects
 5. all of the above
- D. Rapid Application Development (RAD) strategy includes all of the following, except:
1. actively involves system users in the analysis, design, and construction activities
 2. uses waterfall development approach to evolve system concept
 3. organizes systems development into a series of focused, intense workshops
 4. reduces the amount of time that passes before the users begin to see a working system
 5. accelerates the requirements analysis and design phases

7.5 Summary

SAD refers to the process of examining a business situation with the intent of improving it through better procedures & methods. System Development generally is thought of as having two major components:

- a) System Analysis
- b) System Design

System Development Life Cycle: System Development life cycle (SDLC) is used to plan and manage the system development process. Although it is primarily identified with structured analysis, the SDLC describes activities and functions that systems developers typically perform, regardless of how those activities and functions fit into a particular methodology.

Prototyping is the process of creating an incomplete model of the future full-featured system, which can be used to let the users have a first idea of the completed program or allow the clients to evaluate the program.

User Development approach

It focus on supporting the interactions between end users and their computer based applications. The designers concentrate on the design or attractive and efficient forms of user input and output. The designers produce detailed design specifications for information products such as display screens.

Systems approach to planning considers all the factors and their inter-relationship relevant to the subject. It takes a course to an analytical study of the total system, generates alternative courses of action and helps to select the best in the given circumstances.

7.6 Glossary

System Development life cycle (SDLC) : System Development Life Cycle: System Development life cycle (SDLC) is used to plan and manage the system development process. Although it is primarily identified with structured analysis, the SDLC describes activities and functions that systems developers typically perform, regardless of how those activities and functions fit into a particular methodology

Prototyping approach: The Prototyping Model is a systems development method (SDM) in which a prototype (an early approximation of a final system or product) is built, tested, and then reworked as necessary until an acceptable prototype is finally achieved from which the complete system or product can now be

developed. This model works best in scenarios where not all of the project requirements are known in detail ahead of time. It is an iterative, trial-and-error process that takes place between the developers and the users.

Software prototyping is the activity of creating prototypes of software applications, i.e., incomplete versions of the software program being developed. It is an activity that can occur in software development and is comparable to prototyping as known from other fields, such as mechanical engineering.

Throwaway Prototyping : Also called close-ended prototyping. Throwaway or rapid prototyping refers to the creation of a model that will eventually be discarded rather than becoming part of the final delivered software. After preliminary requirements gathering is accomplished, a simple working model of the system is constructed to visually show the users what their requirements may look like when they are implemented into a finished system. It is also a rapid prototyping.

Rapid prototyping involves creating a working model of various parts of the system at a very early stage, after a relatively short investigation. The method used in building it is usually quite informal, the most important factor being the speed with which the model is provided. The model then becomes the starting point from which users can re-examine their expectations and clarify their requirements. When this goal has been achieved, the prototype model is 'thrown away', and the system is formally developed based on the identified requirements.

Evolutionary prototyping: Evolutionary prototyping (also known as **breadboard prototyping**) is quite different from throwaway prototyping. The main goal when using evolutionary prototyping is to build a very robust prototype in a structured manner and constantly refine it. The reason for this approach is that the evolutionary prototype, when built, forms the heart of the new system, and the improvements and further requirements will then be built.

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"*What is Management Information Systems?*". *Mays Business School*. Archived from the original on May 9, 2015.

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Transaction processing systems (TPS) collect and record the routine transactions of an organization. Examples of such systems are sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

7.8 Further Readings

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7.9 Model Questions

1. Explain in detail System Development life cycle (SDLC).
2. What do you understand by Systems Implementation and Systems Operation and Support?
3. Explain in detail Prototyping approach?
4. Explain various types of Prototyping approach?

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 4
- B. 3
- C. 5
- D. 2

LESSON 8: SYSTEM ANALYSIS AND DESIGN

Structure

- 8.0 Objectives
- 8.1 System Analysis and Design Definition
- 8.2 Concept of database and database design
- 8.3 System Implementation
- 8.4 Management of Information System Project
- 8.5 System Documentation
- 8.6 Information System Audit
- 8.7 Summary
- 8.8 Glossary
- 8.9 References
- 8.10 Further Readings
- 8.11 Model Questions

8.0 Objectives

After studying this lesson, you will be able to:

1. Understand the tools of system analysis
2. Understand the concept of database and database design
3. Answer the system implementation process
4. Understand Management of Information System Project
5. Understand System Documentation

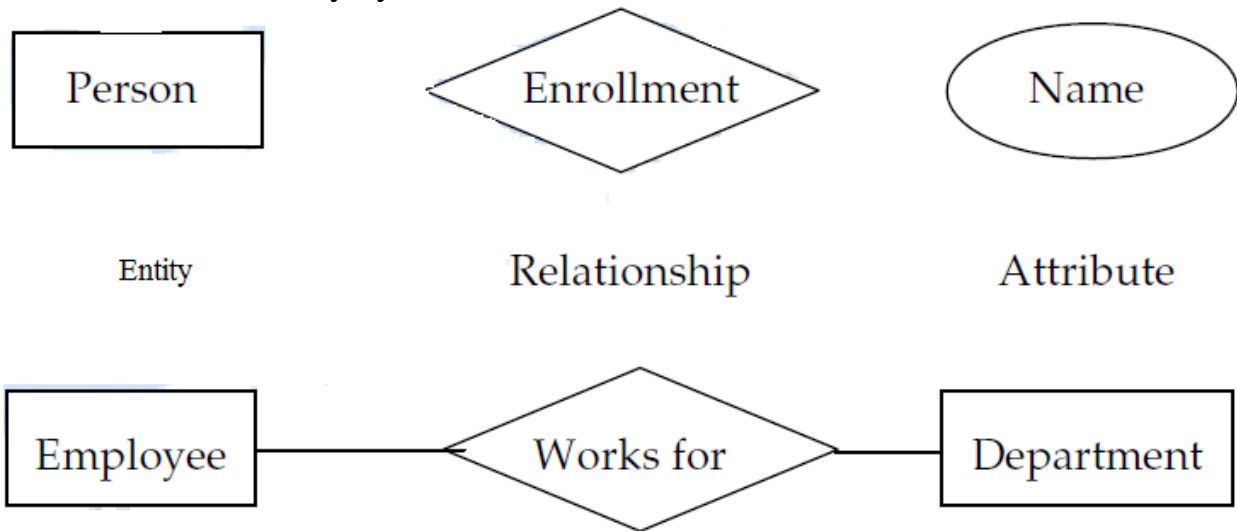
8.1 System Analysis and Design Definition

Following tools are used for system analysis:

(1) **Entity – Relationship Diagrams:** The object-relationship pair can be represented graphically using an ER diagram. An entity represents an object. Examples: a computer, an employee, a song, a mathematical theorem. Entities are represented as rectangles.

A relationship captures how two or more entities are related to one another. Examples: an *owns* relationship between a company and a computer, a *supervises* relationship between an employee and a department, a *performs* relationship between an artist and a song. Relationships are represented as diamonds, connected by lines to each of the entities in the relationship. Entities and relationships can both have attributes.

Examples: an employee entity might have an employee ID number attribute; the *proved* relationship may have a *date* attribute. Attributes are represented as ellipses connected to their entity by a line.



A simple E-R diagram

Fig: Simple ER Diagram

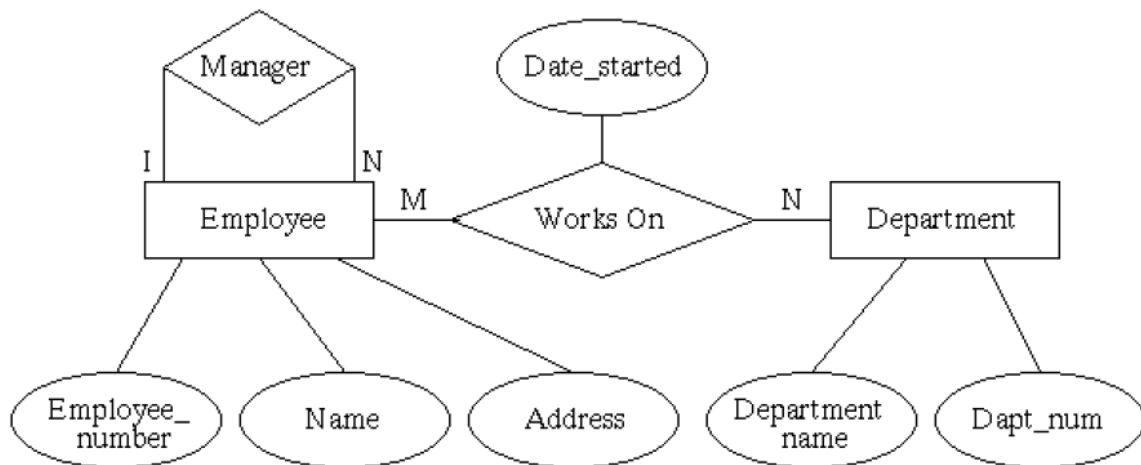


Fig: An E- R Diagram with attributes

(2) **Structured English:** Structured English, as the name implies, is “English with structure.” That is, it is a subset of the full English language with some major restrictions on the kind of sentences that can be used and the manner in which sentences can be put together. It is also known by such names as PDL (Program Design Language) and PSL (Problem Statement Language or Problem

Specification Language). Its purpose is to strike a reasonable balance between the precision of a formal programming language and the casual informality and readability of the English language. In Structured English you can use simple verbs from a small set of action-oriented verbs such as:

GET (or ACCEPT or READ)

PUT (or DISPLAY or WRITE)

FIND (or SEARCH or LOCATE)

ADD

SUBTRACT

MULTIPLY

DIVIDE

Most organizations find that 40 to 50 verbs are sufficient to describe any policy in any process specification.

(3) **Decision Tables:**

There are situations where structured English is not appropriate for writing process specifications. This is particularly true if the process must produce some output or take some actions based on complex decisions. If the decisions are based on several different variables (e.g., input data elements), and if those variables can take on many different values, then the logic expressed by structured English or pre/post conditions is likely to be so complex that the user won't understand it. A decision table is likely to be the preferred approach.

As shown in Figure, a decision table is created by listing all the relevant variables (sometimes known as conditions or inputs) and all the relevant actions on the left side of the table; note that the variables and actions have been conveniently separated by a heavy horizontal line. In this example, each variable is a logical variable, meaning that it can take on the value of true or false.

In many applications, it is easy (and preferable) to express the variables as binary (true-false) variables, but decision tables can also be built from multivalued variables; for example, one could build a decision table with a variable called "customer-age" whose relevant values are "less than 10," "between 10 and 30," and "greater than 30."

	1	2	3	4	5	6	7	8
Age > 21	Y	Y	Y	Y	N	N	N	N
Sex	M	M	F	F	M	M	F	F
Weight > 150	Y	N	Y	N	Y	N	Y	N
Medication 1	X				X			X
Medication 2		X			X			
Medication 3			X			X		X
No medication				X			X	

Fig: A typical Decision table

Next, every possible combination of values of the variables is listed in a separate column; each column is typically called a *rule*. A rule describes the action (or actions) that should be carried out for a specific combination of values of the variables. At least one action needs to be specified for each rule (i.e., for each vertical column in the decision table).

(4) **Data Dictionary:**

A data dictionary is a structured repository of data, about data. In other words it is a set of precise and accurate definitions of all DFDs, data elements and data structures.

There are three main items present in a data dictionary:

- i) **Data Item:** It is the smallest unit of data and cannot be decomposed further.
- ii) **Data Structures:** It is a group of elements handled as a unit. A data structure contains a number of data elements as its fields,
- iii) **Data Flows and Data Stored:** Data flows are nothing but data structure in motion where the data stores are data structures at rest.

Data Dictionary Notation: There are many common notational schemes used by systems analyst. The one shown below is the more common, and it uses a number of simple symbols:

= is composed of

- + And
- () optional (may be present or absent)
- { } iteration
- [] select one of several alternative choices
- ** Comment
- @ Identifier (key field) for a store
- | separates alternative choices in the [] construct

As an example, we might define name as follows:

Name= courtesy-title + first-name + (middle-name) + last-name

Courtesy-title= [Mr. | Miss | Mrs. | Ms. | Dr. | Professor]

First-name= {legal-character}

Middle-name= {legal-character}

Last-name= {legal-character}

Legal-character= [A-Z|a-z|0-9|'|'-| |]

(5) Decision Tree:

Decision trees are graphical representation methods of representing sequences of logical decisions. When initial decision guided then next, when and then next one. This can be done with Decision Tree.

In decision analysis, a **decision tree** (or tree diagram) is a decision support tool that uses a graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility. A decision tree is used to identify the strategy most likely to reach a goal. Another use of trees is as descriptive means for calculating conditional probabilities.

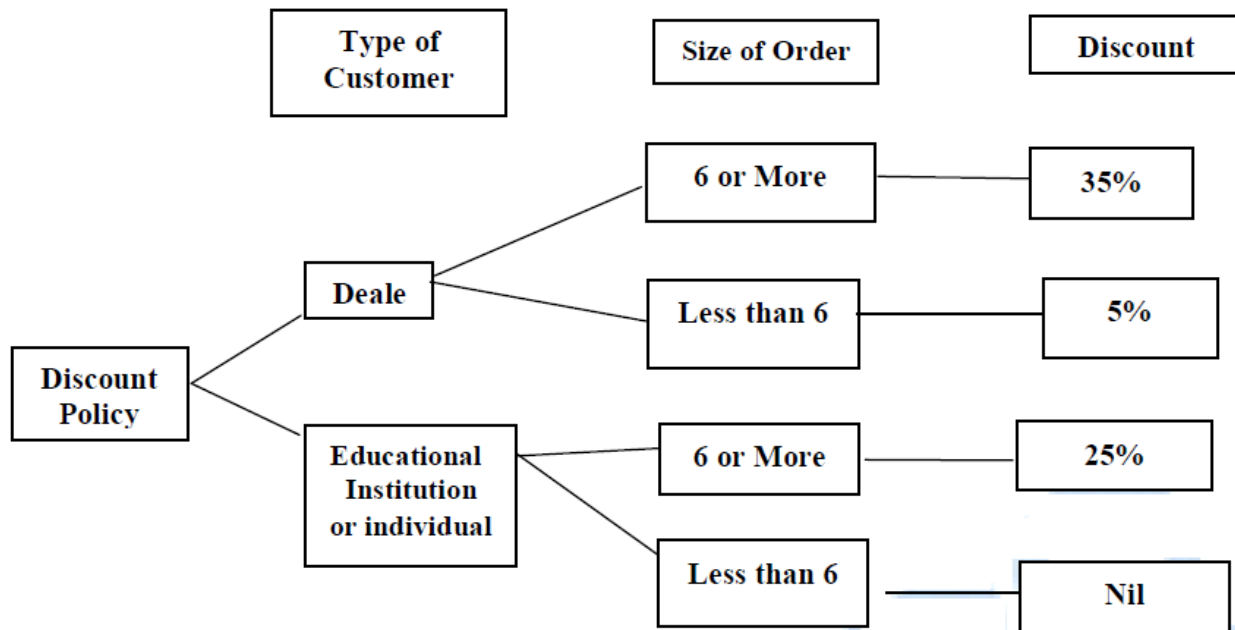


Fig: Decision tree

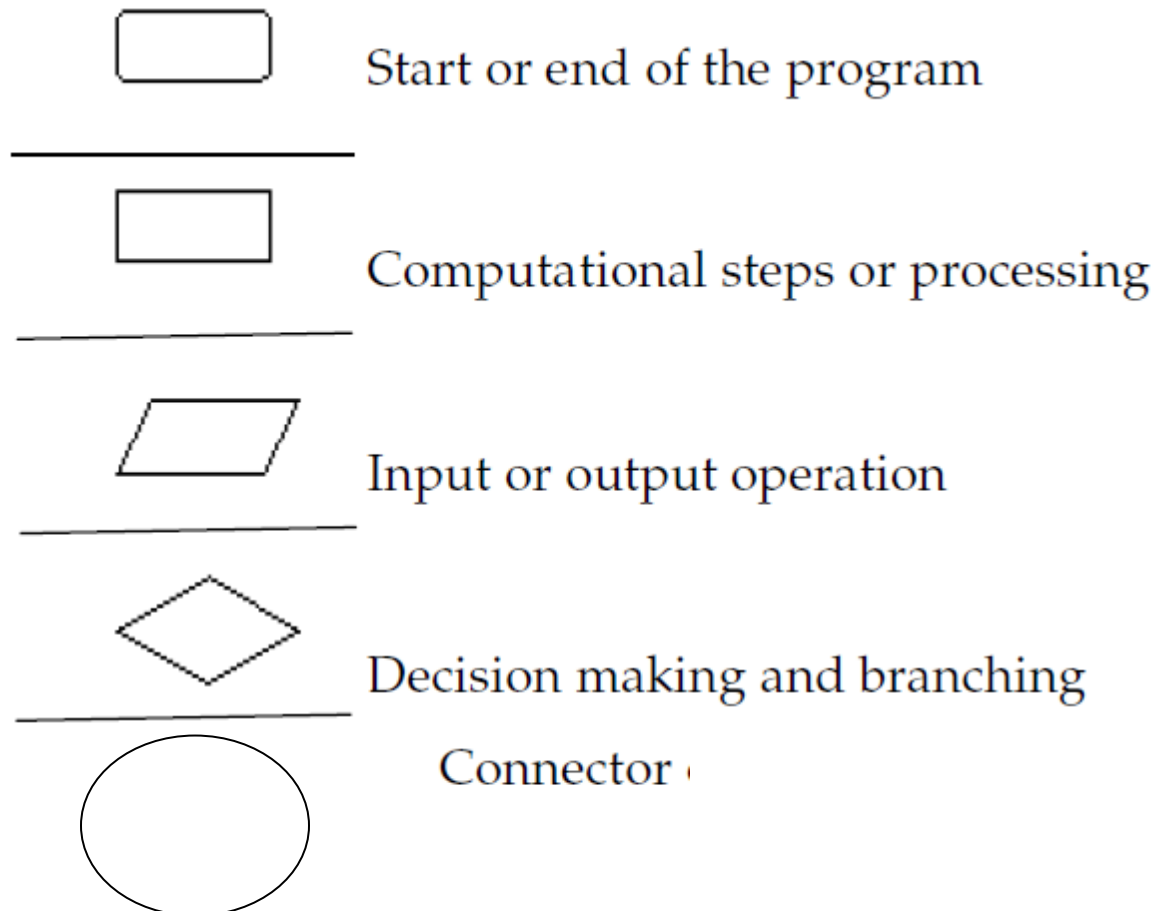
(6) Flow Charts

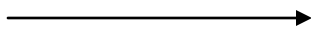
The flowchart is a means of graphical representation of the flow of data through an information processing system, the operations performed within the system and the sequence in which they are performed. A programmer prefers to draw a flowchart prior to writing a computer program. As in the case of the drawing of a blueprint, the flowchart is drawn according to defined rules and using standard flowchart symbols.

“A flowchart is a diagrammatic representation that illustrates the sequence of operations to be performed to get the solution of a problem”.

Guidelines for Drawing a Flow Chart : Flowcharts are usually drawn using some standard symbols; however, some special symbols can also be developed when required. Some standard symbols, which are frequently required for flowchart for many computer programs are as follows :

Flowchart Symbols





Flow Lines

Advantages of Using Flowcharts:

- i) **Communication:** Flowcharts are better ways of communicating the logic of a system to all concerned.
- ii) **Effective Analysis:** With the help of flowchart, problems can be analyzed in more effective way.
- iii) **Proper Documentation:** Program flowcharts serve as a good program documentation, which is needed for various purposes.
- iv) **Efficient Coding:** The flowcharts act as a guide or blueprint during the systems analysis and program development phase.
- v) **Proper Debugging:** The flowchart helps in debugging process.
- vi) **Efficient Program Maintenance:** The maintenance of operating program becomes easy with the help of flowchart. It helps the programmer to put efforts more efficiently on that part.

Limitations of Using Flowcharts:

- i) **Complex Logic:** Sometimes, the program logic is quite complicated. In that case, flowchart becomes complex and clumsy.
- ii) **Alterations and Modifications:** If alterations are required the flowchart may require re-drawing completely.
- iii) **Reproduction:** As the flowchart symbols cannot be typed, reproduction of flowchart becomes a problem.
- iv) The essentials of what is done can easily be lost in the technical details of how it is done.

(7) **Data Flow Diagram :** DFD is graphical modeling tool for structured analysis. The data flow diagram is a modeling tool that allows us to picture a system as a network of functional processes, connected to one another by “pipelines” and “holding tanks” of data. Following terms are used as synonyms for data flow diagram:

- Bubble Chart
- DFD (the abbreviation we will use throughout this book)
- Bubble Diagram
- Process Model (or Business Process Model)

- Business Flow Model
- Work Flow Diagram
- Function Model
- A picture of what's going on around here

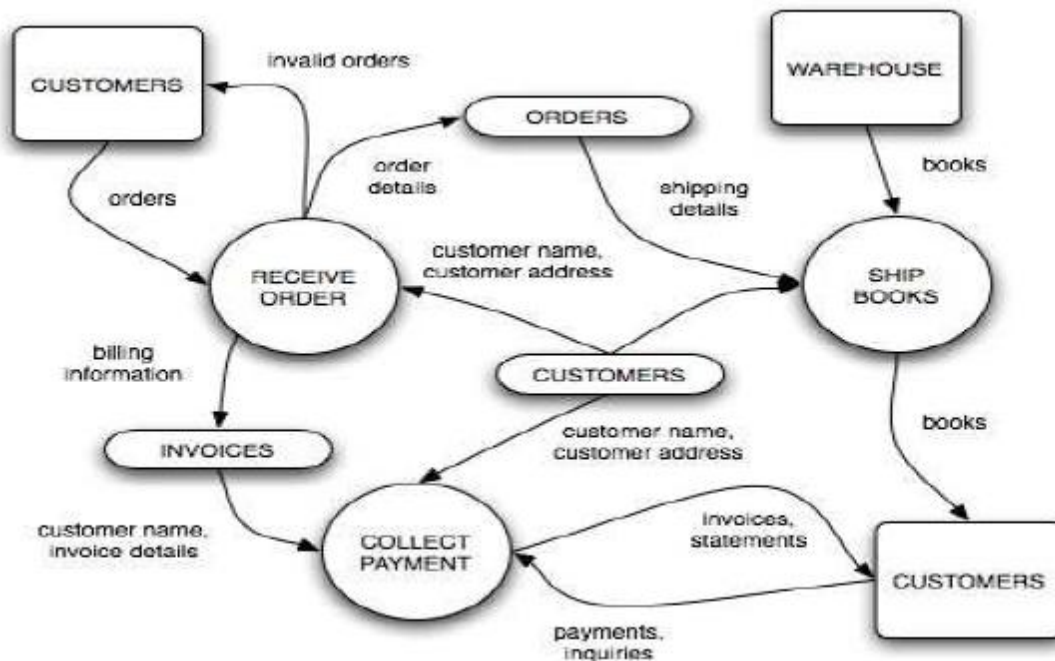
The dataflow diagram is one of the most commonly used systems-modeling tool, particularly for operational systems in which the *functions* of the system are of paramount importance and more complex than the data that the system manipulates.

The Components of a DFD

Following diagram shows a typical DFD for a small system. Before we examine its components in detail, notice several things: -

A Typical DFD has following features:

- It hardly needs to be explained at all;
- The diagram fits easily onto one page.
- The diagram has been drawn by a computer.



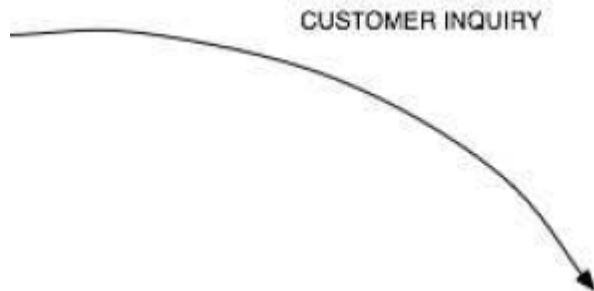
The Process

The first component of the DFD is known as a process. Common synonyms are a bubble, a function, or a transformation. The process shows a part of the system that transforms inputs into outputs; that is, it shows how one or more inputs are changed into outputs. The process is represented graphically as a circle, oval or a rectangle with rounded edges, or rectangle,



The Flow

A *flow* is represented graphically by an arrow into or out of a process. The flow is used to describe the movement of chunks, or packets of information from one part of the system to another part. Thus, the flows represent data in motion, whereas the stores represent data at rest. An example of a flow :



The name represents the meaning of the packet that moves along the flow. A corollary of this is that the flow carries only one type of packet, as indicated by the flow name. It is sometimes useful to consolidate several elementary data flows into a consolidated flow.

The Store

The store is used to model a collection of data packets at rest. The notation for a store is two parallel lines or a rectangle open with one side. Typically, the name chosen to identify the store is the plural of the name of the packets that are carried by flows into and out of the store.



Fig: Graphical Representation of a Store

We can to exclude the issues and model only the *essential* requirements of the system. As we have seen in the examples thus far, stores are connected by flows to processes. Thus, the context in which a store is shown in a DFD is one (or

both) of the following :

- A flow from a store
- A flow to a store

In most cases, the flows will be labeled. While some of the procedural questions can thus be answered by looking carefully at the labels attached to a flow, not all the details will be evident.

A flow from store is often described as a read.

A flow to a store is often described as a write, an update, or possibly a delete.

In all these cases, it is evident that the store is changed as a result of the flow entering the store. It is the process (or processes) connected to the other end of the flow that is responsible for making the change to the store.

The Terminator

The next component of the DFD is a *terminator*; it is graphically represented as a rectangle. Terminators represent external entities with which the system communicates. Typically, a terminator is a person or a group of people, for example, an outside organization or government agency, or a group or department that is *within* the same company or organization, but *outside* the control of the system being modeled. In some cases, a terminator may be another system, for example, some other computer system with which your system will communicate.



Fig: Graphical representation of a terminator

Guidelines for constructing DFDs

The guidelines include the following:

- i) **Choosing Meaningful Names for Processes, Flows, Stores and Terminators:** As we have already seen, a process in a DFD may represent a *function* that is being carried out, or it may indicate how the function is being carried out, by identifying the person, group, or mechanism involved. A good discipline to use for process names is a verb and an object.

ii) **Number the Processes:** As a convenient way of referencing the processes in a DFD, most systems analysts number each bubble. It doesn't matter how much you go about doing this — left to right, top to bottom, or any other convenient pattern will do -- *as long as you are consistent in how you apply the numbers.*

iii) **Avoid Overly Complex DFDs :** The purpose of a DFD is to accurately model the functions that a system has to carry out and the interactions between those functions. But another purpose of the DFD is to be read and understood, not only by the systems analyst who constructed the model, but by the users who are the experts in the subject matter. This means that the DFD should be readily understood, easily absorbed, and pleasing to the eye.

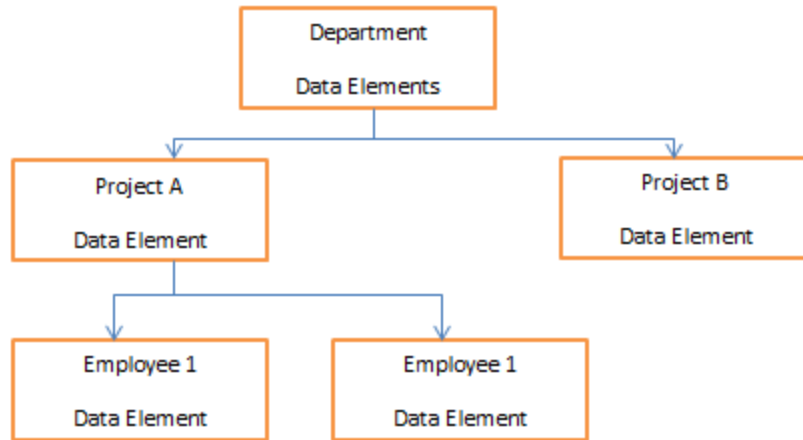
iv) **Redraw the DFD As Many Times As Necessary :** In a real-world systems analysis project, DFD will have to be drawn, redrawn, and redrawn again, often as many as ten times or more, before it is (1) technically correct, (2) acceptable to the user, and (3) neatly enough drawn that you wouldn't be embarrassed to show it to the board of directors in your organization.

Database structures

- Hierarchical
- Network
- Relational
- Object-oriented
- Multi-dimensional

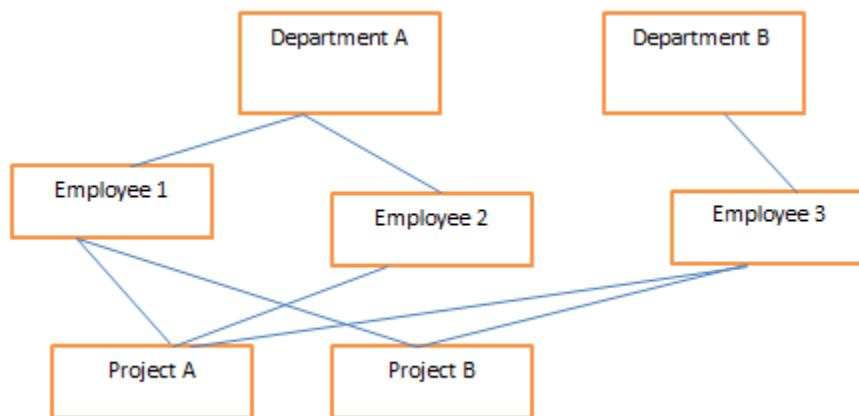
1. Hierarchical Structure

- Early DBMS structure
- Records arranged in tree-like structure
- Relationships are one-to-many



2. Network Structure

- Used in some mainframe DBMS packages
- Many-to-many relationships



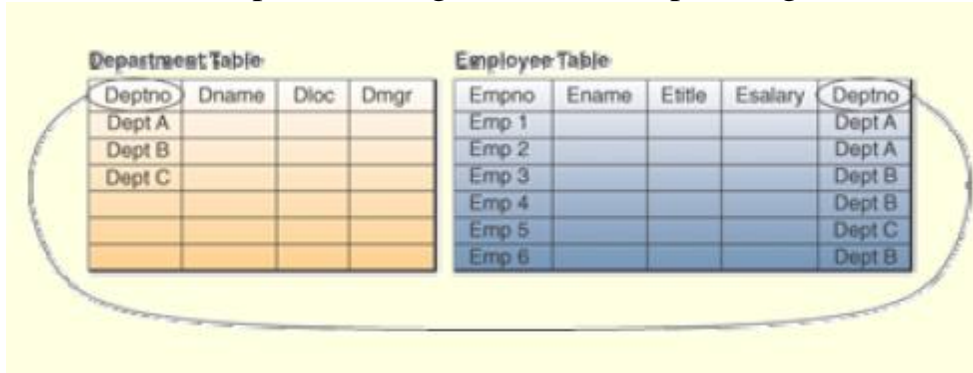
3. Relational Structure

- **Entity** – a person, place, thing, transaction, or event about which information is stored
- **Entity class (table)** – a collection of similar entities
- **Attributes (fields, columns)** – characteristics or properties of an entity class
The columns in each table contain the attributes.

Keys and relationships:

Primary keys and foreign keys identify the various entity classes (tables) in the database

- **Primary key** – a field (or group of fields) that uniquely identifies a given entity in a table
- **Foreign key** – a primary key of one table that appears as an attribute in another table and acts to provide a logical relationship among the two tables



Characteristics:

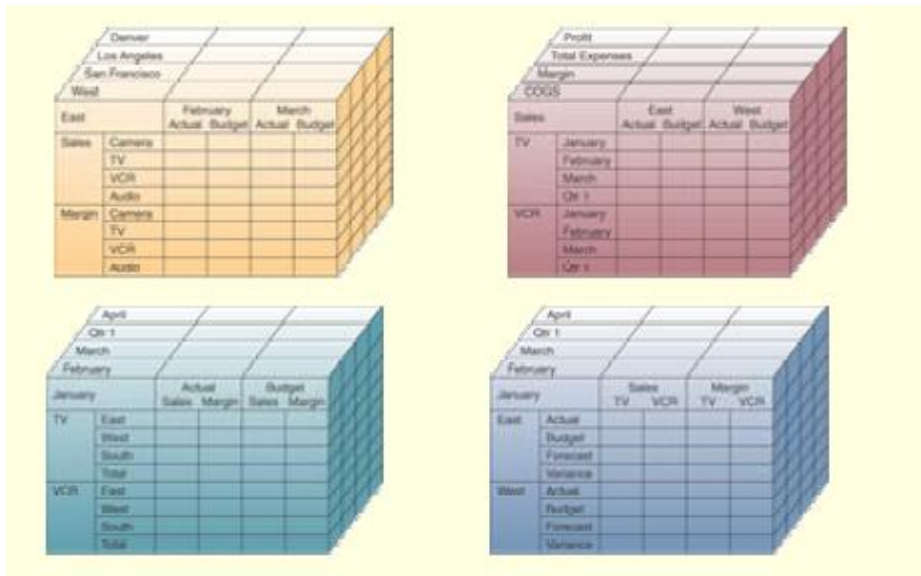
- Most widely used structure
- Data elements are stored in tables
- Row represents a record; column is a field
- Can relate data in one file with data in another, if both files share a common data element

Advantages:

- Increased flexibility
- Increased scalability and performance
- Reduced information redundancy
- Increased information integrity (quality)
- Increased information security

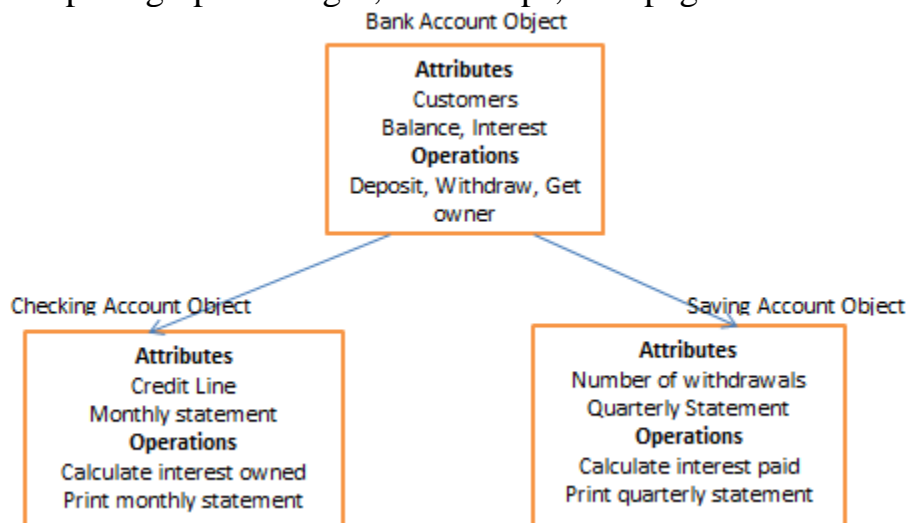
4. Object-oriented

- Variation of relational model
- Uses multidimensional structures to organize data
- Data elements are viewed as being in cubes
- Popular for analytical databases that support Online Analytical



5. Processing (OLAP)

- I. An **object** consists of data values describing the attributes of an entity and operations that can be performed on the data.
 - II. Encapsulation: Combine data and operations
 - III. Inheritance: New objects can be created by replicating some or all of the characteristics of parent objects
 - IV. Supports complex data types more efficiently than relational databases
- Examples: graphic images, video clips, web pages



8.2 Concept of database and database design

Database: an organized collection of data

Database management system (DBMS): group of programs to manage database

- Manipulates database
- Provides an interface between database and the user of the database and other application programs

Database administrator (DBA): skilled IS professional who directs all activities related to an organization's database

Data Management:

Without data and the ability to process it, an organization could not successfully complete most business activities

- Data consists of raw facts
- To transform data into useful information, it must first be organized in a meaningful way

Database Approach

- **Traditional approach to data management:** separate data files are created and stored for each application program
- **Database approach to data management:** a pool of related data is shared by multiple application programs. Offers significant advantages over the traditional file-based approach

ACTIVITIES

1. Describe the concepts used in constructing DFDs use an example of your own to illustrate.
2. What are the 3 most important factors you would use in evaluating computer hardware and software? Explain. Why?

8.3 System Implementation

The following are the steps for system implementation:

1. Data Processing include develop a model of business processes and enterprise model of business processes with documentation.
2. Requirement Specification: define information needs of end user in business processes. Description need of user may be represented in natural language or using tools of particular design.
3. Conceptual Design: express all information requirement in form of High level model.
4. Logical Design: translate the conceptual model into data model of DBMS.

5. Physical Design : determine the data storage structure and access method.

8.4 Management of Information System Project

Data resource management is a managerial activity

- Uses data management, data warehousing, and other IS technologies
- Manages data resources to meet the information needs of business stakeholders

8.5 System Documentation

Data resource management and documentation is a managerial activity

- Uses data management, data warehousing, and other IS technologies
- Manages data resources to meet the information needs of business stakeholders

Documentation is any communicable material such as text, video, audio, etc., or combinations thereof used to explain some attributes of an object, system or procedure. It is often used to mean engineering documentation or software documentation, which is usually paper books or computer readable files such as HTML pages that describe the structure and components, or on the other hand, operation, of a system/product. It is probably immediately think of printed training manuals when you think of "documentation" but there are several different forms for different occasions.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

A. Request for quotation (RFQ) is

1. a document that compares business and technical requirements of a commercial application package against the capabilities and features of a specific commercial application package .
2. A document that communicates business, technical, and support requirements for an application software package to vendors that wish to compete for the sale of that application package and services
3. a document that communicates business, technical, and support requirements for an application software package to a single vendor that has been determined as being able to supply that application package and service
4. a contract with management and the user community to develop or enhance an information system
5. none of the above

- B. Which of the following phases is unique to the commercial application package implementation strategy as opposed to the rapid application development strategy:
1. problem analysis
 2. construction and testing
 3. scope definition
 4. requirements analysis
 5. business process design
- C. A model-driven analysis approach that focuses on the structure of stored data in a system rather than on processes is:
1. structured analysis
 2. information engineering
 3. rapid architected analysis
 4. object-oriented analysis
 5. none of the above
- D. All of the following are phases of systems analysis, except:
1. decision analysis phase
 2. requirements analysis phase
 3. design analysis phase
 4. problem analysis phase
 5. scope definition phase
- E. Which of the following analysis techniques derive system models from existing system or discovery prototypes?
1. rapid architected analysis
 2. object-oriented analysis
 3. data modeling
 4. discovery prototyping
 5. structure analysis
- F. Prototypes are used in:
1. model-driven analysis
 2. object-oriented analysis
 3. traditional approaches
 4. accelerated systems analysis
 5. structured analysis

8.7 Summary

Entity – Relationship Diagrams: The object-relationship pair can be represented graphically using an ER diagram.

Structured English, as the name implies, is “English with structure.” That is, it is a subset of the full English language with some major restrictions on the kind of sentences that can be used and the manner in which sentences can be put together. It is also known by such names as PDL (Program Design Language) and PSL (Problem Statement Language or Problem Specification Language).

Decision Tables: There are situations where structured English is not appropriate for writing process specifications. This is particularly true if the process must produce some output or take some actions based on complex decisions.

A data dictionary is a structured repository of data, about data. In other words it is set of precise and accurate definitions of all DFDs, data elements and data structures

Three main items present in a data dictionary: Data Item, Data Structures and Data Flows and Data Stored.

Decision trees are graphical representation methods of representing sequences of logical decisions. When initial decision guided the next, when and then next one. This can be done with Decision Tree

A flowchart is a diagrammatic representation that illustrates the sequence of operations to be performed to get the solution of a problem.

DFD is graphical modeling tool for structured analysis. The dataflow diagram is a modeling tool that allows us to picture a system as a network of functional processes, connected to one another by “pipelines” and “holding tanks” of data.

Database structures

- Hierarchical
- Network
- Relational
- Object-oriented
- Multi-dimensional

The steps for system implementation are Data Processing, Requirement Specification, Conceptual Design, Logical Design and Physical Design.

8.8 Glossary

Data Dictionary: A **data dictionary** is a collection of descriptions of the **data** objects or items in a **data** model for the benefit of programmers and others who need to refer to them. A **data dictionary** defines the structure of the database itself (not that of the **data** held in the database) and is used in control and maintenance of large databases.

Decision Tree : A **decision tree** is a **decision** support tool that uses a **tree**-like graph or model of decisions and their possible consequences, including chance event outcomes, resource costs, and utility

Flow Charts

Data Flow Diagram: A **data flow diagram (DFD)** is a graphical representation of the "flow" of data through an information system, modelling its *process* aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design). A DFD shows what kind of information will be input to and output from the system, how the data will advance through the system, and where the data will be stored. It does not show information about process timing or whether processes will operate in sequence or in parallel, unlike a traditional structured flowchart which focuses on control flow, or a UML activity workflow diagram, which presents both control and data flows as a unified model

Database management system (DBMS): A **database management system (DBMS)** is a software package designed to define, manipulate, retrieve and manage data in a **database**. A **DBMS** generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.

Database administrator (DBA) : A database administrator (DBA) directs or performs all activities related to maintaining a successful database environment. Responsibilities include designing, implementing, and maintaining the database system; establishing policies and procedures pertaining to the management, security, maintenance, and use of the database management system; and training

employees in database management and use. A DBA is expected to stay abreast of emerging technologies and new design approaches. Typically, a DBA has either a degree in Computer Science and some on-the-job training with a particular database product.

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"What Computer and Information Systems Managers Do". US Bureau of Labor Statistics.

Laudon, Kenneth C.; Laudon, Jane P. (2009). Management Information Systems: Managing the Digital Firm (11 ed.). Prentice Hall/CourseSmart. p. 164.

Transaction processing systems (TPS) collect and record the routine transactions of an organization. Examples of such systems are sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

8.10 Further Readings

Laudon, Kenneth C., and Jane Price Laudon. *Management Information Systems: Managing the Digital Firm*. Prentice Hall, 2005.

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Shim, Jae K. and Joel F. Siegel. *The Vest Pocket Guide to Information Technology*. John Wiley & Sons, 2005.

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8.11 Model Questions

1. Explain in detail the Entity – Relationship Diagrams.
2. What do you understand by the term Decision Tables, Data Dictionary, Decision Tree and Data Flow Diagram?
3. Explain the Database management system (DBMS) and Database administrator (DBA) in detail.
4. What do you understand by the Traditional and Database approach to data management.
5. write a note on “Management of Information System Project”.

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 3
- B. 5
- C. 2
- D. 3
- E. 1
- F. 4

LESSON 9: INFORMATION RESOURCES

Structure

- 9.0 Objectives
- 9.1 Security of information resources
- 9.2 threats of information resources
- 9.3 Security system for Risk Management
- 9.4 Classification of information
- 9.5 DETERMNING THE INFORMATION REQUIREMENT
- 9.6 Centralized Organization of MIS
- 9.7 Decentralized Organization Of MIS
- 9.8 Summary
- 9.9 Glossary
- 9.10 References
- 9.11 further Readings
- 9.12 Model Questions

9.0 Objectives

After studying this lesson, you will be able to

1. Understand the importance of Security of information resources.
2. Understand the threats of information resources.
3. Understand the different Classification of information.
4. Understand the Centralized and decentralized Organization of MIS.

9.1 Security of information resources

Information technology has both beneficial and detrimental effects on society and people it manage work activities to minimize the detrimental effects of information technology and to Optimize the beneficial effects.

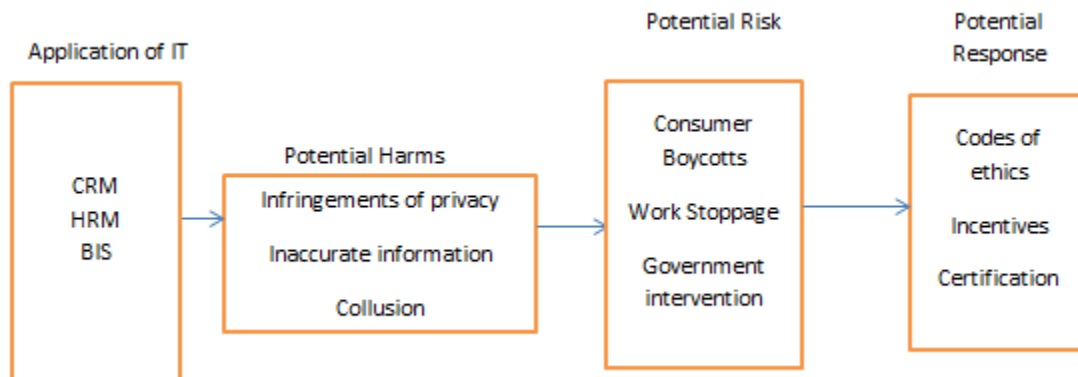


Fig: Ethical Challenges of IT

9.2 threats of information resources

Ethics questions that managers confront as part of their daily business decision making include equity, rights, honesty, and exercise of corporate power.

CSR Theories

- Stockholder Theory

Managers have an ethical responsibility is to increase the profits of the business without violating the law or engaging in fraudulent practices

- Social Contract Theory

Companies have ethical responsibilities to all members of society, who allow corporations to exist

- Stakeholder Theory

Managers have an ethical responsibility to manage a firm for the benefit of all its stakeholders. Stakeholders are all individuals and groups that have a stake in, or Claim on, a company.

9.3 Security system for Risk Management

I. Technology Ethics

Ethical Guidelines: A responsible professional Acts with integrity to Increases personal competence, Sets high standards of personal performance, Accepts responsibility for his/her work, Advances the health, privacy, and general welfare of the public.

II. Computer Crime

It includes

- Unauthorized use, access, modification, or destruction of
- hardware, software, data, or network resources
- The unauthorized release of information
- The unauthorized copying of software
- Denying an end user access to his/her own hardware, software,
- data, or network resources
- Using or conspiring to use computer or network resources
- illegally to obtain information or tangible property

III. **Unauthorized use** of computer systems and networks is time and resource theft. It include:

- Doing private consulting
- Doing personal finances
- Playing video games
- Unauthorized use of the Internet or company networks

Steps to protect privacy of data resources over internet include:

- Encrypt email
- Send newsgroup postings as anonymous mailers
- Don't reveal personal data and interests on online service and website user profiles

ACTIVITIES

1. List down the threats to information systems and explain how they are existing?
2. How will you create a control environment for information systems?
3. Explain the various security hazards faced by an information system.

9.4 Classification Of The Information

The information can be classified in a number of ways provide to a better understanding. John Dearden of Harvard University classified information in the following manner:

Action versus no-action information

The information which induces action is called action **information**. The information which communicates only the status of a situation is **no-action information**. `No Stock. Report calling a purchase action is an action information but the stock ledger showing the store transactions and the stock balances is a No-action information.

Recurring versus non-recurring information

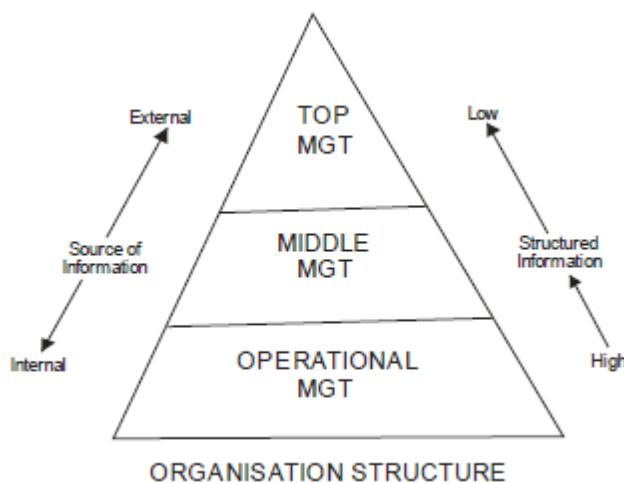
The information generated at regular intervals is recurring **information**. The monthly sales reports, the stock statements, the trial balance, etc. are recurring information. The financial analysis or the report on the market research study is **non-recurring** information.

Internal versus external information

The information generated through the internal sources of the organization is termed as internal **information**, while the information generated through the Government reports, the industry surveys, etc. is termed as external **information**, as the sources of the data are outside the organization.

The timing information, the recurring information and the internal information are the prime areas for computerization and they contribute qualitatively to the MIS. The timing and accuracy of the action information is usually important. The mix of the internal and the external information changes, depending on the level of the management decision. At the top management level, the stress is more on the external information and at the operational and the middle management level; the stress is more on the information. Figure shows the source and kind of information required vis-à-vis of management in the organization.

The information can also be under, in terms of its application.



Planning information

Certain standards, norms and specifications are used in the planning of any activity. Hence, such information is called the **planning information**. The time standards, the operational standards, the design standards are the examples of the planning information.

Control information

Reporting the status of an activity through a feedback mechanism is called the **control information**. When such information shows a deviation from the goal or the objective, it will induce a decision or an action leading to control.

Knowledge information

A collection of information through the library reports and the research studies to build up a knowledge base as an information source for decision making is known as **Knowledge information**. Such a collection is not directly connected to decision making, but the need of knowledge is perceived as a power or strength of the organization.

The information can also be classified based on its usage. When the information is used by everybody in the organization, it is called the **organization information**. When the information has a multiple use and application, it is called the **database information**. When the information is used in the operations of a business it is called the functional or the **operational information**.

Employee and pay-roll information is organization information used by a number of people in a number of ways. The material specifications or the supplier information is database stored for multiple users. Such information may need security or an access control. Information like sales or production statistics is functional, meeting the operational needs of these functions.

9.5 DETERMINING THE INFORMATION REQUIREMENT

The sole purpose of the MIS is to produce such information which will reduce uncertainty in a given situation. The moment what is unknown becomes known, the decision maker's problem is simple. Methods have been evolved to handle the degree of uncertainty the management is expected to deal with.

The difficulty to determine a correct and complete set of information is on account of the factors given below:

1. The capability constraint of the human being as an information processor, a problem solver and a decision maker.
2. The nature and the variety of information.
3. Reluctance of decision makers to spell out the information for the political and the behavioral reasons.
4. The ability of the decision makers to specify the information.

In spite of these difficulties, methods are evolved based on the uncertainty scale, starting from the low to the high level of uncertainty. If the uncertainty is low, seeking information requirement or needs is easy as against a very high level of uncertainty. Based on the uncertainty scale the following methods, shown in Table have been suggested as:

<i>Level of uncertainty</i>	<i>Level of management</i>	<i>Method</i>
Low (Near certainty)	Operations management.	Ask Questions such as, what do you need ?
Precise probabilistic knowledge (A risk situation)	Middle management	Determine from the existing systems and methods of decision making and problem solving.
Not able to determine in probabilistic terms precisely (Very risky)	Middle and top management.	Determine through the critical success factors, decision parameters and decision methodology.
High (Total uncertainty)	Top management.	Determine through experimentation, modeling and sensitivity analysis.

Fig: methods of handling uncertainty

There are four methods of determining the information requirements. They are:

1. Asking or interviewing
2. Determining from the existing system
3. Analyzing the critical success factors
4. Experimentation and modeling.

Asking or Interviewing

In this method a designer of the MIS puts questions or converses with the user of information and determines the information requirements. Putting the questions is an art and it should be used properly to seek information. When the user has to select one answer from finite set of answer a closed question should be asked.

For example, .Which are the raw materials used for making a product? But an open question is put, when the user has no precise knowledge but has an ability to determine all answer and to select one out of them? For example, .Which are the raw materials which can be used in a product?. In open questions, the answers may not be immediate but can be obtained by surveying the domain of knowledge of the user. When multiple users or several decision makers in similar functions or positions are involved, a brain storming session is performed to cover all possible answer to the questions. When several users are involved, group consensus can be sought to get the most feasible set of answer.

The experts or experienced users are asked to give their best answer- this approach is called the Delphi method. In all these methods, the systems designer has to test the validity of all the answer independently. An experienced designer is able

to analyze critically the answers given to the questions and to determine the correct information requirement.

Determining from the Existing System

In a number of cases the existing system, which has been evolved after a number of years, and has been designed out of experience given straightaway the requirement of information. In many situations, system from other companies can give additional information requirements.

The fund of knowledge is available from the textbooks, handbooks, research studies which can determine the information requirement. For example, systems such as the accounts receivables, the accounts payables, the pay roll, the inventory control, the financial accounting, etc., have well determined information requirements. Irrespective of the type of organization and business, ninety per cent of the information requirement is common and the balance ten per cent may be typical to the organization or the business, which needs to be determined separately.

The managers in the operations and the middle management use the existing system as a reference for determining the information requirement. This method is adopted when the rules and decision methods are outside the purview of the decision maker. They are determined or imposed by external sources such as the Government, the Authority, the principles, etc. for example, the information required to manager shares of the company are determined through the rules and regulations laid down by the Company Law Board. The manager of the shares department has very little additional information need. In all such functions, the manager determines the information needs and the designer of the MIS can always fall back on the prescribed law books, manuals, theory and textbooks, hand books, etc. to confirm the informational needs

Analyzing the Critical Factors

Every business organization performs successfully on the basis of certain critical factors. Other factors are important and play a support role in the functioning of the organization. Many times a function is singularly critical to the successful functioning of a business organization.

For example, in a high technology business, the management of the technology becomes the critical function. Or in a service organization, the management of service becomes a critical factor. In a consumer industry, marketing and service become the critical functions. The information requirements of such organizations largely relate to these critical factors. The analysis of these functions or factors will determine the information requirements.

Experimentation and Modelling

When there is total uncertainty, the designer and the user of the information resort to this method for determining the information requirement. The experimentation would decide the methodology for handling the complex situation. If the method is finalized, the information needs are determined as they have been evolved through the experimentation.

Test marketing of a product is an approach of the experimentation to decide the correct marketing strategy. Sometimes models are used for deciding the initial information needs and they are modified during the implementation stage. The information requirements determined through such methods undergo a qualitative change as the users get the benefit of learning and experience and the needs may undergo a change or get replaced completely.

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. The person generally responsible for the program design strategy, standards, and construction is called a(n):
 - 1. program librarian
 - 2. backup chief programmer
 - 3. network designer
 - 4. chief programmer
 - 5. systems analyst

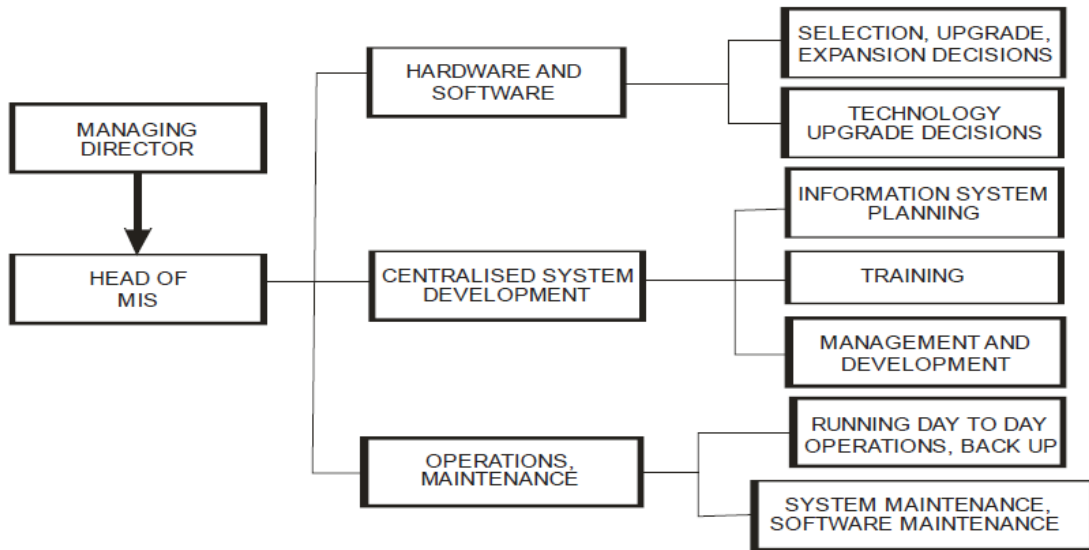
- B. Which one of the tests is performed on a subset of a program?
 - 1. subset test
 - 2. unit test
 - 3. stub test
 - 4. program test
 - 5. system test

- C. Which of the following is the last phase of the Systems Construction phase?
 - 1. build and test databases
 - 2. write and test new programs
 - 3. prepare conversion plan
 - 4. build and test networks

5. none of the above
- D. Which installation strategy is a variation on the abrupt and parallel conversion?
1. location conversion
 2. staged conversion
 3. partial conversion
 4. hierarchical conversion
 5. none of the above
- E. Which of the following is(are) the task(s) of the Systems Conversion phase?
1. prepare conversion plan
 2. train users
 3. convert to new system
 4. build and test networks
 5. none of the above
- F. Which of the tests is a final system test performed by end users using real data over an extended period of time?
1. final test
 2. complete test
 3. systems acceptance test
 4. parallel test
 5. none of the above

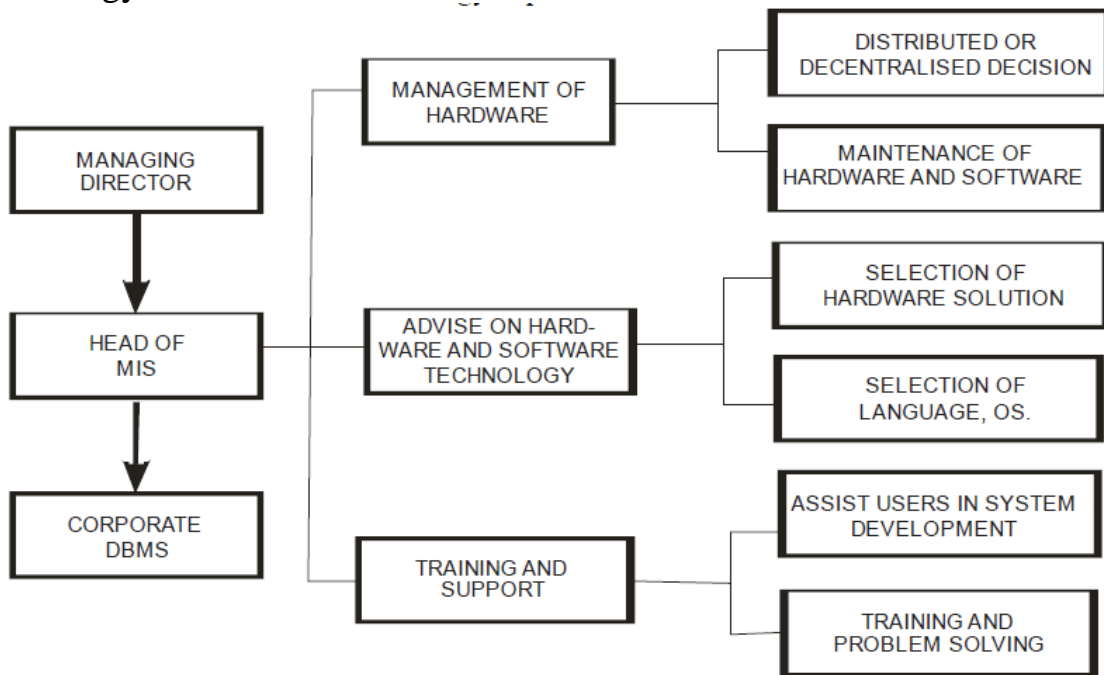
9.6 Centralized Organization of MIS

Information is considered as corporate resource and hence generated centrally by the head of theMIS and made available to all the users on conditions and needs. The function of the head of theMIS is to manage the information centrally as a corporate resource from the data to theInformation and its technology requirement.



9.7 Decentralized Organization Of MIS

Information is considered as a resource for a department, group of individuals or In other words, it is considered specific to the business function. The head of the MIS provides support to the users of the information in their task of Development. The major responsibility is the data management and the technology.



9.8 Summary

CSR Theories include: Stockholder Theory, Social Contract Theory and the Stakeholder Theory

Managers have an ethical responsibility to manage a firm for the benefit of all its stakeholders. Stakeholders are all individuals and groups that have a stake in, or Claim on a company.

Computer Crime includes unauthorized use, access, modification, or destruction of hardware, software, data, or network resources, The unauthorized release of information and The unauthorized copying of software etc.

Steps to protect privacy of data resources over internet include: Encrypt email, Send newsgroup postings as anonymous mailers. Don't reveal personal data and interests on online service and website user profiles

The sole purpose of the MIS is to produce such information which will reduce uncertainty in a given situation. The moment what is unknown becomes known, the decision makers problem simple. Methods have been evolved to handle the degree of uncertainty the management is expected to deal with.

There are four methods of determining the information requirements. They are:

1. Asking or interviewing
2. Determining from the existing system
3. Analyzing the critical success factors
4. Experimentation and modeling.

9.9Glossary

Internal & External Information: The information generated through the internal sources of the organization is termed as internal **information**, while the information generated through the Government reports, the industry surveys, etc. is termed as external **information**, as the sources of the data are outside the organization.

Action & No action information: The information which induces action is called action **information**. The information which communicates only the status of a situation is no-**action information**.

CSR: It is referred to business practices involving initiatives that benefit society. A business's CSR can include a wide variety of tactics, from giving away a portion of a company's proceeds to charity to implementing "Greener" business operations.

9.10References

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Transaction processing systems (TPS) collect and record the routine transactions of an organization. Examples of such systems are sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

9.11 Further Readings

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9.12Model Questions

1. Explain in detail about the Security of information resources.
2. What are the various Ethical Challenges of IT?

3. Explain in detail the Stockholder Theory, Social Contract Theory and the Stakeholder Theory.
4. differentiate between :Action versus no-action information, Recurring versus non-recurring information and Internal versus external information.

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 4
- B. 3
- C. 2
- D. 2
- E. 4
- F. 3

LESSON 10: ERP

Structure

- 10.0 Objectives
- 10.1 Introduction to ERP definition
- 10.2 Features of ERP
- 10.3 Characteristics of ERP Solution
- 10.4 BENEFITS OF THE ERP
- 10.5 Modules
- 10.6 Implementation
- 10.7 ERP Architecture
- 10.8 ERP Solution structure
- 10.9 ERP Model and Modules
- 10.10 Characteristics of ERP Solution
- 10.11 ERP Selection
- 10.12 Summary
- 10.13 Glossary
- 10.14 References
- 10.15 Suggested Readings
- 10.16 Model Questions

10.0 Objectives

After studying this lesson, you will be able to:

1. Understand ERP
2. Understand the features and benefits of ERP
3. Understand the implementation process of an ERP
4. Understand the Architecture of an ERP
5. Understand the characteristics of an ERP

10.1 Introduction to ERP

ERP is a cross-functional enterprise backbone that integrates and automates processes within Manufacturing, Logistics, Distribution, Accounting, Finance, Human resources.

It is an integrated suite of software modules that:

- Supports basic internal business processes
- Facilitates business, supplier, and customer information flows

The ERP system deals 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 execute the strategies, plan, decisions, and actions in a time bound manner.

The ERP provides a support system in the transaction processing, updating, and reporting across the functions. The ERP is a package encompassing all major functions of the business. The product is generic in nature and is supposed to incorporate the best business practice, generally followed in most of the companies. The product philosophy is to implement the system as it is with some customization which may be typical to the customer requirement. The system design of the ERP is integrated with the features and functions providing an enterprise wide solution to handle all the process functionalities. For example, it provides capability to process the purchase order from ordering to bill processing, and also meets the information needs of purchase, stores, manufacturing accounts and finance.

The ERP packages build information base and provide knowledge base for planning and control of the business through the business function management. The ERP is the main system, interfaced or assisted by the other systems in the organization. These systems may stand alone or form a part of the manufacturing or commercial processing systems. These systems provide the database to the ERP or support the ERP by the basic data input directly or through the data transfer, for example, the manufacturing system module of the ERP is interfaced with the Drawing, Engineering database for query, viewing and usage of the drawings and it accepts the data of work order by process operations, for costing and for building the standards for the future.

The architecture is client/server and uses object oriented technology for design and development of the system. These packages are RDBMS based with the front end tools. The key benefit of the ERP is that it provides an integrated solution for all the requirements of the business. It addresses the issue of data integrity, information transparency, seamless integration and information communication. Simultaneously it respects the organizational hierarchy of authority, while conducting the business transactions through the system.

The implementation of most of the ERP packages begin with the enterprise modeling which defines the enterprise structure, the authority function,

the processes and the business rules. The enterprise model is the platform the ERP system implementation.

The ERP solutions are available on the Unix Platform and also on Windows NT. The solution is structured in the modular fashion to cover the entire business operation. A typical ERP package solution has following modules:

1. Sales, Marketing, Distribution
2. Manufacturing
3. Stores Management
4. Finance
5. Personnel
6. Maintenance
7. Purchase, Inventory
8. Planning and Control

These modules are designed for data capture, data transaction validation, its analysis, accounting updating and reporting. All the ERP solutions provide report writer for these to create the reports. The standard reports like the trial balance, the stores ledger, the employee attendance report, the income tax return, etc are provided with the solution at a generic level.

The ERP features are many. The important ones are security authorization, referencing responsibility, and the implementation of the business rules. These are provided to safeguard the business of the organization from illegal practice and also to protect the valuable information from misuse. These features help to keep the system, the information and the data integrity at the highest level. The ERP is activated by its users. The security is built for authorized usage and also for selective access.

The ERP usage can be controlled at all levels, viz., the data, transaction, information and analysis level. The security system of the ERP is built around the OS security and the additional features are provided while designing the system. It provides access and updating rights to the users as per the control requirement of the management.

Authorization is a feature provided for ensuring that the transaction is completed with regards to the business rules set by the management. The system provides the

mapping capability to tie the data, information or process to the user. This means that only the authorized user sign, the transaction is not posted in the system for further processing and usage.

For example, in the purchase order transactions the price and discount are confirmed by one user, the terms are decided by the other users and the purchase order is signed by the third user. The system provides defined levels to the users and the purchase order is signed by the third user. The system provides defined levels to the users and these are no limitations on the number of levels.

Referencing is a feature, provided for tracking the chain of events for monitoring, progress checking and control. For example, if one wants to check the status of customer order, the referring feature helps to link the customer order to work order to delivery note to excise gate pass to bill. It is possible to establish the link through cross reference of the transaction number or code of the previous transactions.

For example, a work order will give a reference of customer order, a delivery note would give a reference of work order, a bill would give a reference to a delivery note and customer order. The feature does not allow the transaction to proceed unless such references are established. The business organization runs through the rules and the responsibility allocation. A strict adherence to them is essential for creation of the controlled environment.

The ERP satisfies this need of the business. It provides a facility to ensure that the user location (Department/Division) Transaction integrity is confirmed through check and validation and then ERP allows proceeding.

For example, a cash transaction is allowed at the Finished Goods Store and in the Accounts Department by the authorized users only. At any other place evolving cash transaction is prohibited. The material indents are process able in the stores while the vouchers are process able in the Account Department. The order entry is permissible in marketing.

The ERP provides such facilities to ensure that the business is operated on the rules and the guidelines set by the management. The ERP system provides a variety of technology supports to implement the solution very fast in execution mode. The solution provides the E-mail facility for communication of memos, reminders, and text to the selected list. It also sends copies to the concerned person as stipulated.

Through the EID connectivity, it can transact directly to the vendor or the customer in its own format.

ERP system provides an aid to create the transaction by a cut and paste mechanism. It can raise a purchase order on the vendor by picking up and choosing the old purchase orders, which saves the generation time. The ERP solutions are built for a user friendly flexible approach to manage the business with the changing needs.

This requires processing in a different manner to assess the impact. The solution provides facilities like the trial posting, the end of chosen period processing, the posting by choice, the flexible valuation procedures, and the hold transaction, etc.

Through these facilities the management can conduct an impact analysis to judge the financial results and makes the business decisions.

The ERP also provides an intelligent support in business management. It allows the user to define the events, alert and schedule them at his choice. These events alerts are triggered by the database inserts or updates. Having raised the alert, it also allows you to define the action to respond to the alert.

The ERP sends the electronic mail and executes the SQL statement. It is also capable of taking multiple actions through the stored procedures. Take an example of an item receipt in stores. The receipt would update the database and the system will have an updated stock status. This database update is an event for using the alert. The alert in this case can be defined as, on receipt of an item send E-mail to the purchase Manager, the Production Planner and further, show the work orders which are scheduled where this item is in use. If the receipt of this item closes the Purchase Order then raise an automatic Purchase Order on the same vendor with the same terms and conditions.

All the ERP solutions provide Drill Down and Context Sensitive helps to use the system. The drill down helps to run through the system to locate the weak spot for action and control. Suppose, the sales manager is viewing the sales by region by product line. Then he wishes to see the sales revenue over a time, in order to better understand the seasonality in the business.

The drill down facility helps him to use the information the way he wants, to form the judgments on the business happenings. The drill down could be multi-dimensional to analyze the critical business information.

The context sensitive help provides an access to help library which can be used by user by calling help. The help could be information, guidance and understanding of the term or process or formats. The help facilities make the ERP user-friendly and easy to learn.

Definition:

At the heart of all ERP systems is a database, when a user enters or updates information in one module, it is immediately and automatically updated throughout the entire system.

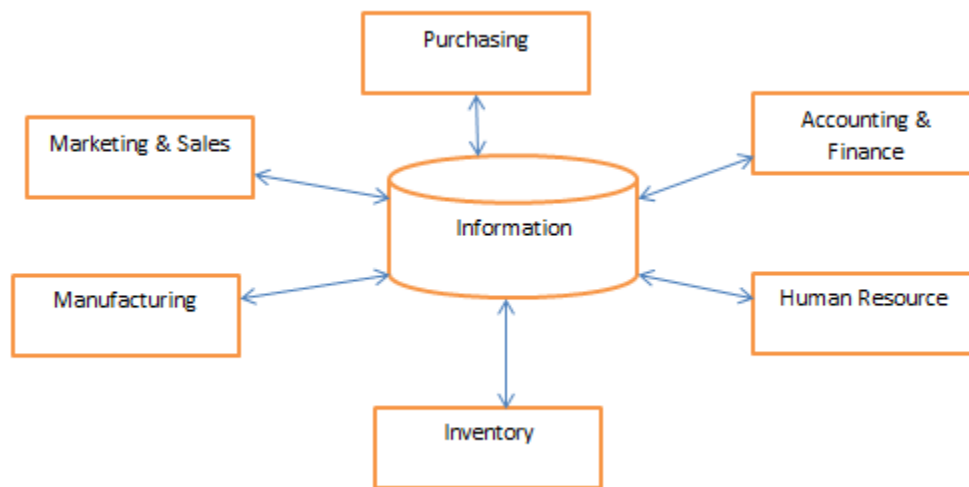


Fig: Information flow with help of an ERP

The ERP system deals 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 execute the strategies, plan, decisions, and actions in a time bound manner.

The ERP provides a support system in the transaction processing, updating, and reporting across the functions. The ERP is a package encompassing all major functions of the business. The product is generic in nature and is supposed to incorporate the best business practice, generally followed in most of the companies.

10.2 Features of ERP

The ERP features are many. The important ones are security authorization, referencing responsibility, and the implementation of the business rules. These are provided to safeguard the business of the organization from illegal practice and also to protect the valuable information from misuse. These features help to keep the system, the information and the data integrity at the highest level. The ERP is activated by its users. The security is built for authorized usage and also for selective access.

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The ERP provides such facilities to ensure that the business is operated on the rules and the guidelines set by the management.

10.3 Characteristics of ERP Solution

- Modular structure.
- Scalable architecture.
- Seamless integration of modules.

- RDBMS independent.
- Independence of hardware platform.
- Interface capabilities.
- PC download/ upload facility.

Most of the ERP solutions need some changes to suit changes to suit the environment. The Commerce and Corporate Laws differ from country to country and the ERP in such cases need customization to satisfy the local requirement of the business.

The ERP solution has advantages of fast implementation as the design and development is eliminated being a package. Due to object oriented technology and the client server architecture, the changes are easy to make, which are less at the server end and more at the clients end.

Since, it has modular structure; one can implement the solution in a phased manner module by module. It can be implemented first on a smaller scale and expanded subsequently with more users, more locations and more modules as well. Since the whole solution is a package product, the manufacturer of the package brings out newer versions of the product offering more facilities to the user to improve the utility of the solution.

There are more than a dozen ERP solution available in the market each having its own specialty. Though, they are characterized as described earlier, they differ in feel, look presentation, processing efficiently and user-friendliness. Some of these products are developed as an application in a particular organization and then turned into a packaged solution. In view of this, some of ERP solution is more useful and efficient in similar organization. The specific industry features have been taken care of more efficiently as customized solutions. Since the design / developer have a choice of RDBMS, front end tools, the interface tools, and so on the package efficiency changes with the choice to tools. Some of these packages run better, if installed on a particular hardware platform; and used by a particular organization. Though tools, technology and approach may be same or similar, the manner in which they are used decides the efficiency of the solutions.

ERP Business Benefits include:

- Quality and efficiency for the business
- Decreased costs

- fast and efficient Decision support
- Enterprise agility

10.4 Benefits of ERP

1. Better management of resources reducing the cost of operations.
2. Planning at function and process level simultaneous increase in the productivity of the business possible.
3. Customer satisfaction increase due to shorter delivery cycle. Closer contact with the customer.
4. Simultaneous atomization of the decision centers because of instant inducement through triggers or updates.
5. Business operations transparency between business partners cutting down the execution time of critical business operation.
6. Intelligent ERP download the decision making at lower level, releasing the burden on the middle management.
7. Due to faster processing technology and SQL, management can see the information in their perspective and take different view of the business.
8. Due to strong interface capabilities, the human resource can be utilized better due to access to information across the databases distributed over the organization.
9. Since, the ERP design is proactive, it make the management alert at a number of points demanding the decision or action.
10. The processes become faster due to work group technology and application of work flow automation.
11. Due to the support technologies like EDI, E-mail, office automation, paperless office is a newer possibility as communication is faster and systems get connected directly.
12. The ERP still remain a valid solution with the expansion of business as it is a scalable architecture.
13. Due to the client/server architecture, the application of object technology and use of the front end tools, the process changes can be easily carried out in a short duration of time. Hence, the user service can be maintained at higher level.
14. The ERP implementation automatically leads to the usage of the best business procedures bringing the consistency of operation in the world of business.
15. With the use of the data warehousing and data reverse engineering, management becomes knowledge's driven and the organization becomes a learned one.
16. The ERP scope can be enlarged through the Internet/Intranet access, making the ERP sensitive to the latest events in the business, market and technology.

17. The quality of decision making improve as the user decision maker is made alertand he is made knowledgeable and better informed dynamically.
18. The tools available to the decision maker are friendly whereby he is equipped tomake decision and execute it simultaneously.

ACTIVITIES

- 1.** Explain the ERP concepts and its benefits to your organization.
- 2.** Write an essay on the ways ERP helping out business and its processes.
- 3.** Explain the various approaches through which companies are organizing ERP projects.

10.5 Modules

Atypical ERP package solution has following modules:

1. Sales, Marketing, Distribution
2. Manufacturing
3. Stores Management
4. Finance
5. Personnel
6. Maintenance
7. Purchase, Inventory
8. Planning and Control

These modules are designed for data capture, data transaction validation, it analysis,accounting updating and reporting. All the ERP solutions provide report writer for theuse to create the reports. The standard reports like the trial balance, the stores ledger,the employee attendance report, the income tax return.

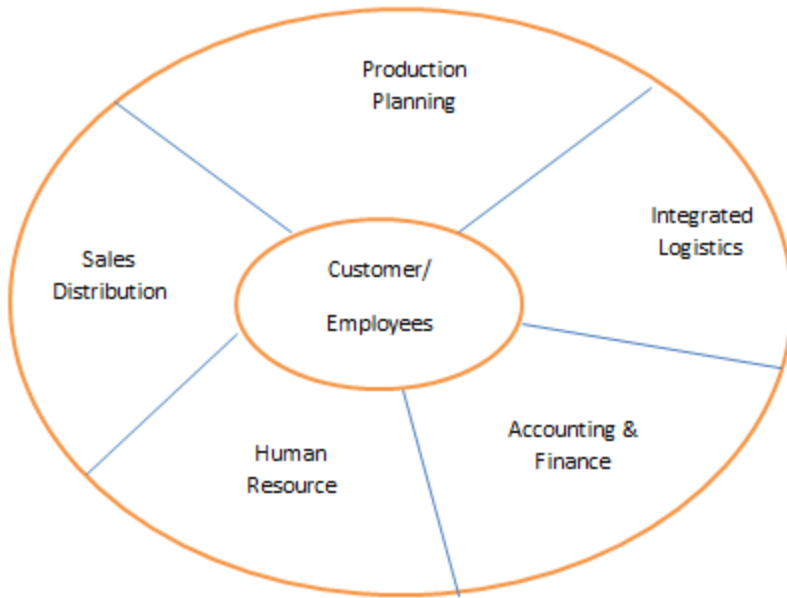


Fig: ERP System Modules

General features

- Separation of the program code and the data areas
- Command language
- Screen based flow control
- Application logic
- common service functions such as the currency, date, editing, and help
- Diagnostic functions
- Transaction flow control
- Help functions
- Central table system for management of parameters, text and master data, online logical checks and validations
- Word processing, text editing
- Action messages
- Tuning
- Enterprise Modeling: Structure/Policy/Rules/Guidelines

Business system

- Business forecasting for products, groups, markets
- Target fixing and allocation by the key parameters
- Business planning in terms of the resources to execute

- Strategy formulation and implantation
- MIS for strategy monitoring and control
- Business modeling for the strategy development and testing, DSS for resource planning
- Information base management for management application

Sales

- Basic data (master) management
- Order processing
- Dispatching and invoicing
- Order analysis, forecasting
- Sales analysis, budgets and controls
- Finished goods stores management
- Dealer, distributor management system
- Receivable analysis
- Market/ Customer / Product analysis
- Market research information database
- Marketing personnel management
- Sales forecasting and budgeting

Production

- Basic master data management
- Bill of materials, classification
- Process sheet, routing
- Work order generation, scheduling and control
- Production Planning : BOM, MRP, MPS and capacity planning
- Interface of CAD/CAM/CAE systems
- Quality systems for data capture, analysis and control
- WIP tracking, valuation
- Work station/machine centre management
- Production-Materials interface
- Collection of unit data for valuation and costing

Materials

- Purchasing and procurement
- Goods receipt and issue system
- Stock management and valuation

- Inventory analysis
- Stores ledger, valuation, analysis, disposal
- Excise/customer interface
- Data integration with production, accounts systems
- Quotation/Enquiry processing
- Subcontracting, material accounting and bill passing

Finance

- General accounting functions
- Ledger, payables and receivables
- Subsidiary ledgers
- Cash-flow management
- Loan management, funds management
- Working capital management
- Budgeting, planning and control
- Balance sheet processing
- Tax management status reporting
- Assets accounting
- Cost accounting: cost centre accounting, order accounting, product costing
- Bank reconciliation
- Letter of credit management
- Consolidation of accounts

Personnel

- Personnel data management
- Personnel attendance system, time management
- Payroll accounting: salary, wages, incentives, bonus, income tax and other deductions, and contribution to various public and provident funds
- Human resources management: Planning, recruitment, training and up gradation
- Personnel cost, projection and planning

Fixed Assets

- Fixed assets accounting: Inventory, register
- Depreciation accounting
- Capital work in progress
- Fixed assets retirement and disposal
- Year end processing for balance sheet schedules

Maintenance

- Plant maintenance planning
- Breakdown, preventive, conditional maintenance
- Maintenance management: Initiation, planning, execution, control, and cost accounting
- Monitoring performances for maintenance action as all kinds of productive assets
- Contract management

Quality Control

- System of data gathering to assess quality and measure against standard
- Analysis of quality by process, material, work centre location
- Analysis of quality by reasons and action taken
- Building quality assurance data for equipment/ process/ technology selection
- Monitoring quality across the organization from input to output for operating decisions and business decisions

Consolidation of Business Operations

- Accounting by units and divisions with local focus
- Consolidation by accounts in corporate functions
- Bringing out comprehensive reporting system for business decisions

10.6 Implementation

The ERP implementation, generally, follows the waterfall mode approach. Once a firm order is received the implementation begins with kick-off meeting between the vendor and the organization. In such meeting the organizational issues are taken care of. Since it is a long term activity a preliminary planning is done to start the implementation.

Requirement Definition and Description (RDD)

Though, initially, the study has been carried out by the vendor, more in-depth study is taken up jointly by the vendor and the project in-charge of the organization. In this phase of study the user are contacted for their requirement specifications. These requirements may be of the data, information, function, features, processes or reports. It is necessary to understand them to evaluate the ability of the ERP solution to satisfy these requirements.

Since, the ERP is designed as a standard package, it after requires changes and modifications to suit the requirements of the business. All the ERP packages provide standard features, functions lists of the package used. These lists are examined vis-à-vis the requirements and new document is prepared called as the deviation RDD.

Once the deviation RDD is made, it should be approved by the authorized person in the organization. The purpose of such a document is to freeze any requirement to carry out further changes in the package.

In the evaluation of standard RDD, two kinds of changes emerge, one major, where the ERP design needs to be changed. Such changes are time consuming and the vendor may charge additionally for such requirement fulfillment. Other changes may be minor and may not affect the design of ERP. The minor changes are cosmetic and / or in presentation, and they are generally at the lower end of the process. The changes are like the field change, the report format modifications, and the computing process and so on.

The advantage of preparing the RDD and a deviation there from is that the users of the ERP get committed to the solution as they have thought the standard requirement provision of the ERP and the deviation required in the provision. In this process, the resistance to change is eliminated, due to direct involvement of the users and the decision makers.

The another distinct advantage of the RDD and the deviation from the RDD, is that it provides the revised specifications clearly to the designer and the developer to bring out the changes required in the design of the ERP. It also further helps to assess the work load arising out of the changed requirement.

As soon as the new RDD is prepared, the process design starts implementing the changes. The moment the changes are required the processes of design coding; testing, etc come into picture for execution. The changes of made, are then tested on a sample data and other steps of unit testing, module testing and system testing for complete integration are taken. After establishing the requirement definition and description (RDD) and mapping it with the standard RDD of the ERP solution, the DRDD (Deviation RDD) is prepared for changes in the solution and implementation.

The implementation steps are given as follows:

1. A user meeting is arranged to explain the ERP and process of implementation.

2. The RDD and the DRDD is explained for understanding and approval.
3. The resource to carry out the changes in the system, generally, known as customization is provided. This could be business specific and customer specific.
4. The DERP (Deviation ERP) solution is tested.
5. The solution on the recommended platform is loaded.
6. The solution is tested on a sample data of substantial nature.
7. The solution is then demonstrated to the users for their understanding and confirmation.
8. The users are trained to run the solution and resolve the difficulties in operations of the system solution.
9. The change over from the manual system to the ERP solution are meticulously planned, taking care of the cut off dates, the opening balances, the data transfer etc.
10. A logbook of the system usage is kept to note down the problems, solutions and modifications carried out to make the solution more efficient and effective.
11. Standard reports like checklists, ledger, trial balance, and sales analysis are taken to confirm the integrity of the ERP solution.
12. The standard documentation of the ERP solution is changed to the changed version of the ERP.
13. The system performance is checked in terms of speed, response, etc. and the ERP solution and / or the hardware is turned for improving the performance of the solution.
14. After three to four months working, a review meeting with the user is conducted, taking the support of the log system for the purpose of improvement, confirmation and finalization of the ERP implementation.

The major hassles in the ERP implementation are due to:

1. The resistance of the users in the acceptance of standard ERP solution.
2. The limited awareness of the users and the appreciation of the Information Technology applications.
3. The ability of the users to change over from the old conventional systems to the technology based new systems.
4. The level of acceptance of the standard business processes incorporated in the system. Lower the acceptance, longer the implementation time, resulting into a loss of efficiency and effectiveness of the solution.
5. A lack of clarity on the business requirement, the customer focus and the strategy of business and its impact on the ERP solution.

6. The ERP implementation is carried out without properly evaluating the business processes and practices through business process reengineering and is preceded by restructuring of the organization.

7. The choice of the ERP solution. Not all the ERP solutions are appropriate for the organization. Each solution has its own peculiarities in terms of design, architecture, and technology, coverage of business scope, functions and features.

Some solutions are good for certain type of business and industry and not for all the businesses and industries.

Ideally, the choice should be based on the ERP fit for the organizations, functions and features. Higher the fit, better is the solution from all angles. If the fit is higher, the customization will be less and the user acceptance will be higher. In short, the implementation cycle would be short.

There is a qualitative change in the MIS design due to the complexity of the business operations and the risk involved in handling the business. The management focus is shifting from the function to the process, i.e., the management requires the information support in the process management and not in the function management.

The MIS is now required to maximize the process productivity and performance. The decision making support is required for the process optimization. The decision models are built across the business management functions. Besides the normal MIS reports required for the top management, the Top Management also needs a set of the additional reports, where the critical business processes and the critical success factors are a focus area.

The ERP solution caters to this requirement very easily. The ERP solution is an integrated solution. The solution operation is seamless, disregarding the hardware or the software platform. The ERP solution takes care of data integrity and consistency across the organization, which may have multiple locations.

In today's competitive world, the shift of decision making is towards strategic management of the business. The ERP solution, due to its scope and coverage, and supported by a variety of tools, enables Strategic Management based on the strategic information for decision making.

The management attention on the focused area is easily possible. The conventional MIS design is more or less embedded in the ERP solution. They provide all the routine reports at any time for the middle management of the organization. The ERP, over and above this, provides executive information for the strategic management of business. It further helps to formulate the strategies to achieve these goals taking its implementation further.

The ERP design provides transparency to the users of information giving them an access to the sensitive information to locate, define and resolve the problems. The ERP enables the work group management efficiently and effectively. The effective uses of the variety of tools, like the data replication, the work flow automation, the EDI/D-mail, the data warehousing, the EIS, the bar coding, and the paging systems are built in ERP. The effective use of these variety of tools also speeds up processing, cuts down the operation cycle time and raises the ability of the management to take decisions.

Once the ERP is built in the organization, it takes care of the data, the information and its storage and, therefore, provides the capability to modify the Management Information System from time to time as per the changing information needs. All the solutions use the client-server architecture in the solution, where the data processing, and the application level processing logic is taken care in the server level giving freedom to the user, as a client, to define the problem and evolve the solution using the front-end tools. The front-end hardware and the tools are so powerful that an individual can develop his own MIS based on his decision making information needs beside the usual MIS like corporate, functional, etc. the decision maker can operate as an individual in isolation from the others, if need be.

The ERP through such an MIS design improves the decision making skills of the individuals very effectively. It provides autonomy in global system operations. With the ERP, the MIS design is more flexible highly decision intensive and efficient. ERP along with other systems becomes an EMS, MIS design uses ERP which in turn uses other systems for inputs in terms of data capture, transaction processing and data base creation, MIS in ERP environment is a sophisticated design serving the needs of the organization.

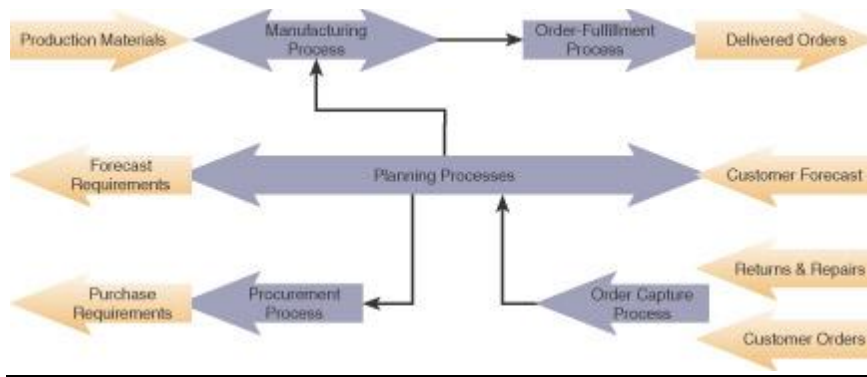


Fig: ERP Process and Information Flow

SELF ASSESSMENT QUESTIONS

Please mark the correct option

- A. Which of the following is(are) the primary inputs into the task of writing and testing new programs?
1. programming plan
 2. database structure
 3. test data
 4. integration requirements
 5. both (a) and (c)
- B. Which of the following is the first phase of the Systems Implementation phase?
1. conduct system test
 2. build and test networks
 3. prepare conversion plan
 4. build and test databases
 5. write and test new programs
- C. Which of the following is(are) the deliverables of the Systems Implementation phase?
1. training materials
 2. functional system
 3. physical design specification
 4. operational system
 5. none of the above

- D. Which of the following is(are) the inputs to the Systems Construction phase?
1. design prototypes
 2. redesigned business processes
 3. physical design specifications
 4. documentation
 5. all of the above
- E. Which of the following is(are) an input process method(s)?
1. smart card
 2. biometric
 3. optical mark
 4. point-of-sale
 5. all of the above
- F. A form used to record data about a transaction is a(n)
1. batch document
 2. source document
 3. on-line document
 4. data entry document
 5. none of the above

10.7 ERP Architecture

Any information system has three basic components, viz., the Data Management, the Application Logic, and the Presentation. These components can be built with the client server role definitions. The client is a user and the server provides the services required by the user to run the system. Since, the information needs are dynamically changing, the architecture required is to separate the data and its management from its application. The user requires the choice of using the data as suits him the most. Hence the application logic has to be separate from the data.

There is also a variability in the manner how the application logic is developed and presented.

The architecture could be a two tier or three tier as shown in Fig.

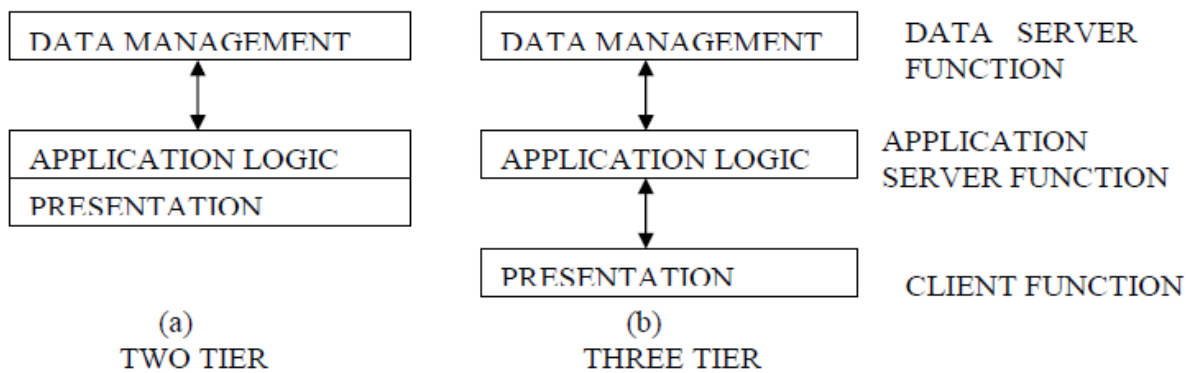


Fig: Client/Server Model Architecture

Since, the ERP is a generic solution for the business operations, in each case of implementation, customization should suit the specifics of the business or customer.

The architecture choice is influenced by this requirement. In a two tier system architecture, there is a rigid division of roles. The datamanagement is by the server and its processing is through the application logic by client.

In this architecture all the requirements are sent to the server by all the users in the network. This affects the load on the server and the response time to the user increase. However, there could be an application which deals with high volume and complex data structure and this approach is more efficient, if response issue is taken care of by the high end multiple CPU and the parallel processing hardware platforms. There could be a case where the user is dumb and is required to use the system in a guided manner with the help assistance. Then the three tier architecture is suitable.

The client uses the GUI (Graphical User Interface) tools for simplicity while the application logic is processed on another machine. In this architecture three distinct roles are defined and three hardware platforms are made responsible to perform.

The servers play two distinct roles of handling the data and the application logic. This logic which deals with the data more is attached to the server platform, where the data is being managed. The logic which deals with the presentation and the specific needs of the user is left to the client platform as shown in Figure.

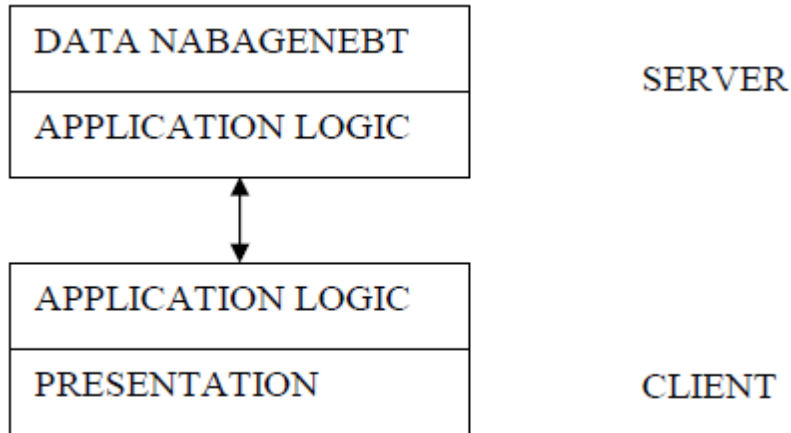


Fig: Client/server Model

It is very difficult to recommend one or the other architecture as the solution to overcome a typical requirement problem. In the choice of architecture, what is important is the user environment and the information needs and how the user handles them?

The best architecture, in a given environment, is the one which is userfriendly, easy to understand and easy to maintain. The technology solutions are available to implement this philosophy.

The ERP solutions are multi-users which are distributed over the organization, spread over to any length. Two main solutions are available to the designer and the implementer of the ERP. One is the Graphical User Interface (GUI) and the Network Management. The GUI is chosen since it allows the customization for a particular business entity. The GUI screens are so developed that the process running across the organization is mapped to the business flows instead of the discrete business functions.

The network is typically the bottleneck in any client/server system. With the application logic, appropriately divided between client and server, it creates a reduced traffic intensity due to GUI interface. Accompanying the network efficiency and the GUI, the ERP solution uses a scalable architecture and a parallel processing technology by installing the suitable server at the required locations. This ensures good performance with a continuous increased load conditions.

For most of the customers, the ERP offers a basic business functionality. However, some users have particular needs for which they want an additional support through the tools or other modules. Most of these requirements are extensions to the basic

business functions. These customer specific needs are met through a popular and a widely used, client/ server tool set.

The business being complex requires a variety of systems to run efficiently. The presence of existing systems is not challenged or minimized by the ERP solution. Infact, most of the ERP solutions use open application program interfaces that enable easy coexistence and integration with the legacy and the third party systems.

The solution also provides the gateways to the popular database which are used in business. The ERP solutions are designed to make the office of the business paperless. It keeps all the business information online. Then, the users use the Work Flow Technology to move the process in a screen format from person to person for the changes, the approvals and the execution. With the multi-media technology, the servers can be configured to keep the business information online in any format, including the text, the spreadsheet, the image audio and the network video.

The solution offers support for the electronic notifications, through the EDI, the E-mail, or the internet to the business partners. For example, you can create a purchase order, get it justified and approved by the authorized person sitting at the other location, attach the engineering drawing to the purchase order by accesses to the CAD system, assemble the documents of the purchase order, and have it sent through the EDI to a vendor located at a distant location without creating any the paper document.

10.8 ERP Solution structure

The Enterprise Resource Planning solution structure is built in three layers namely, technology, business and implementation

Business Operations

On the business side, it provides solution for the data entry, data capture, transaction processing and data base updates. It then supports an analysis of the processed result in single or the multi-dimensions for one period or successive periods. It offers a support on the comparative analysis, The budget versus the actual, the target versus the actual, the target versus the actual, the standard versus the actual and so on. The analysis also throws light on the exception conditions, for immediate attention and action.

The ERP solution provides the decision making capabilities either built-in or through the decision support systems when it comes to implementation. It

providesthe database functionalities for data and information management. It then has thefront end tools to develop the application in an exclusive manner.

The ERP solution then handles the interfacing requirement to the legacy or thethird party systems as a support to the main ERP solution. Using various informationtechnology tools and application development tools, the application logic isdeveloped to the business functionality. The tools are-report writers, interfacing tools,query processing tools, application development tools, the object oriented tools, etc.

Technology

The technology side of the ERP solution is managed through the databasemanagement technology for data acquisition to data base creation, updating, and maintenance. The application development is done through the client/servertechnology, where the servers handle the specific or the general functions as the casemay be and the client play the role of processing interactively and locally for meetingthe information needs. The client/server implementation could be two tier or threetier, based on the design and the implementation strategy. To reduce the developmenteffort and for ease of maintenance, the development approach is an object-orientedapproach, where the class and the object libraries are built for reusability of the objectand its code.

Implementation

The ERP implementation is multi-user and calls for the network usage for the work flow, communication and the access to the database (s) which may be at one locationor distributed. The successful implementation of the ERP calls for a strong technology component appropriate to the environment.

10.9 ERP Model and Modules

The generic ERP package represents the commonly operated business model of theorganization. It is built with the function models like the Finance, Materials,Marketing, Sales, and Personnel and their sub-modules. These modules are then integrated to perform ensuring data and information consistency and concurrency.

The seamless integration of the modules allows the user at any level to take amicro and a macro view of the function and process view of the transaction across thefunction.

A typical ERP solution has the following modules:

- Business forecasting, planning and control (Business)
- Sales, distribution, invoicing (Sales)
- Production planning and control (Production)
- Material management (Material)
- Finance and accounting (Finance)
- Personnel management (Personnel)

10.10 Characteristics of ERP Solution

- Modular structure
- Scalable architecture
- Seamless integration of modules
- RDBMS independent
- Independence of hardware platform
- Interface capabilities
- PC download/ upload facility

Most of the ERP solutions need some changes to suit changes to suit the environment. The Commerce and Corporate Laws differ from country to country and the ERP in such cases need customization to satisfy the local requirement of the business.

The ERP solution has advantages of fast implementation as the design and development is eliminated being a package. Due to object oriented technology and the client server architecture, the changes are easy to make, which are less at the server end and more at the client's end.

Since, it has modular structure; one can implement the solution in a phased manner module by module. It can be implemented first on a smaller scale and expanded subsequently with more users, more locations and more modules as well.

Since the whole solution is a package product, the manufacturer of the package brings out newer versions of the product offering more facilities to the user to improve the utility of the solution.

There are more than a dozen ERP solution available in the market each having its own specialty. Though, they are characterized as described earlier, they differ in feel, look presentation, processing efficiently and user-friendliness.

Some of these products are developed as an application in a particular organization and then turned into a packaged solution. In view of this, some of ERP solution is more useful and efficient in similar organization. The specific industry features have been taken care of more efficiently as customized solutions. Since the design / developer have a choice of RDBMS, front end tools, the interface tools, and so on the package efficiency changes with the choice to tools. Some of these packages run better, if installed on a particular hardware platform; and used by a particular organization. Though tools, technology and approach may be same or similar, the manner in which they are used decides the efficiency of the solutions.

10.11 ERP Selection

Since, the market offer a number of ERP packages, the buyer has a choice to make. Each product has its own USP and differs in a number of ways in content, scope, an ease of implementation, etc. The selection can be made on three dimensions, viz, the vendor, the technology, the solution scope, and architecture.

Vendor Evaluation Factors

1. Business strength of the vendor.
2. Product shares in total business of the vendor.
3. R. & D investment in the product.
4. Business philosophy of the vendor.
5. Future plans of the vendor.
6. Market reach and resource strength of the vendor.
7. Ability to execute the ERP solution.
8. Strength in the other technology knowledge and the ability to use them
9. Perspective plan of the ERP improvement with technology development.
10. Image in the business and in the information technology world.
11. Financial strength of the vendor to sustain and handle the business and technology risk.
12. Organization for product development and support.
13. The global experience of the vendor and commitment to the product for long term.

Technology Evaluation Factors

1. Client server architecture and its implementation-two tier or three tier.
2. Object orientation in development and methodology.
3. Handling of server and client based data and application logic.
4. Application and use of standards in all the phases of development and in the product.
5. Front end tools and back end data based management system tools for the

data, process presentation management.

6. Interface mechanism; Data transfer, real time access, OLE/ODBC compliance.

7. Use of case tool, screen generators, report writers, screen painter and batch processor.

8. Support system technologies like bar coding, EDI, imaging, communication network.

9. Down loading to PC based packagers, MS-Office, lotus notes, etc.

10. Operating system and its level of usage in the system.

11. Hardware-software configuration management.

ERP Solution EvaluationFactor

1. ERP fit for the business of the organization in terms of the functions, features and processes, business scope versus application scope and so on.

2. The degree of deviation from the standard ERP product.

3. Ease of use; Easy to learn, implement and train.

4. The ability to migrate to the ERP environment from present status.

5. Flexible design.

6. The level of intelligent usage of help error messages, dictionaries.

7. The ability for a quick start on implementation.

8. Versatility of the solution for implementation on a platform with the project of saving the investment.

9. Rating on performance, response and integration.

10. Product quality in terms of security, reliability, and precision in results.

11. Documentation for system handling and administration.

12. Product rating in its class of products.

13. Solution architecture and technology.

The methodology of selection will begin first with the study of organization interms of the business focus, critical application, sensitive business process, etc. Since,the ERP solution is a tool to change the style of business management; it requiresthorough understanding of the business, the business issues, the managementcriticalities, and the socio-cultural factors. Such a study will help find out if the ERPis fit for the organization. It is a very important to find out that the ERP is fit or not,as it is the most important and critical success factor.

The price of the ERP package is difficult to judge and often it is a negotiable point in favor of the buyer in competitive scenario. Since the ERP implementation is a two three years project, the ERP solution will sustain and be adequate for the currentand the future business needs for a period of five to seven years. After that,

it would become a platform for the future expansions and growth. It is advisable for the organization to form a committee for selection of the ERP Solution. A strong Information Technology person and a person from corporate planning function. The committee should be headed by a CEO or his designated authority.

This committee should prepare a requirement document spelling out the business goals, and objectives, the futuristic scenario of business, the critical functions, processes, business focus and customer deliverables. A note on the management philosophy, procedures, practices and style will be a valuable input.

When such a document is ready, the selected ERP vendors should be called for seeking the ERP offer. The document should be given to the vendors, and they should be allowed to study the organization and its business. All the vendors should be asked to submit a technical proposal explaining the fit of the ERP to the organization. The submission of the vendors should be scrutinized by the committee for short-listing. The short-listed vendors then should be asked to give the product presentation to the selected group of decision makers to seek their opinion on the product. When the product presentation is over, product demonstration should be arranged, for a detailed security and evaluation. In this process, the committee should confirm whether the critical requirement of business, in terms of information, process handling facilities, features, etc. are available or not. If some of them are not available then there is a possibility of work around to achieve the same result.

A second evaluation note should be made for a comparative analysis of the ERP solutions and then a critical evaluation of this analysis should lead to the choice list. Simultaneously, the committee should gather information on the experience of the other organization where the ERP is implemented. This information should be on how successful the vendor is, in the implementation of the ERP? The strengths and the weaknesses of the vendor, the product and the post sales processes should be ascertained. The choice list should be weighed by these points.

Though such an approach is appropriate, it is not always possible to bring out a clear win in the evaluation, as many factors are intangible in nature. In such an event, the committee should examine the trade off involvement in the selection. It should not happen that organizational issue dominates the choice of the ERP and in the process the best product is rejected. Ideally, the organization should be carrying out business process engineering and reengineering study, restructure the organization, modify the processes functionalities before the ERP decision is made.

Once the committee makes the decision, the vendor should be asked to resubmit the technical and commercial proposal with price and the terms of offer. The proposal should have the following details.

1. Scope of supply.
2. Objectives
3. Modules and deliverables
4. Implementation methodology.
5. Plan and schedules of hardware and software implementation.
6. Resource allocation
7. Responsibility division between the organization and the vendor.
8. Process of implementation
9. Organization of implementation.
10. Progress monitoring and control of the important events
11. Process of resolving the issue all levels
12. The official product literature
13. Association with the other vendor its purpose
14. Commercial submission.
 - Price by module and number of users
 - Payment terms.
15. Process of acceptance of the ERP by stages and linking with the payments.

Once the ERP decision is made, the vendor and organization enter into a legal contract. Such legal contract should list the obligations, duties, responsibilities, deliverables and the value components. It should also include the clauses on issues arising out of unforeseen circumstances and how to resolve them with the legal remedy available to both the parties. Since, the ERP is a product of several technologies, there should be clauses relating to safeguarding the interests of each other to cover the risk arising out of the technology failure.

The ERP is a tool to manage the enterprise resources to achieve the business objective. It is a supporting system and does not solve all the problems of business management. The success of the ERP lies in its implementation with commitment. It requires full participation of the organization. It is to be appreciated as a managerial tool and not as a labor saving device. Since, potentially the ERP is designed for productivity rise, the management must exploit it to its advantage by adopting the best practices or changing the practices through the business process reengineering.

10.12 Summary

The ERP packages build information base and provide knowledge base for planning and control of the business through the business function management. The Interfaced or assisted by the other systems in the organization. These systems may stand alone or from a part of the manufacturing or commercial processing systems.

These systems provide the database to the ERP or support the ERP by the basic data input directly or through the data transfer, for example, the manufacturing system module of the ERP is interfaced with the Drawing, Engineering database for query, viewing and usage of the drawings and it accepts the data of work order by process operations, for costing and for building the standards for the future.

The architecture is client/server and uses object oriented technology for design and development of the system. These packages are RDBMS based with the front end tools.

The key benefit of the ERP is that it provides an integrated solution for all the requirement of the business. It addresses the issue of data integrity, information transparency, seamless integration and information communication. Simultaneously it respects the organizational hierarchy of authority, while conducting the business transactions through the system.

The implementation of most of the ERP packages begin with the enterprise modeling which defines the enterprise structure, the authority function, the processes and the business rules.

The enterprise model is the platform the ERP system implementation. The ERP solutions are available on the Unix Platform and also on Windows NT. The solution is structured in the modular fashion to cover the entire business operation.

10.13Glossary

ERP: Enterprise resource planning is the integrated management of core business processes, often in real-time and mediated by software and technology. ERP is usually referred to as a category of business-management software — typically a suite of integrated applications—that an organization can use to collect, store, manage and interpret data from these many business activities.

Client/Server Model Architecture: The **client–server model** is a distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters, called clients. Often clients and servers communicate over a computer network on separate hardware, but both client and server may reside in the same system. A server host runs one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming requests. Examples of computer applications that use the client–server model are Email, network printing, and the World Wide Web.

10.14References

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Transaction processing systems (TPS) collect and record the routine transactions of an organization. Examples of such systems are sales order entry, hotel reservations, payroll, employee record keeping, and shipping.

10.15 Further Readings

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10.16 Model Questions

1. What is the concept of Enterprise Resource Planning? Why is ERP solution now possible? What role does technology play in ERP implementation?
2. Explain the terms: Seamless integration, MRP, Graphical User Interface, Functionality, Features.
3. What is ERP architecture? What is solution architecture? What is the difference between the two? ERP packages offer standard solutions for business operations. However, some amount of customization is necessary to suit the solution to specific organizations. Explain.
4. Make a small note on ERP package selection for management.
5. Why is implementation effort necessary even though ERP package is chosen?
6. What care should be taken while selecting ERP package?
7. Can you be sure that if ERP solution is implemented, the MIS is in place?
Discuss.
8. Can you say that if ERP is implemented, user needs on information are satisfied? Discuss.

ANSWERS TO SELF ASSESSMENT QUESTIONS

- A. 5
- B. 1
- C. 4
- D. 5
- E. 5
- F. 2