

BCAR-501

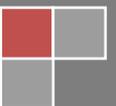
**Business Application and
Introduction to ERP**



Bachelor of Computer Application (BCA)

2024

Business Application and Introduction to ERP



BCAR-501: BUSINESS APPLICATION AND INTRODUCTION TO ERP

SYLLABUS

BLOCK I: INTRODUCTION TO MANAGEMENT INFORMATION SYSTEM (MIS)

- Unit - 1 Concept, Definition, Role, Impact and Importance of Management Information System
- Unit-2 MIS and its Uses, MIS Approaches to Management
- Unit-3 Functions of Manager-Manager and The environment
- Unit-4 Management as a Control System

BLOCK II: TYPES OF INFORMATION

- Unit – 5 Types of information system and Decision Making.
- Unit- 6 Decision support system and its Concepts, Methods and Functions
- Unit- 7 Executive information system, Management Information System (MIS)
- Unit- 8 Transaction Processing System (TPS), Executive support Systems (ES)

BLOCK III: Business Information system

- Unit- 9 Business Information system and Functional Information System
- Unit-10 Marketing Information System
- Unit-11 Personal Information Management Systems (PIMS), Manufacturing Information System, Quality Information System (QIS)

BLOCK IV: Financial, Accounting and Human Resource Information system

- Unit- 12 Financial, Accounting and Human Resource Information system
- Unit-13 Financial, Accounting and Human Resource Information system
- Unit -14 Human Resource Information System

BLOCK V: System Development Life cycle

- Unit-15 System Development Life cycle and System Analysis

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Block 1

INTRODUCTION TO MANAGEMENT INFORMATION SYSTEM (MIS)

Unit – 1 Concept, Definition, Role, Impact and Importance of Management Information System.

Unit - 2 MIS and its Uses, MIS Approaches to Management

Unit - 3 Functions of Manager-Manager and The environment

Unit - 4 Management as a Control system

Unit - 1

INTRODUCTION TO MANAGEMENT INFORMATION SYSTEM (MIS)

Overview

Learning objectives

1.1 Introduction to MIS

1.2. Meaning of MIS

1.3. Definition of MIS

1.4. Structure and pillars of Management Information System (MIS)

1.5 Concept of Management Information System (MIS)

1.6 Role of Management Information System (MIS)

1.7 Impact of Management Information System (MIS)

1.8 Objectives of Management Information System (MIS)

1.9 Importance of Management Information System (MIS)

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your Progress

Overview

In this unit, we will learn about meaning and Definition of Management Information System Management, Structure and pillars of Management Information System (MIS), Concept of Management Information System (MIS), Role of Management Information System (MIS) Impact of Management Information System (MIS), Objectives of Management Information System (MIS) and Importance of Management Information System (MIS).

Learning Objectives

At the end of this unit you will be able to understand

- Meaning and Definition of Management Information System Management,
- Structure and pillars of Management Information System (MIS),
- Concept of Management Information System (MIS) ,
- Role of Management Information System (MIS)
- Impact of Management Information System (MIS),
- Objectives of Management Information System (MIS)
- Importance of Management Information System (MIS)

1.1 Introduction to MIS

Introduction

A **Management Information System (MIS)** is a systematic organization and presentation of information that is generally required by the management of an organization for taking better decisions for the organization. The MIS data may be derived from various units of the organization or from other sources.

A **Management Information System (MIS)** is a system that provides the information necessary to manage an organization effectively. MIS and the information it generates are considered essential components of prudent and reasonable business decisions.

1.2 Meaning of MIS

A management information system (MIS) is a computer system of hardware and software that acts as the foundation for an organization's operations. An MIS collects data from various online systems to support management decision-making, analyses the information, and reports data.

In an organization, it is utilized for information coordination, control, analysis, and visualization. People, procedures, and technology are all involved in studying management information systems in an organizational setting. It provides businesses and organizations with technology that facilitates communication and information flow, assisting in issue-solving and giving an organization a competitive edge.



Figure 1.1. MIS

1.3 Definition of MIS

“Management Information System (MIS) is an integrated man/machine system for providing information to hold up the operations, management and decision making functions in an organization”- **G.B. Davis.**

“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 organisational operations for the purpose of achieving the organisational goals”

- I. Kennevan

“A Management Information System is an organized portfolio of formal systems for obtaining, processing, and delivering information in support of the business operations and management of an organization”
- **Zwass (1992)**

1.4 Structure and pillars of Management Information System (MIS)

Management Information System (MIS) is one of the five major Computer Based Information Systems (CBIS). Its purpose is to meet the general information needs of the managers in firm or organization. MIS is a computer based system that makes information available to users with similar needs.

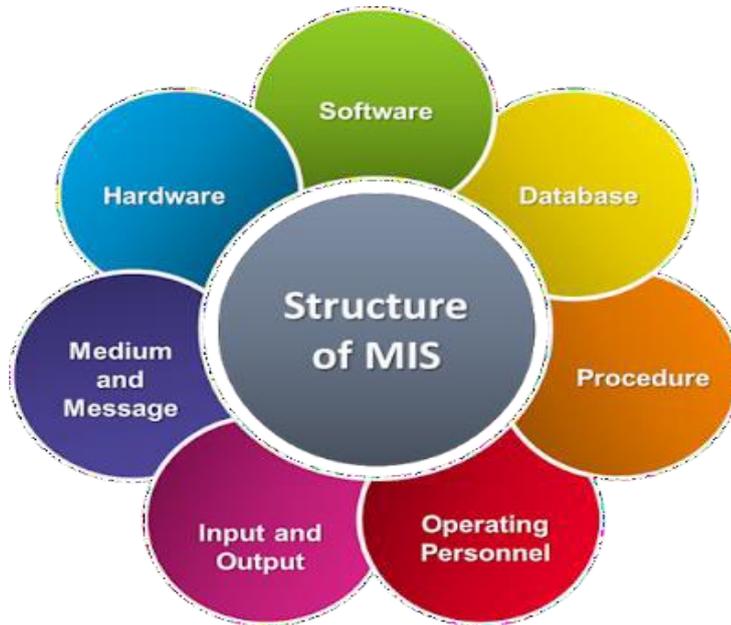


Figure 1.2. Structure of Management Information System

Management Information System (MIS) consists of following **three pillars**: Management, Information, and System. These are explained as following below.

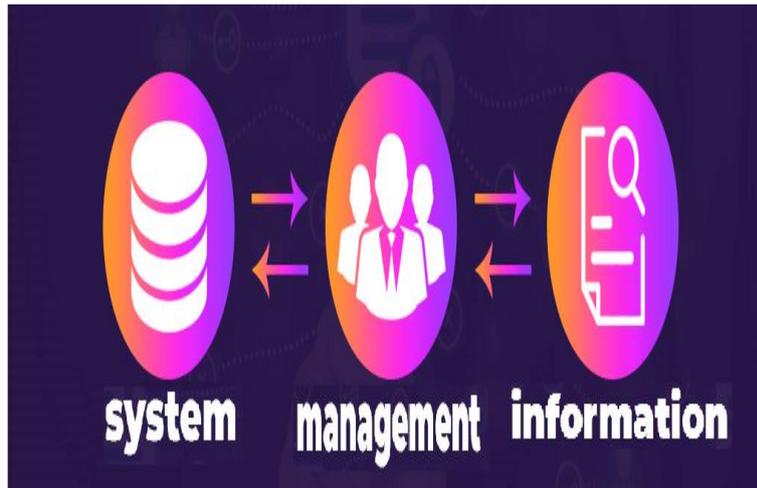


Figure 1.3. Pillars of Management Information System

Management: Art of getting things done through and with the people of in formally organized groups. Managerial functions:

- (i) Planning
- (ii) Organizing
- (iii) Staffing
- (iv) Directing
- (v) Controlling

Information: data that have a meaning with a context, where data is raw facts about an entity (entity is the object of interest).

System: set of inter-related components with a clearly defined boundary working together to achieve a common goal.

1.5 Concept of Management Information System (MIS)

Management Information System (MIS) is the use of information technology, people, and business processes to record, store and process data to produce information that decision makers can use to make day to day decisions.

The concept of Management Information Systems (MIS) has evolved over a period of time comprising many different facet of the organizational function. MIS is a necessity in all the organizations. The initial concept of MIS was to process the data available in the organization and present it in the form of reports at regular intervals. The system was largely capable of handling the data from collection to

processing. It was more impersonal, requiring each individual to pick and choose the processed data and use it for his requirements.

The concept of Management Information System (MIS) in today's world is a system which handles the databases, provides computing facilities to the end user and gives a variety of decision making tools to the user of the system and also enables the citizens / beneficiaries to use the MIS from external source and connect with organization. The concept of MIS gives high regard to the individual and his ability to use information. Management Information System (MIS) gives information through data analysis. While analyzing the data, it relies on many academic disciplines. These include the theories, principles and concepts from the Management Science, Psychology and Human Behaviour, making the Management Information System (MIS) more effective and useful. These academic disciplines are used in designing the MIS, evolving the decision support tools for modelling and decision making.

The foundation of Management Information System (MIS) is the principles of management and its practices. The concept of management Information System can be evolved for a specific objective if it is evolved after systematic planning and design. It calls for an analysis of a business, management views & policies, organization culture and the management style. Information should be generated in this setting and must be useful in managing the business. This is possible only when it is conceptualized as a system with an appropriate design. MIS, therefore, relies heavily on the systems theory and offers solutions to handle the complex situations of the input and output flows. It uses theories of communication which helps to evolve a system design capable of handling data inputs, process, and outputs with the least possible noise or distortion in transmitting the information from a source to a destination. It uses the principles of system Design, Viz., an ability of continuous adjustment or correction in the system in line with the environmental change in which the MIS operates. Such a design help to keep the MIS tuned with the business managements needs of the organization.

1.6 Role of Management Information System (MIS)

Information system and information technology is a vital component of any successful business and is regarded as a major functional area like any other functional area of a business organization like marketing, finance, production, human resources (HR) etc. Information systems play following 3 vital roles for a business organisation:

- Supports the business processes and operations of an organisation.
- Support of decision making by employees and managers of an organisation.
- Support the strategies of an organisation for competitive advantage.

The role of Management Information System (MIS) in an organization can be compare 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 work faster and supplies more blood when needed. It regulates and controls the incoming impure blood, processed it and sends it to the destination in the quantity needed. It fulfils the needs of blood supply to human body in normal course and also in crisis.

The Management Information System (MIS) plays exactly the same role in the organization. The system ensures that an appropriate data is collected from the various sources, processed and send further to all the needy destinations. The system is expected to fulfil the information needs of an individual, a group of individuals, the management functionaries: the managers and top management.

A management information system (MIS) plays an important role in business organizations.

What is MIS role: There are many roles of MIS and some of the important.

MIS role are discussed below:

1. Decision making
2. Coordination among the department
3. Finding out Problems
4. Comparison of Business Performance
5. Strategies for an Organization

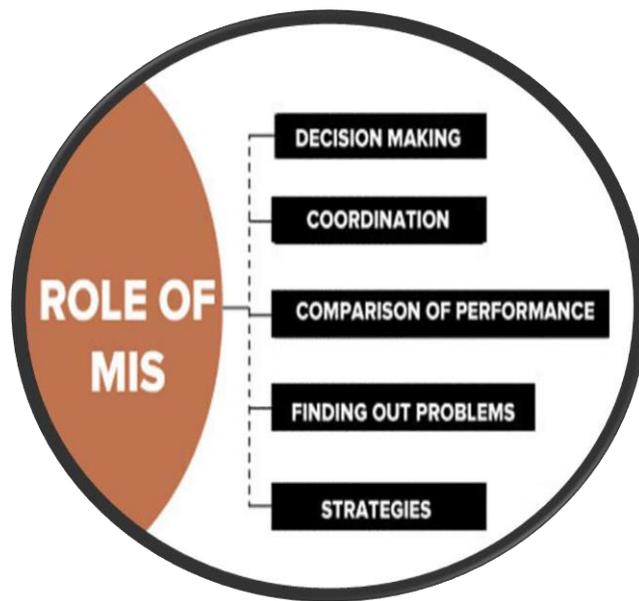


Figure 1.4. MIS role

- **Decision making**

Management Information System (MIS) plays a significant role in the decision-making process of any organization. In any organization, a decision is made on the basis of relevant information which can be retrieved from the MIS.

- **Coordination among the department**

Management Information System satisfies multiple need of an organization across the different functional department.

- **Finding out Problems**

As we know that MIS provides relevant information about every aspect of activities. Hence, if any mistake is made by the management then MIS, information will help in finding out the solution to that problem.

- **Comparison of Business Performance**

MIS store all past data and information in its Database. That why the management information system is very useful to compare business organization performance.

- **Strategies for an Organization**

Today each business is running in a competitive market. An MIS supports the organization to evolve appropriate strategies for the business to assent in a competitive environment

1.7 Impact of Management Information System (MIS)

Management Information System (MIS) plays a very important role in the organization; it creates an impact on the organization's functions, performance and productivity.

The impact of Management Information System on the functions is in its management with a good Management Information System, supports the management of marketing, finance, production and personnel becomes 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 activity and the targets. The manager is kept alert by providing certain information indicating and probable trends in the various aspects of business. This helps in forecasting and long-term perspective planning. The manager's attention is bought to a situation which is expected in nature, inducing him to take an action or a decision in the matter. Disciplined information reporting system creates structure 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 by blending and analysis, saving the manager's valuable time.

The Management Information System (MIS) creates another impact in the organization which relates to the understanding of the business itself. The Management Information System begins with the definition of 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 Management Information System (MIS) calls for a systematization of the business operations for an effective system design. This leads to streamlining of the operations which complicates the system design. It improves the administration of the business by bringing a discipline in its operations as everybody is required to follow and use systems and procedures. This process brings a high degree of professionalism in the business operations.

The goals and objectives of the Management Information System (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 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 modelling. 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 simple. The impact is on the managerial ability to perform. It improves decision-making ability considerably high.

Since, the Management Information System (MIS) work on the basic system such as transaction processing and database, the drudgery of the clerical work is transferred to the computerized system, relieving the human mind for better work. It will be observed that lot of manpower is engaged in this activity in the organization. Seventy (70) percent of the time is spent in recording, searching, processing and communicating. This MIS has a direct impact on this overhead. It creates information –based working culture in the organization.

1.8 Objectives of Management Information System (MIS)

Objectives of MIS

MIS has five major objectives which include:

1. Data Capturing
2. Processing of Data
3. Storage
4. Retrieval
5. Dissemination

1. Data Capturing

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

2. Processing of Data

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

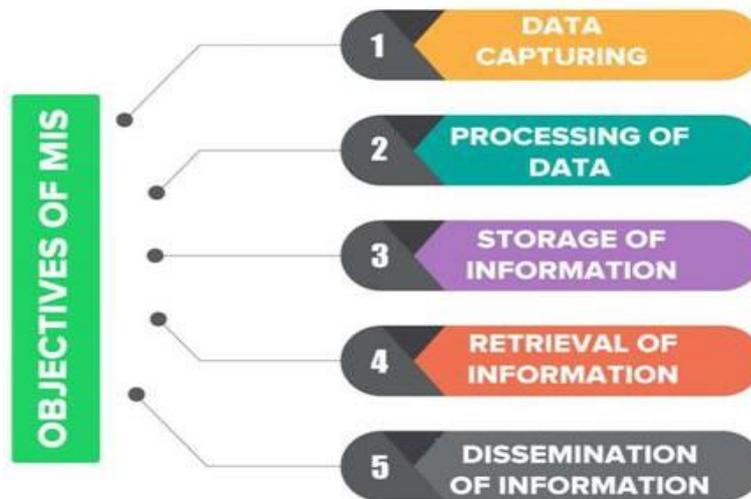


Figure 1.5. Objectives of MIS

3. 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.

4. Retrieval of Information

MIS retrieves information from its stores as and when required by various users.

5. 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 a computer terminal.

1.9 Importance of Management Information System (MIS)

❖ Data Capturing:

MIS captures data from various internal and external sources of an organization. Data capturing may be manual or through computer terminals. End users, typically record data about transactions on some physical medium such as paper form or enter it directly into a computer system.

❖ Processing of data:

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

❖ Storage of information:

MIS stores processed or unprocessed data for future use. If any information is not immediately required, it is saved as an organizational record. In this activity, data and information are retained in an organized manner for later use. Stored data is commonly organized into fields, records, files and databases.

❖ Retrieval of information:

MIS retrieves information from its stores as and when required by various users. As per the requirements of the management users, the retrieved information is either disseminated as such or it is processed again to meet the exact demands.

❖ Dissemination of MIS:

Management information, which is a finished product of MIS, is disseminated to the users in the organization. It could be periodic, through reports or on-line through computer terminals.

Let Us Sum Up

In this unit, we dealt about the Meaning, Definition, Role and Importance of Management Information System (MIS)

Check Your Progress

1. ___ is an organized portfolio of formal systems for obtaining processing and delivering information in support of the business operations and management of an organization.
2. _____ technology includes computers hardware, software, database management systems, and data communication system.
3. MIS is both an area of _____ and a _____ of scholarly inquiry.
4. _____ is the general transformation cycle for information?
5. Information systems that support the business functions that reach out to suppliers are known as_____.
6. What is MIS?
7. What is data capturing?

Glossaries

MIS : Management Information System

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

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

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Suggested Readings

1. <https://mays.tamu.edu/department-of-information-and-operations-management/management-information-systems/>
2. <https://eller.arizona.edu/departments-research/schools-departments/mis/what-is-mis>.

Answers to Check Your Progress

1. MIS
2. Information
3. Design, diagnosis
4. Data to information to knowledge.

5. Back-office information systems
6. A management information system (MIS) is a computer system of hardware and software that acts as the foundation for an organization's operations. An MIS collects data from various online systems to support management decision-making, analyses the information, and reports data.
7. Data Capturing:

MIS captures data from various internal and external sources of an organization. Data capturing may be manual or through computer terminals. End users, typically record data about transactions on some physical medium such as paper form or enter it directly into a computer system.

Unit - 2

MIS and its Uses, Approaches to management

Overview

Learning objectives

2.1 Management Information System and its Functions

2.2 Characteristics of Management Information System (MIS)

2.3 The need for Management Information System (MIS)

2.4 Components of Management Information System (MIS)

2.5 Uses of Management Information System (MIS)

2.6 Challenges of Management Information System (MIS)

2.7 Advantages of Management Information System (MIS)

2.8 Disadvantages of Management Information System (MIS)

2.9 MIS - Approaches to Management

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Overview

In this unit, we will learn about Management Information System and its Functions, Characteristics of Management Information System (MIS) the need for Management Information System (MIS) Components of Management Information System (MIS) Uses of Management Information System (MIS) Challenges of Management Information System (MIS) Advantages of Management Information System (MIS) Disadvantages of Management Information System (MIS).

Learning Objectives

At the end of this unit you will be able to understand

- Characteristics of Management Information System (MIS).
- Components of Management Information System (MIS)
- Challenges of Management Information System (MIS)
- Uses of Management Information System (MIS)

2.1 Management Information System and its Functions

- **To improve decision-making:** MIS helps management by providing background information on a variety of issues and helps to improve the decision-making quality of management. The fast and accurate information supplied by MIS is leveraged by the managers to take quicker and better decisions thereby improving the decision-making quality and adding to the bottom line of the company.
- **To improve efficiency:** MIS helps managers to conduct their tasks with greater ease and with better efficiency. This reflects in better productivity for the company.
- **To provide connectivity:** MIS provides managers with better connectivity with the rest of the organization.

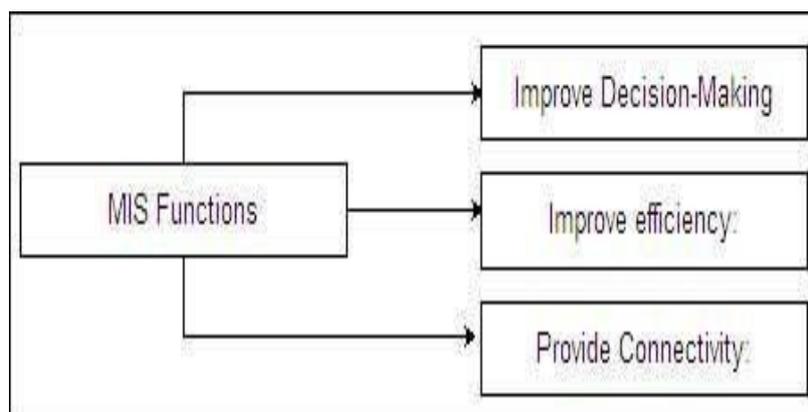


Figure 2.1.MIS Factions

2.2 Characteristics of Management Information System (MIS)

Management information being a specialized information system conforms to certain characteristics. These characteristics are generic in nature. These characteristics remain more or less the same even when the technology around such management information system changes.

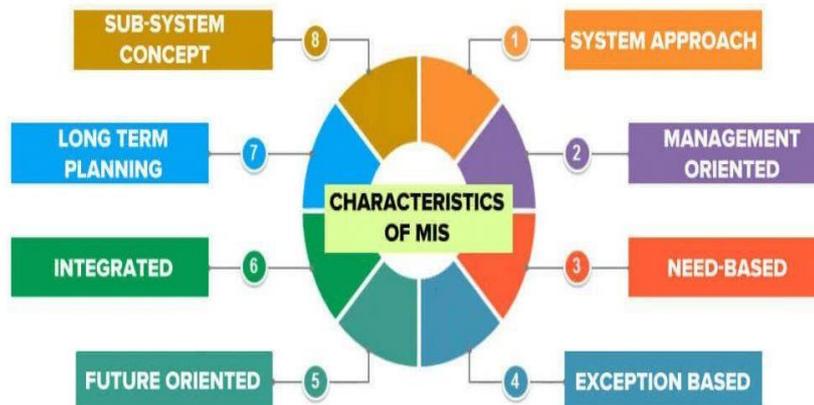


Figure 2.2. Characteristics of Management Information System

- **Management oriented**

One important feature of MIS is that MIS is designed top-down. This means that the system is designed around the need felt by the management at different levels for information. The focus of the system is to satisfy the information needs of management.

- **Management directed**

Since MIS is 'for the' management it is imperative that it also should have a very strong 'by the' management initiative. Management is involved in the designing process of MIS and also in its continuous review and up gradation to develop a good qualitative system. The system is structured as per directions factored by management. This helps in minimizing the gap between expectations of management form the system and the actual system.

- **Integrated**

MIS is an integrated system. It is integrated with all operational and functional activities of management. This is an important characteristic and- requirement for a system to qualify as MIS. The reason for having an integrated system is that information in the managerial context for decision-making may be required from different areas from within the organization. If MIS remains a collection of isolated systems and each satisfying a small objective, then the integrated information need of managers will not be fulfilled. In order to provide a complete picture of the scenario, complete information is needed which only an integrated system can provide.

- **Common data flows**

Through MIS the data being stored into the system, retrieved from the system, disseminated within the system or processed by the system can be handled in an integrated manner. The integrated approach towards data management will result in avoiding duplication of data, data redundancy and will help to simplify operations.

- **Strategic planning**

MIS cannot be designed overnight. It requires very high degree of planning which goes into creating an effective organization. The reason for this kind of planning is to ensure that the MIS being built not only satisfies the information need of the managers today but can also serve the organization for the next five to ten years with modifications. Sometimes when the planning part is done away with, systems tend to perform well in the present but they tend to become obsolete with time. Planning helps to avoid this problem.

- **Need-Based**

MIS design and development should be as per the information needs of managers at different levels, strategic planning level, management control level and operational control level. In other words, MIS should cater to the specific needs of managers in an organization's hierarchy.

- **Exception Based**

MIS should be developed on the exception-based reporting principle, which means an abnormal situation, i.e. the maximum; minimum or expected values vary beyond tolerance limits. In such situations, there should BE exception reporting to the decision-maker at the required level.

- **Future Oriented**

Besides exception-based reporting, MIS should also look at the future. In other words, MIS should not merely provide past or historical information; rather it should provide information, on the basis of projections based on which actions may be initiated.

- **Long Term Planning**

MIS is developed over relatively long periods. Such a system does not develop overnight. A heavy element of planning is involved. The MIS designer must have the future objectives and needs of the company in mind.

- **Sub-System Concept**

The process of MIS development is quite complex and one is likely to lose insight frequently. Thus, the system, though viewed as a single entity, must be broken down into digestible sub-systems which are more meaningful at the planning stage.

- **Central Database**

A central database is a mortar that holds the functional systems together. Each system requires access to the master file of data covering inventory, personnel, vendors, customers, etc. It seems logical to gather data once, validate it properly and place it on a central storage medium, which can be accessed by any other subsystem.

- **Bias towards centralization**

MIS is required to give 'one version of the truth', i.e., it must supply the correct version of the latest information. There is a

requirement for the data repository to be centralized. Centralized data management helps MIS to exercise version control as well as provide an integrated common view of data to the managers. In a non-centralized system, data will get entered, updated and deleted from the system from different locations. In such a case it becomes difficult to provide correct information to managers.

For example, in a decentralized System if a person superannuates from an organization and his superannuating is only recorded in the human resource system but not communicated to the finance department system, then it is quite likely that his salary may be generated by the finance system for the next month. A centralized system where data is entered, updated and deleted from only one location does not suffer from such problems. In a centralized system, the superannuating employee's details are deleted from the master file from which all departments' access data, thereby eliminating the risk of generating his salary for the next month.

2.3 The need for Management Information System (MIS)

The following are some of the justifications for having a Management Information System.

- ❖ Decision makers need information to make effective decisions. Management Information Systems make this possible.
- ❖ To facilitate communication within and outside the organization – employees within the organization are able to easily access the required information for the day to day operations. Facilitates such as Short Message Service (SMS) & Email make it possible to communicate with customers and suppliers from within the MIS system that an organization is using.

- ❖ Record keeping – management information systems record all business transactions of an organization and provide a reference point for the transactions.

2.4 Components of Management Information System (MIS)

The major components of a typical MIS long-form (Management Information System) are:

- **People** – people who use the information system
- **Data** – the data that the information system records
- **Database:** It is used to store data or information that an organization uses.
- **Business Procedures** – procedures put in place on how to record, store and analyze data
- **Hardware** – these include servers, workstations, networking equipment, printers, etc.
- **Software** – these are programs used to handle the data. These include programs such as spreadsheet programs, database software, etc.
- **Database management system.** It is a collection of programs that enable the storage, modification and manipulation of information from a database.
- **User-interface:** Allows the user to interact with the system
- **Model base:** It has the required statistical models in order to analyze the large amount of data.

2.5 Uses of Management Information System (MIS)

It allows real-time performance reports

By receiving performance reports in real-time, the organisation can become more dynamic in its operations. Its employees may be able to discover and respond to opportunities more quickly. They may also be able to detect potential threats and find appropriate solutions to avoid or minimise them. Additionally, when everyone is better-informed about the

business operations and long-term results, their work productivity may improve.

It generates analytical reports

The principal function of MIS is to organise and analyse data and use it to generate informative reports. With these reports, the organisation's management can monitor its performance and identify new business opportunities. They can formulate plans to improve the organisation's processes and increase its production efficiency.

It compares projections and performances

Organisations regularly set business goals and make business and financial forecasts, but they need to monitor their effectiveness. For that, they must compare them with actual performances. An MIS facilitates performance reviews and accurate comparisons with the projections. That can enable the management to make better business decisions.

It aids the work allocation process

With an MIS information system, the organisation's management can make better decisions concerning the allocation of staff and resources. They can review the performance reports of individual employees and departments and identify the best performers. To enhance work productivity and get better business results, they can transfer the best employees to the high-performing departments. They can also arrange for training programmes to improve the performances of the employees and departments that have not been doing as well.

It improves internal communication

It can facilitate communication between different employees and departments of the organisation. They can share relevant and timely business information, particularly about interdepartmental work. That can prevent work delays or misuse of resources due to any

misunderstanding or lack of discussion. For instance, when two departments require different parts or materials that the organisation must order from a foreign supplier, it is more convenient and economical to place an order together, rather than separate orders that could cause delays in arrival.

2.6 Challenges of Management Information System (MIS)

What is MIS Challenges: There are three major challenges of MIS: high cost, training of employees and maintenance cost. These are briefly discussed below:

1. High Cost
2. Training of Employee
3. Maintenance Cost

1. High Cost

Development of new computerized based information system is a problem for the organization due to the cost factor and it creates problems because with the change of time there is need of up-to-date of the information system.

2. Training of Employee

Employees should have the capacity of learning of the information system with the changing competitive and business environment; otherwise it will be difficult for the organization to stay in the market.

3. Maintenance Cost

Sometimes a problem arises due to server crash and website crash. Sometimes it leads to the loss of information. So, maintenance cost is needed to tackle the above problem.

2.7 Advantages of Management Information System (MIS)

A good management information system can be used not only for the storage of electronic data alone but must be able to support the analysis required by management. There are many advantages of MIS which are utilised by manager to achieve organization goal.

- ❖ Improves quality of an organization or information content by providing relevant information for sound decision making.
- ❖ Management Information System change large amount of data into summarize form and thereby avoid confusion which may an answer when an information officer are flooded with detailed fact.
- ❖ Management Information System facilitates integration of specialized activities by keeping each department aware of problem and requirements of other departments.
- ❖ Management Information System serves as a link between managerial planning and control. It improves the ability of management to evaluate and improve performance.
- ❖ Increased customer satisfaction
- ❖ Improved quality and quantity management decisions
- ❖ Improved responsiveness number of the competitor's condition
- ❖ Improved operational efficiency and flexibility
- ❖ Improved quality of internal and external communications
- ❖ Improved quality of planning
- ❖ Improved quality control and supervision

2.8 Disadvantages of Management Information System (MIS)

Even though MIS has many benefits but it also has its limitations. Limitations of MIS are discussed below:

- Too rigid and difficult to adapt.
- Resistance in sharing internal information between departments can reduce the effectiveness.
- Hard to quantify benefit to justify implementation of Management Information System.
- Quality of output of an Management Information System is directly proportional to quality of input and processes.

- While MIS may solve some critical problems but it is not a solution to all problems of an organization.
- It cannot meet the special demands of each person.
- MIS if designed in an improper manner does not serve the management and hence is of little relevance.
- The MIS is not good if the basic data is obsolete and outdated.
- Mostly information provided by the MIS is in quantitative form. Hence, it ignores the qualitative information like the attitude of an employee.

2.9 MIS - Approaches to Management

The systems approach is an old concept. The approach stands on the assumption that breaking down of a complex concept into simple easy to understand units helps in better understanding of the complexity. Ludwig von Bertalanffy first proposed the systems approach under the name of 'General System Theory'.

Even though he had orally created the notion of the general systems theory in the 1940's he formally published it in 1968 (Ludwig von Bertalanffy 1968). He introduced system as a new scientific philosophy and defined it in a formal manner. He noted that most systems (biological or physical) of any practical relevance are open as they interact with the environment. Therefore, to understand the system it has to be differentiated from the environment, i.e., the boundary of the system has to be clearly defined along with its interaction with the environment from within this boundary.

The approach concentrates on the holistic entity of the system without neglecting the components. It attempts to understand the role each component plays in the system while simultaneously understanding the activity of the whole system. Major concepts of the systems approach are:

1. **Holism:** A change in any part/component of a system affects the whole system directly or indirectly (Boulding 1985, Litterer 1973, von Bertalanffy 1968).

2. **Specialization:** A whole system can be divided into granular (smaller easy to understand), components so that the specialized role of each component is appreciated.
3. **Non-summational:** Every component (subsystem/partial system) is of importance to the whole. It is therefore essential to understand the actions of each component to get the holistic perspective (Boulding 1985, Litterer 1973).
4. **Grouping:** The process of specialization can create its own complexity by proliferating components with increasing specialization. To avoid this it becomes essential to group related disciplines or sub-disciplines.
5. **Coordination:** The grouped components and sub components need coordination. Without coordination the components will not be able to work in a concerted manner and will lead to chaos. Coordination and control is a very important concept in the study of systems as without this we will not be a unified holistic concept.
6. **Emergent properties:** This is an important concept of systems approach. It means that the group of interrelated entities (components) has properties as a group that is not present in any individual component. This is the holistic view of a system. For example, multicellular organisms exhibit characteristics as a whole which are not present in individual constituent parts like cells.

Approaches of MIS Development

Here, we are going to learn about the approaches of MIS development with suitable diagram.

- **MIS development** is a strategic process of developing an informative information system for a company. To do this, many experts from different levels of a system sit together and investigate and examine a feasible approach to MIS development. An approach is a method of developing a system in such a way so that it can be designed as per system needs and meets all the system objectives.

MIS (Management Information System) is an important source of information for an organization. An approach of MIS development offers some significant facts for the organizations that influence each approach. MIS approaches to distinguish between each other; organizations are using an appropriate MIS development approach as per their need.

There are 3 different types of MIS

1. Top-down approach
2. Bottom-up approach
3. Integrative approach

1) Top-down Approach

In this method, the entire system is partitioned into a hierarchy of subsystems. The overall system is divided into a number of subsystems, which are then divided into a number of other subsystems in a top-down approach.

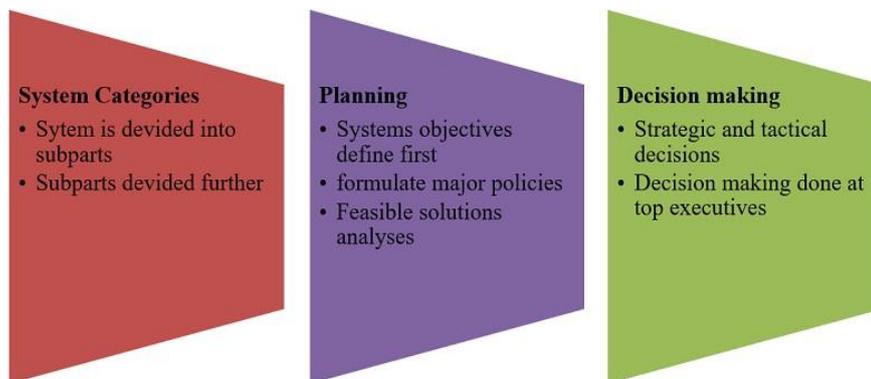


Figure 2.3: Key activities involves in Top-down approach

A behavioural classification is used in the top-down approach of MIS development. This approach also defines the strategic and tactical decisions and the necessary decisions to operate the various key activities of MIS development. Many of them, strategies, goals, and plans are recognized by top management executives and conveyed to the administrative management levels.

The key objectives of the systems are established and ways to achieve them are decided in top-down design. They're gradually pushed down the organizational hierarchy to be created and defined well.

2) Bottom-up Approach

As its name implies, this approach mainly starts with the leaf-level or bottom-most management and proceeds progressively to the upper management levels. After recognizing the primary transactions, the needed file requirements and information processing programs are developed for each life stream system which is then moved towards data integration that is stored in different files of the information system. A bottom-up approach is functional to identify the various factors and understand the difficult situations and formulate strategies to deal with them.

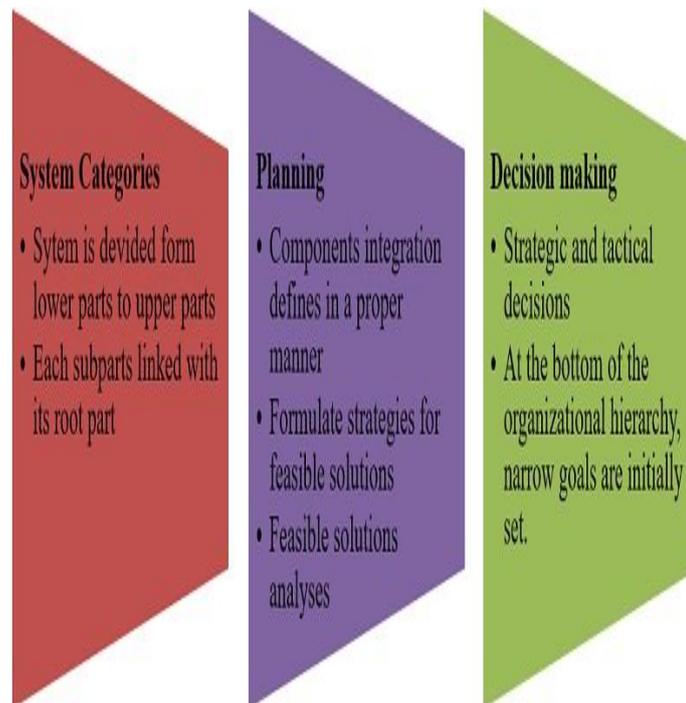


Figure 2.4: Key activities involves in Top-down approach

3) Integrative Approach

In the integrative approach subsystems of a system are integrated with each other in such a way so that the objective of the system can be fulfilled.

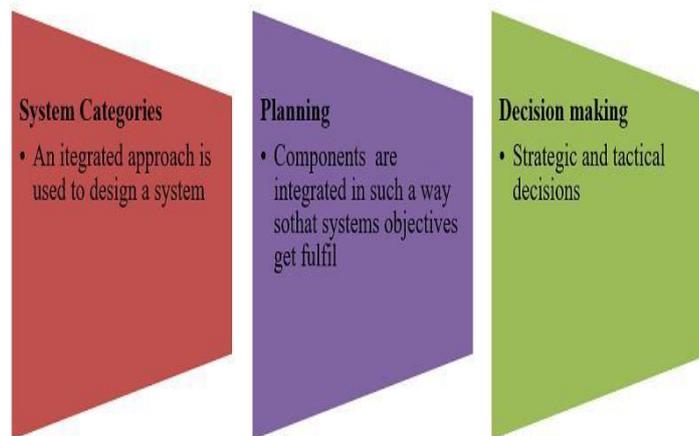


Figure 2.5. Key activities involves in integrative approach

An integrative approach of a system development may consist of followings -

- Design a system that can be achieving the major objectives of the system using its subsystems.
- Designing a system that combines the various functions performed by its subsystems.
- Designing a system that is not very clear to the user but is concealed under the previously existing subsystems.

Managers at all levels can control the design using an integrated approach. Top management determines the structure and design of MIS that is appropriate for the business.

Let Us Sum Up

In this unit, we dealt about the Characteristics of Management Information System (MIS), **The** need for Management Information System (MIS), Components of Management Information System (MIS), Uses of Management Information System (MIS), Challenges of Management Information System (MIS), Advantages of Management Information System (MIS) and Disadvantages of Management Information System (MIS) .

Check Your Progress

1. MIS is normally found in _____sector.
2. The Management Information System receives input from the _____.
3. _____ is an important factor of a management information system.
4. Management information system is _____human-machine based system.
5. What is hardware?
6. What is the meaning of software?
7. Write in detail about the DBMS.

Glossaries

Keywords	Explanation
Integrative Approach	In the integrative approach subsystems of a system are integrated with each other in such a way so that the objective of the system can be fulfilled.
Non-summation	Every component (subsystem/partial system) is of importance to the whole. It is therefore essential to understand the actions of each component to get the holistic perspective (Boulding 1985, Litterer 1973).

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Instructions

Instructions to Study:

- Learn The need for Management Information System (MIS),
- Learn Components of Management Information System (MIS),
- Learn Uses of Management Information System (MIS),
- Learn Advantages and disadvantages of Management Information System (MIS)

Suggested Readings

1. <https://www.geektonight.com/what-is-mis/>
2. <https://finance-notes.com/advantages-and-disadvantages-of-management-information-systems/>

Answers to Check Your Progress

1. Manufacturing Sector
2. TPS
3. System
4. An integrated
5. **Hardware** – these include servers, workstations, networking equipment, printers, etc.
6. **Software** – these are programs used to handle the data. These include programs such as spreadsheet programs, database software, etc.
7. **Database management system.** It is a collection of programs that enable the storage, modification and manipulation of information from a database.

Unit - 3

Functions of Manager, Manager and the environment

Overview

Learning objectives

Functions of a Manager

Various Challenges of a Manager

Information Systems Manager Skills

How to become an information systems manager

Environmental manager skill

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Functions of a Manager, Various Challenges of a Manager, Information Systems Manager Skills' How to become an information systems manager and Environmental manager skill

Learning Objectives

At the end of this unit you will be able to understand

- Learn Functions of a Manager,
- Learn Various Challenges of a Manager,
- Learn Information Systems Manager Skills
- Learn How to become an information systems manager and
- Learn Environmental manager skill.

3.1 Functions of a Manager

Functions of a manager are the various roles played by the manager in an organization. A manager is accountable for all the happenings in the firm and is answerable to the management. The seven major roles played by the manager are –

- Planning
 - Organizing
 - Staffing
 - Directing/leading
 - Coordinating
 - Reporting
 - Budgeting
 - Controlling
-
- **Planning** – The basic step required for any project, big or small, is the planning stage. The manager needs to plan the schedule and give the blueprint of how the task is to be done with all the necessary details, and also the manager should have a backup plan that if this doesn't work then what next. **Example** – There is a new project, how to start, human resource required, resources required, etc., everything should be planned.
 - **Organizing** – Next comes the organizing part, where the manager needs to synchronize and have to make sure everything is going according to the plan. Everything should work as per the plan, and if not then the manager needs to look into the issue and make it work as planned. **Example** – A software tester is required, so organize the venue, date and time to interview those eligible for the post.
 - **Staffing** – In simple words, staffing means grouping of people into different teams and allotting different tasks to them. If the team members have some disputes then the team member needs to report to the team leader who will forward it to the manager and the issue will be taken care of. **Example** – Assembling a new team for a new project.

- **Directing/Leading** – It is a manager’s responsibility to guide the employees in all situations in order to avoid conflicts and delay in the task. Manager has to lead the employees so that they can get a clear idea about what is to be done and how to do it. **Example** – a team needs a team leader to look after each task that is accomplished, in-process, or aborted.
- **Coordinating** – It means bringing all the employees together by forming an efficient relationship and making them feel comfortable to share their views and issues freely. **Example** – Coordinating the schedule for a project.
- **Reporting** – The manager has to keep updated information about all the ongoing tasks, and it is the sole responsibility of the manager to report the updated status to the higher authorities; while all the employees are bound to report to the manager. **Example** – Keeping the respective directors informed about the progress on their respective projects.
- **Budgeting** – A task has to be completed within the given time frame as well as it should be cost efficient. The manager needs to be double sure that all the amount invested in the project doesn’t exceed the budget given and in case of imbalance, the budgeting manager has to report to the management. **Example** – If budget allows to place three employees then five employees cannot be assigned for the task.
- **Controlling** – Last but of course not the least role played by the manager is having everything under control. Whether it is the budget, or resource allocation, everything should be in order. **Example** – All members of a team cannot be granted leave on the same day, as it affects work delivery.

3.2. Various Challenges of a Manager

We have seen the different roles a manager as to play in order to maintain the workflow balance in an organization. With all these responsibilities, there are some tough challenges a manager has to deal with while trying to balance everything. Following are some challenges a manager has to deal with –

- **Managing workforce diversity** – Manager shouldn't create or encourage discrimination among employees. Employees from different background, culture, and ethnicity should be treated as equal and rewards should be given only on the basis of work.
- **Improving quality and productivity** – It is the sole responsibility of the manager to increase the productivity without hampering the quality. It can be done in two ways –
- **Totally quality management** – that is constant focus on customer satisfaction by improving organizational process.
- **Process of engineering** – Focusing on the manufacturing of the product, so that the quality is not compromised.
- **Responding to labour shortage** – If there is a labour shortage then the manager should quickly respond to solve this problem by arranging for the workforce required so that the product delivery is not delayed.
- **Eradication of labour shortage** – The manager needs to take quick action, if there is a labour shortage and should assure with backup plans so that there is no labor shortage in future.
- **Improving customer service** – Manager faces the challenge to constantly improve customer service to survive in an ever-competitive environment.
- **Improving ethical behaviour** – Managers should make sure that the employees behave properly and maintain the decorum of the company. These are few major challenges a manager faces while trying to complete a project. To maintain work-life balance and for the betterment of the organization, the manager should try level best to resolve these challenges.

Information systems managers have a variety of job responsibilities as leaders and IT professionals. An information systems manager is often responsible for:

- Managing IT department budget and prioritizing funds based on primary department goals
- Hiring and training IT professionals, such as support specialists, network engineers, IT analysts and technicians, to work as members of the IT department
- Monitoring the productivity and performance levels of IT employees and conducting performance reviews
- Maintaining efficient relationships with other department heads to determine their technology needs
- Delegating repair and installation requests among IT employees
- Monitoring inventory of available hardware devices or computer accessories to assess purchasing needs
- Creating long-term schedules to determine when to update company computer systems and cyber security measures
- Researching new business technologies and IT software to strengthen the organization's computer systems
- Creating surveys to gauge company employee IT needs and questions
- Drafting informational documents to help company employees troubleshoot standard computer problems and navigate new programs
- Meeting with IT directors and other upper-management staff to propose ideas and relay information to the IT department
- Assisting IT employees with complex installations or repairs
- Implementing new software programs and computer technologies that support organizational goals and objectives.

3.3. Information Systems Manager Skills

There are several technical and interpersonal skills that are required to perform this job well. Here are some examples of skills that information systems managers should possess:

- **Leadership**

Leadership refers to an individual's ability to manage a group of people and guide them in their activities. As an information systems manager, you'll need to demonstrate excellent leadership to uphold IT standards, encourage employee productivity and maintain a positive working environment. However, you'll also need to be able to provide a leadership role to other departments when helping them assess their technology needs.

- **Negotiation tactics**

As an information systems manager, you'll need to be able to negotiate with technology wholesalers to establish price points for computer hardware. Being able to negotiate is also important when you want to advocate for new computer hardware or software that could benefit the company.

- **Problem solving**

Problem solving is the process by which individuals identify problems and develop solutions. As an information systems manager, you have to problem solved in a variety of different situations. This includes problem solving to fix budgeting concerns, enhance productivity or troubleshoot computer system errors on the company level.

- **Interpersonal communication**

Interpersonal communication refers to an individual's ability to adjust the language they use depending on the person they're speaking with. Information systems managers need interpersonal communication skills

as they communicate with IT department employees, business partners, upper management professionals and other company departments on a daily basis. They also have to explain IT terminology and procedures to individuals with little-to-no IT experience.

- **Written communication**

Written communication is the ability to convey clear and concise thoughts in writing. In an information systems management role, you may have to send out department memos and company-wide reports to detail systems updates and recent issues. You may also have to write instruction manuals to help non-IT personnel understand how to use computer systems properly.

- **Public speaking**

Information systems managers host department meetings and give presentations to other departments and upper-management personnel. For this reason, it's beneficial if you know how to speak in front of an audience and hold their attention.

- **Task delegation**

As an information systems manager, you focus on department operations on a broad level. Therefore, it's important that you know how to delegate tasks among your employees, as it allows you to monitor performance, budgeting and other essential department activities.

- **Systems management**

Systems management refers to an individual's ability to use IT hardware and software to help businesses achieve goals and objectives. Including this skill on your information systems manager resume shows employers that you understand the connection between technology and business.

- **Hardware and software installation**

Being able to install hardware and software as an information systems manager ensures you can train new employees. It also helps ensure that you can partake in complex hardware and software installations when necessary. This skill shows employers that you can select and install the right equipment to support their computer systems.

- **IT project management**

In your leadership role as an information systems manager, you may have to lead IT projects and other initiatives to improve your employer's computer systems. IT project management skills highlight your ability to lead IT projects and oversee multiple tasks at once.

3.4. How to become an information systems manager

Use these steps as a guide to determine how to become an information systems manager:

1. Earn a bachelor's degree

To become an information systems manager, you need to first attend a four-year bachelor's degree program in information technology, computer systems management or computer science. In an IT bachelor's degree program, students learn about the fundamentals of information technology and how to install, use and troubleshoot computer hardware and software. They may also learn how to use programming languages to create code.

2. Complete internships and tech support work

As you complete your bachelor's degree, make sure you find additional ways to learn and enhance your IT skills. You can work in entry-level technical support roles during college and complete IT internships to gain professional experiences that enhance your resume.

3. Consider earning a master's degree

Earning a master's degree is an optional step for those looking to become information systems managers. However, some employers require master's degrees for those looking to pursue information system management positions. Earning a master's degree is also a great way for you to expand your knowledge in a specialty area like information systems, computer science or business administration.

4. Obtain a few years of experience in an IT role

Whether you earn a bachelor's degree or master's degree, you need to expand your professional experiences in order to qualify for an information systems management role. Depending on an employer's requirements, a job candidate may need between three to five years of experience before assuming an IT management position. Helpful job titles to pursue include:

- IT Technician
- Computer Programmer
- IT Analyst
- System Administrator

5. Determine which industries you want to work in the most

One of the benefits of working in IT is that you can work in a variety of different industries to provide technical support and solutions. Consider your interests and look for information systems management positions in one or more industries you enjoy. For example, if you have an interest in public health, search for information systems management positions in the health care industry.

6. Tailor your resume and cover letter for an information systems manager role

Because an information systems management role requires leadership and in-depth IT knowledge, you need to present yourself as a

qualified leadership professional in your resume and cover letter. You can do this by using leadership action verbs when describing your previous job role responsibilities. Similarly, you can use your cover letter to expand on your professional experiences and give examples that demonstrate your ability to lead a team of IT professionals.

3.4. Manager and the Environment

Environmental Manager Responsibilities

1. Advise organisations

Environmental managers usually advise organisations on how to reduce their environmental impact, comply with regulations and avoid excessive operation costs. If an environmental manager gains employment with an organisation, they usually advise business executives through an environmental management system. They might also gain employment as consultants, where they advise an organisation about a specific activity or operation. For example, if a resource extraction company wants to identify the environmental legal implications of drilling an area, it may hire an environmental manager as a consultant.

2. Develop strategies

An environmental manager typically creates strategies for businesses to follow that outline processes and procedures for minimising environmental effects. These strategies often apply to the executive decision-making processes of a business rather than daily activities conducted by its workforce. For example, an environmental strategy for a logistics and transportation company might focus on shortening transport routes, changing fleets to include electric-powered vehicles and changing packaging material to bio-degradable alternatives. A strategy helps direct a business toward an environmentally friendly operation and ensures compliance with industry regulations through strategic decisions.

3. Create policies

An environmental policy is usually a framework that helps organisations follow their environmental strategies. These policies detail the steps for an organisation to follow that help them reduce waste, minimise environmental impact and maintain compliance with laws and regulations. When an environmental manager plans strategies for a business, they also plan the policies involved in the strategy. Environmental policies might vary in organisations, but they usually incorporate six primary goals. These goals are waste reduction, energy conservation, legal compliance, resource recycling, continuous improvement and pollution prevention. Coordinate waste management.

4. Primary management

A primary responsibility for environmental managers is usually waste management. This responsibility is often more prominent in industries and operations that produce excessive waste, such as mining operations, production facilities and manufacturing plants. An environmental manager creates protocols and procedures for a business to follow that help its workforce adhere to the waste reduction component of an environmental policy. For example, an environmental manager creates procedures for improving inventory management, reducing packaging materials, enhancing material reusability and reducing water usage in the production process. These procedures help the business achieve its waste reduction goals.

5. Identify renewable energy sources

Depending on the business and operation where an environmental manager gains employment, they may continuously research alternate energy solutions. This is typically to adhere to the energy conservation component of an environmental policy. For example, if an operation uses excessive diesel and petrol as a resource for powering production, an environmental manager may assess the feasibility of using electricity generated by renewable sources. Another example may be a transportation company changing their fleet to

electrical vehicles rather than diesel and petrol. An environmental manager often liaises with change management teams to identify the feasibility of these operational changes.

6. Conduct audits

An environmental manager may conduct internal or external audits to ensure an organisation adheres to environmental laws and regulations. When conducting an internal audit, they create reports detailing the performance of the environmental management systems, such as the waste rate, pollution emissions and compliance with laws and regulations. An environmental manager usually provides these reports to business executives and clients to prove that the business meets its environmental policies and industry regulations. An external audit is typically when a government agency requests an audit of an organisation. Environmental managers not associated with the business usually conduct these audits.

7. Assess environmental impacts

When planning and monitoring an environmental management system, an environmental manager often reviews the current impact the business's operation has on the environment. They assess the current effects and use it as a benchmark for identifying the management system's success in reducing operational effects on the environment. Environmental managers usually determine the impact of an operation through consumption indicators, such as how much energy, water and resources the business consumes. They compare these consumption indicators with industry standards, suggesting the extent of the company's effects on the environment.

8. Educate employees on environmental issues and responsibility

For a business to implement an environmental strategy successfully, its workforce often requires training to develop awareness and understanding of environmental issues and individual accountability. An environmental manager typically creates learning resources to

educate employees on their responsibility and duty in minimising their impact on the environment. These learning resources may include reading materials and group activities, encouraging employees to be self-aware of their impact. Like change management, if a workforce understands the purpose and reasoning for conducting environmentally friendly procedures, it's more likely to commit to additional responsibilities.

9. Negotiate environmental service agreements

An environmental service agreement is a contract that outlines a contractor's or business's obligation to conduct operations and duties per environmental standards. For example, a builder enters a contractual agreement to build a commercial structure for a client. As part of the contract, the client instructs the builder to use explicit materials and implement a specific waste management procedure throughout the build process. An environmental manager often creates and negotiates these service agreements to ensure operations comply with regulations and standards.

10. Monitor the performance of environmental management systems

After implementing an environmental management system, an environmental manager continuously reviews the system to ensure it's performing and achieving its goals. To assess the success of these management systems, they often collect and analyse the same indicators used in an audit. These are key performance indicators (KPIs) for a business's environmental policy. The KPIs outline the waste reduction, energy conservation, recycling and pollution prevention of a business's operation. The performance review of an environmental management system is often part of an organisation's commitment to continuous improvement in reducing its impact on the environment.

3.5. Environmental manager skills

- **Strategic thinking:** This skill typically allows you to consider the context and requirements for achieving specific goals and targets. As an environmental manager, your strategic thinking skills can help you plan strategies and policies that a business can reasonably achieve throughout a strategy's lifecycle.
- **Communication:** The ability to communicate with others and absorb information is usually crucial in an advisory and consultancy role. As an environmental manager, your communication skills can be ideal for educating a workforce on its responsibilities and advising business executives on strategic directions.
- **Problem-solving:** This skill can help to identify issues and plan effective solutions. When planning and creating an environmental management system, you essentially identify the environmental issues and create strategies and policies to resolve those issues.
- **Industry knowledge:** There are often many regulations, laws and scientific procedures involved in creating environmental management systems. Your industry knowledge can be ideal for ensuring your management systems are accurate, relevant and comply with the associated laws and regulations.
- **Research:** As an environmental manager, you may continuously research environmentally friendly practices that a business can adopt to reduce its waste and energy consumption. Your research skills can help you identify these practices and consider their viability for the business.

Let Us Sum Up

In this unit, we dealt about the Functions of a Manager, Various Challenges of a Manager, Information Systems Manager Skills' How to become an information systems manager and Environmental manager skill.

Check Your Progress

1. Using a business performance management software to monitor performance _____
2. Which attribute manager require for quality information.
3. The legal constraints Monitoring by a company which operates under requires review of _____
4. What is organising?
5. Write note on staffing.

Glossaries

Develop strategies: An environmental manager typically creates strategies for businesses to follow that outline processes and procedures for minimizing environmental effects.

Systems management Systems: management refers to an individual's ability to use IT hardware and software to help businesses achieve goals and objectives.

Strategic thinking: This skill typically allows you to consider the context and requirements for achieving specific goals and targets.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://www.indeed.com/career-advice/finding-a-job/manager-information-system>
2. <https://www.practicaladultinsights.com/what-does-a-mis-manager-do.htm>.

Answers to Check Your Progress

1. Manager's Risk
2. Relevance
3. A company's macro-environment.
4. **Organizing** – Next comes the organizing part, where the manager needs to synchronize and have to make sure everything is going according to the plan. Everything should work as per the plan, and if not then the manager needs to look into the issue and make it work as planned. **Example** – A software tester is required, so organize the venue, date and time to interview those eligible for the post.
5. **Staffing** – In simple words, staffing means grouping of people into different teams and allotting different tasks to them. If the team members have some disputes then the team member needs to report to the team leader who will forward it to the manager and the issue will be taken care of. **Example** – Assembling a new team for a new project.

Unit – 4

Management as a Control system

Overview

Learning objectives

Management as a Control System

Features of Management Control

Major System in Organizational Systems

Types of Information Systems and Control system

Manual Information System

Let us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Scope and functions of Management.

Learning Objectives

At the end of this unit you will be able to understand

- Management as a Control System
- Features of Management Control
- Major System in Organizational Systems
- Types of Information Systems
- Manual Information System

4.1 Management as a Control System

Definition of Management Control

The management function of implementation of strategies is termed as 'Management Control'. It is defined as "the process by which managers influence the members of the organisation to implement the organisation strategies".

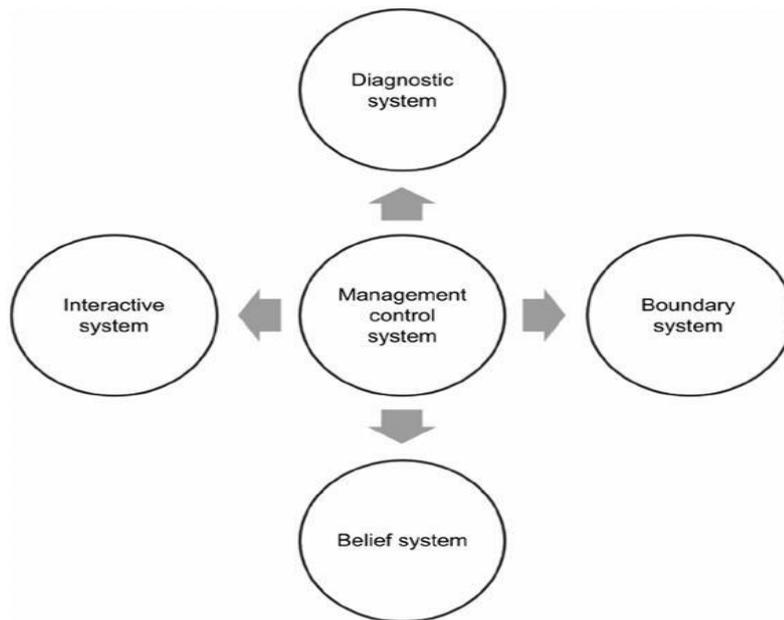


Figure: 4.1. Management Control System

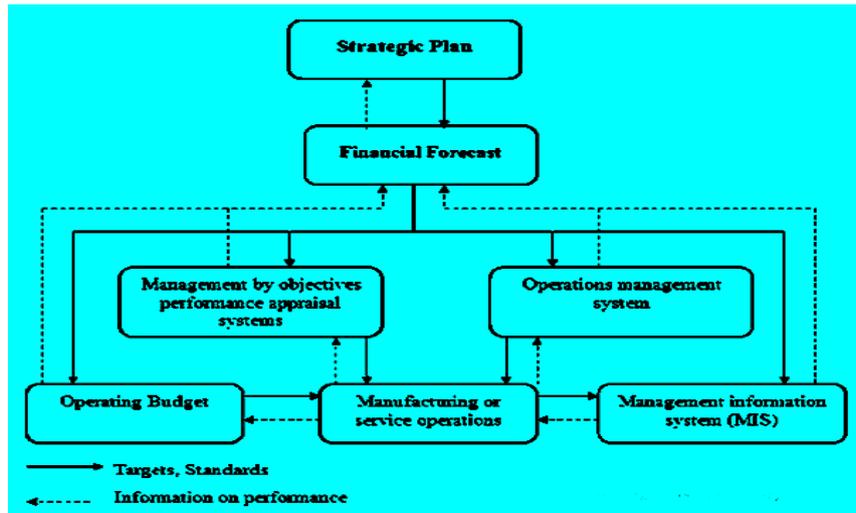


Figure: 4.2. Management Control System

4.2 Features of Management Control

Management Control Activities

Management control function is carried through various managerial activities which are grouped as:

Activity	
Planning	<ul style="list-style-type: none"> — Long Term, Short Term goals — Course of action for achievement of goals
Communicating	<ul style="list-style-type: none"> — The objectives, plans for action
Co-ordinating	<ul style="list-style-type: none"> — The activities of several parts of the organisation
Evaluation	<ul style="list-style-type: none"> — Of activities
Controlling	<ul style="list-style-type: none"> — Deciding what, if any action should be taken
Influencing	<ul style="list-style-type: none"> — People to change their behaviour for goal achievement

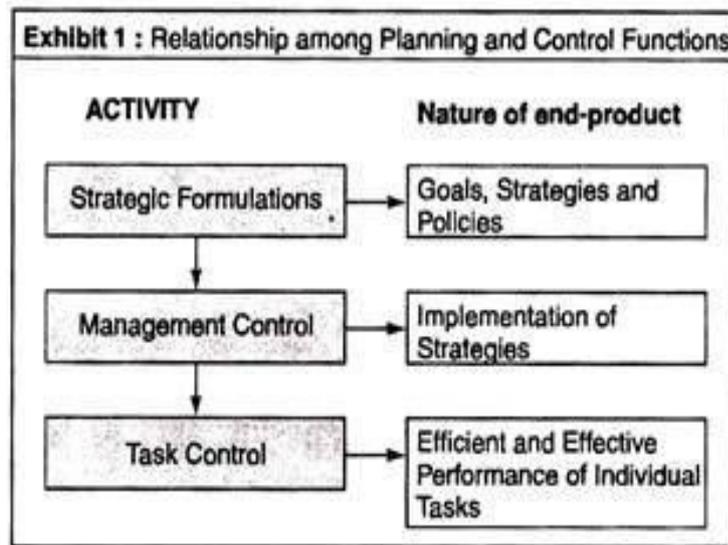
Behavioural Consideration

Management control aims at influencing people for implementation of strategies by goal congruence. Goal Congruence means that when individual members of organisation seek their personal goals they help to attain the organisation's goals.

The performance appraisal of managers by results, contributions to goal achievement, development of optimum compensation plans and other incentives are important considerations for promoting goal congruence.

Financial and Non-Financial Performance:

Financial and Non-financial performance measures are developed to compare the actual performance against the plans, as overemphasis on financial performance alone may not contribute to the organisation’s long term goals.



4.2. Components of Management Control System

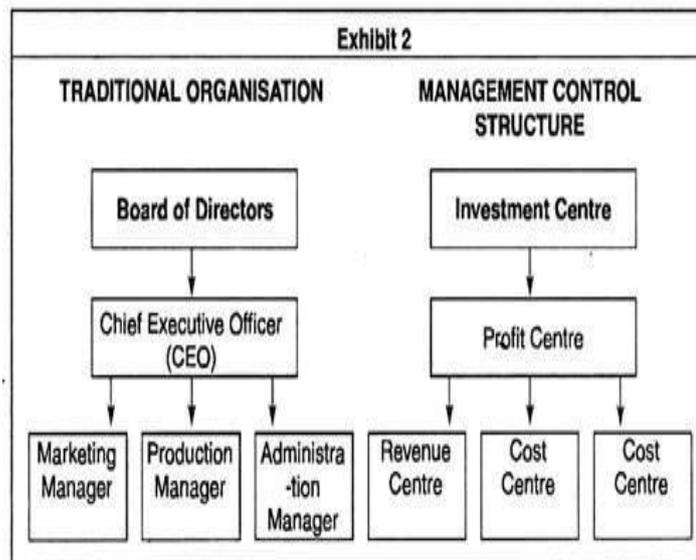
1. Management Control Structure:

The organisation is sub-divided into various sub-units. Each sub-unit is designated as a Responsibility Centre (RC), whose head is called Responsibility Centre Manager.

The Management Control Structure may comprise hierarchy of RCs shown below:

- I Investment Centre The head of this RC is having control over investment decision e.g. Board of Directors
- II Profit Centre The head of this RC is having control over profit i.e. revenue and expenses e.g. CEO
- III Cost Centre The head of this RC is having control over cost only e.g. Production Manager
- IV Revenue Centre The head of this RC is having control over the revenue e.g. Marketing Manager.

Each RC Manager is responsible for obtaining the optimum relationship between input and output. Each RC is evaluated in terms of efficiency and effectiveness. In some situations the relationship is direct and casual e.g. production department, while in some departments it is difficult to measure the input-output relationship e.g. R&D department, Accounts department etc.



Information Resource: It also embraced computer processing and applied the technology as both conceptual information system and physical manufacturing system. For example: quality control, cost control.

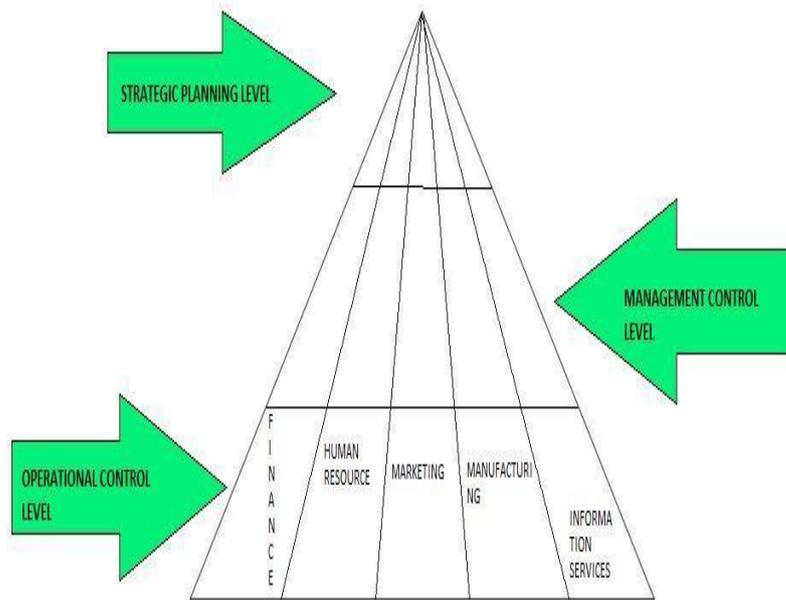


Figure: 4.3. Information Resource

4.4. Types of Information Systems and Control system

The type of information system that a user uses depends on their level in an organization. The following diagram shows the three major levels of users in an organization and the type of information system that they use.

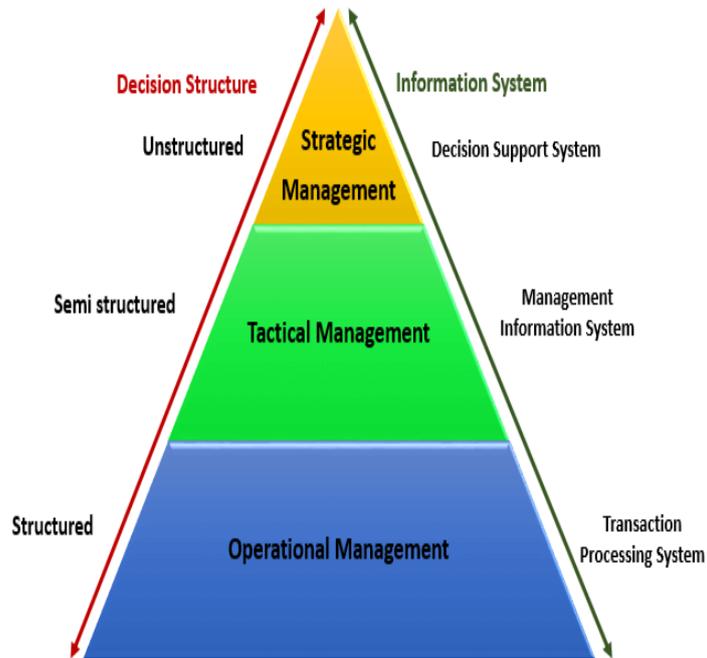


Figure: 4.4. Types of Information Systems and Control system

Transaction Processing Systems (TPS)

This type of information system is used to record the day to day transactions of a business. An example of a Transaction Processing System is a Point of Sale (POS) system. A POS system is used to record the daily sales.

Management Information Systems (MIS)

Management Information Systems abbreviated as MIS, are used to guide tactic managers to make semi-structured decisions. The output from the transaction processing system is used as input to the MIS system.

Decision Support Systems (DSS)

Decision support systems are used by top level managers to make semi-structured decisions. The output from the Management Information System is used as input to the decision support system. DSS

systems also get data input from external sources such as current market forces, competition, etc.

Types of Control Systems

There are two types of control systems namely:

1. Open loop control systems (non-feedback control systems)
2. Closed loop control systems (feedback control systems)

Open Loop Control System

If in a physical system there is no automatic correction of the variation in its output, it is called an open loop control system. That is, in this type of system, sensing of the actual output and comparing of this output (through feedback) with the desired input does not take place. The system on its own is not in a position to give the desired output and it cannot take into account the disturbances. In these systems, the changes in output can be corrected only by changing the input manually.

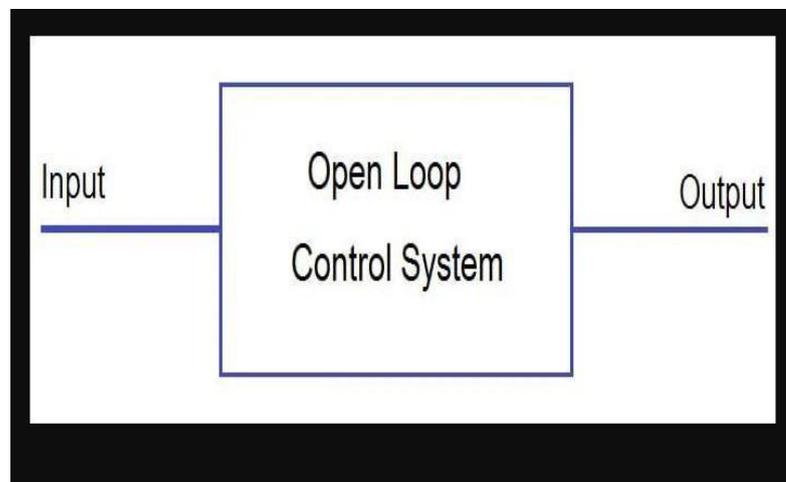


Figure: 4.5. Open Loop Control System

These systems are simple in construction, stable and cost cheap. But these systems are inaccurate and unreliable. Moreover these systems do not take account of external disturbances that affect the output and they do not initiate corrective actions automatically.

Examples of open loop control systems:

1. Automatic washing machine
2. traffic signal system
3. home heating system(without sensing, feedback and control)

Any non-feedback control system can be considered as a feedback control system if it is under the supervision of someone. Although open loop control systems have economical components and are simple in design, they largely depend on human judgement. As an example, let us consider a home furnace control system. This system must control the temperature in a room, keeping it constant. An open loop system usually has a timer which instructs the system to switch on the furnace for some time and then switch it off. Accuracy cannot be achieved as the system does not switch on/off based on the room temperature but it does as per the present value of time.

Closed Loop Control System

A closed loop control system is a system where the output has an effect upon the input quantity in such a manner as to maintain the desired output value.

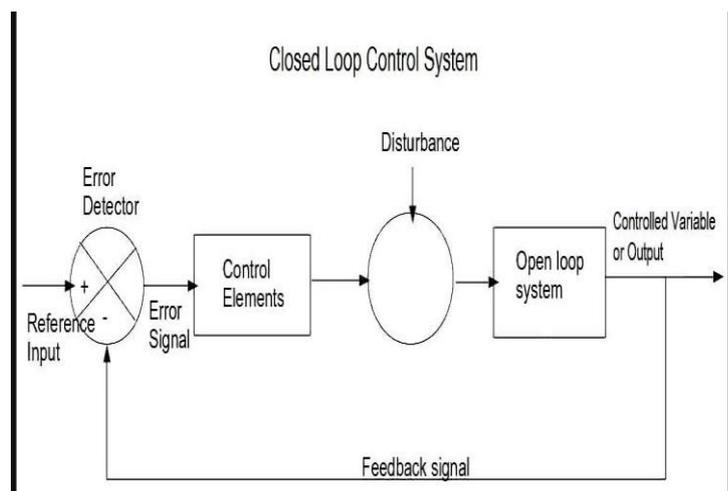


Figure: 4.6.Closed loop Control System

An open loop control system becomes a closed loop control system by including a feedback. This feedback will automatically correct

the change in output due to disturbances. This is why a closed loop control system is called as an automatic control system. The block diagram of a closed loop control system is shown in figure.

In a closed loop control system, the controlled variable (output) of the system is sensed at every instant of time, feedback and compared with the desired input resulting in an error signal. This error signal directs the control elements in the system to do the necessary corrective action such that the output of the system is obtained as desired.

The feedback control system takes into account the disturbances also and makes the corrective action. These control systems are accurate, stable and less affected by noise. But these control systems are sophisticated and hence costly. They are also complicated to design for stability, give oscillatory response and feedback brings down the overall gain of the control system.

4.5. Manual Information System

A manual information system does not use any computerized devices. The recording, storing and retrieving of data is done manually by the people, who are responsible for the information system.

The following diagram illustrates how a typical manual information system works

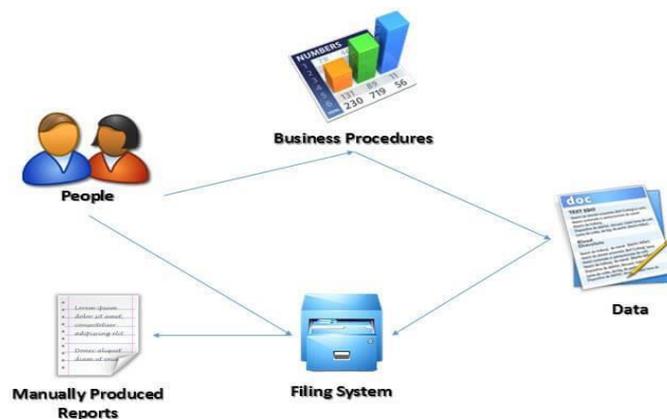


Figure: 4.7. Manual Information System

Advantages and Disadvantages of a manual information system

Advantages:

The following are the advantages of manual information systems

- ❖ **Cost effective** – it is cheaper compared to a computerized system because there is no need to purchase expensive equipment such as servers, workstations, printers, etc.
- ❖ **Flexible** –evolving business requirements can easily be implemented into the business procedures and implemented immediately.

Disadvantages:

The following are some of the disadvantages of a manual information system.

- ❖ **Time consuming** –all data entries need to be verified before filing, this is a time consuming task when done by humans. Retrieving data from the filing system also takes a considerable amount of time
- ❖ **Prone to error** – the accuracy of the data when verified and validated by human beings is more prone to errors compared to verification and validation done by computerized systems.
- ❖ **Lack of security** – the security of manual systems is implemented by restricting access to the file room. Experience shows unauthorized people can easily gain access to the filing room
- ❖ **Duplication of data** –most departments in an organization need to have access to the same data. In a manual system, it is common to duplicate this data to make it easy to accessible to all authorized users. The

challenge comes in when the same data needs to be updated

- ❖ **Data inconsistency** – due to the duplication of data, it is very common to update data in one file and not update the other files. This leads to data inconsistency
- ❖ **Lack of backups** – if the file get lost or mishandled, the chances of recovering the data are almost zero.

Let Us Sum Up

In this unit, we dealt about the Management as a Control System, Features of Management Control, Major System in Organizational Systems, Types of Information Systems and Manual Information System.

Check Your Progress

1. The output of the feedback control system must be a function of _____
2. There are generally _____ types of control systems.
3. What is DSS?

Glossaries

Keywords	Explanation
Transaction Processing Systems (TPS)	This type of information system is used to record the day to day transactions of a business. An example of a Transaction Processing System is a Point of Sale (POS) system. A POS system is used to record the daily sales.
Prone to error	The accuracy of the data when verified and validated by human beings is more prone to errors compared to verification and validation done by computerized systems.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Instructions

Instructions to Study:

- Learn Management as a Control System
- Learn Features of Management Control
- Learn Major System in Organizational Systems
- Learn Manual Information System

Suggested Readings

1. <https://www.indeed.com/career-advice/career-development/management-control>
2. <https://www.myaccountingcourse.com/accounting-dictionary/management-control-systems>

Answers to Check Your Progress

1. Input and feedback signal
2. Four
3. Decision support systems are used by top level managers to make semi-structured decisions. The output from the Management Information System is used as input to the decision support system. DSS systems also get data input from external sources such as current market forces, competition, etc.

Block 2

Types of Information System

Unit - 5 Types of information system and Decision Making.

Unit - 6 Decision support system and its Concepts, Methods and Functions

Unit - 7 Executive information system, Management Information System (MIS)

Unit - 8 Transaction Processing System (TPS), Executive support Systems (ES)

Unit - 5

Types of Information Systems and Decision Making

Overview

Learning objectives

Definition and Dimensions of Information

Types of Information System

Concepts of Decision making

Features of Decision-Making

Major Classification of Decision

Characteristics of Decision-Making

Process and Steps in Decision-Making

Elements of Decision-Making

Principles of Decision-Making

Approaches to Decision-Making

Models of Decision-Making

Importance of Decision-Making

Let us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about types of Information System, Concepts of Decision making, Features of Decision-Making, Major Classification of Decision and Characteristics of Decision-Making.

Learning Objectives

At the end of this unit you will be able to understand

- Learn Definition and Dimensions of Information
- Learn Types of Information System, Process and Steps in Decision-Making
- Learn Principles of Decision-Making
- Learn Approaches to Decision-Making
- Importance of Decision-Making

5.1. Definition and Dimensions of Information System

“An information system is a set of interrelated components that works together to collect, process, store and breakdown the information to support decision making. ”

Following are the DIMENSIONS of information system:

Organizational Dimension: Information system is part of organization. Information system will have the standard operating procedure and culture of an organization embedded within them. This involves:

a)Functional specialties b)Business processes c)Culture d)Political interest groups

Management Dimension: Managers perceive business challenges in the environment. Information systems supply tools and information needed by the managers to allocate, coordinate and monitor their work, make decision, create new products and services and make long range strategic decision.

Technology Dimension: Management uses technology to carry out their functions. It consists of – computer hardware/software, data management technology, networking/telecom technology. It's one of the many tools managers use to cope with the change.

5.2. Types of Information System

Information Systems are classified by organisational levels, mode of data, processing, system objectives and type of support provided.

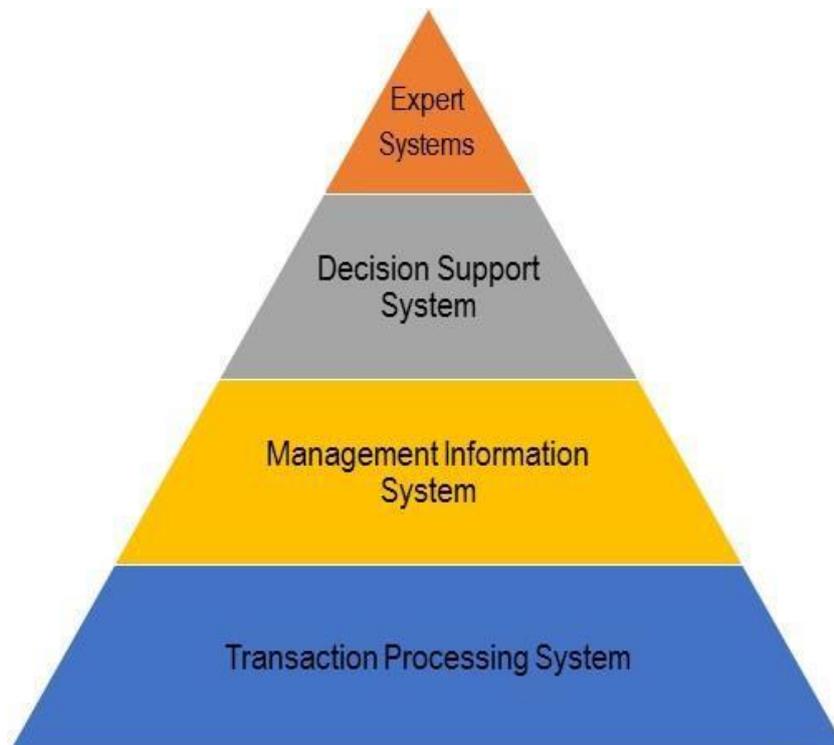


Figure.5.1. Types of Information System

Transaction Processing System (TPS):

- Transaction Processing System are information system that processes data resulting from the occurrences of business transactions
- Their objectives are to provide transaction in order to update records and generate reports i.e to perform store keeping function
- The transaction is performed in two ways: **Batching processing** and **online transaction processing**.
- **Example:** Bill system, payroll system, Stock control system.

Management Information System (MIS):

- Management Information System is designed to take relatively raw data available through a Transaction Processing System and convert them into a summarized and aggregated form for the manager,

usually in a report format. It reports tending to be used by middle management and operational supervisors.

- Many different types of report are produced in MIS. Some of the reports are a summary report, on-demand report, ad-hoc reports and an exception report.
- **Example:** Sales management systems, Human resource management system.

Decision Support System (DSS):

- Decision Support System is an interactive information system that provides information, models and data manipulation tools to help in making the decision in a semi-structured and unstructured situation.
- Decision Support System comprises tools and techniques to help in gathering relevant information and analyze the options and alternatives, the end user is more involved in creating DSS than an MIS.
- **Example:** Financial planning systems, Bank loan management systems.

Experts System (ES)

- Experts systems include expertise in order to aid managers in diagnosing problems or in problem-solving. These systems are based on the principles of artificial intelligence research.
- Experts Systems is a knowledge-based information system. It uses its knowledge about a specify are to act as an expert consultant to users.
- Knowledgebase and software modules are the components of an expert system. These modules perform inference on the knowledge and offer answers to a user's question.

Information systems come in various forms to gather data, provide reports, and aid operational and middle-level managers in making decisions. Depending on the situation, several management information systems are used. Thus, choosing the appropriate MIS type is crucial.

5.3. Concepts of Decision making

Decision making is the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions. Using a step-by-step decision-making process can help you make more deliberate, thoughtful decisions by organizing relevant information and defining alternatives

Concepts of Decision Making:

One of the most important functions of a manager is to take decisions in the organization. Success or failure of an organization mainly depends upon the quality of decision that the managers take at all levels. Each managerial decision, whether it is concerned with planning, organizing, staffing or directing is concerned with the process of decision-making.

It is because of its perverseness of Decision-Making that professor Herbert Simons has said the process of managing as a process of decision-making. As per his opinion a post of position cannot be said to be managerial until and unless the right of Decision-Making is attached to it.

A decision is a course of action which is consciously chosen from among a set of alternatives to achieve a desired result. It means decision comes in picture when various alternatives are present. Hence, in organization an executive forms a conclusion by developing various course of actions in a given situation. It is made to achieve goals in the organization. To decide means to cut off on to come to a conclusion.

It is also a mental process. Whether the problem is large or small in the organization, it is usually the manager who has to comfort it and decide what action to take. So, the quality of managers' decisions is the Yardstick of their effectiveness and value to the organization. This indicates that managers must necessarily develop decision making skills.

According to D. E. McFarland, “A decision is an act of choice – wherein an executive forms a conclusion about what must not be done in a given situation. A decision represents a course of behavior chosen from a number of possible alternatives”.

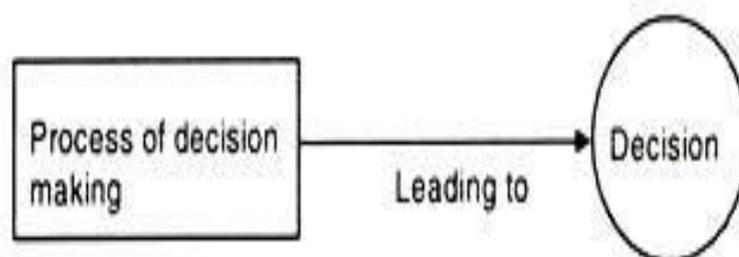
According to Haynes and Massie, “a decision is a course of action which is consciously chosen for achieving a desired result”.

According to R. A. Killian, “A decision in its simplest form is a selection of alternatives”.

Thus, from above definitions it can be concluded that decision-making is a typical form of planning. It involves choosing the best alternative among various alternatives in order to realize certain objectives. This process consists of four interrelated phases, explorative (searching for decision occasions), speculative (identifying the factors affecting the decision problem), evaluative (analysis and weighing alternative courses of action and selective (choice of the best course of action).

5.3.1. Relationship between Decision and Decision-Making

From the definitions of decision and decision-making, it follows that decision making is a process; a decision is the outcome of this process. Accordingly, the better the decision-making process; the better would be the decisions emerging out of it leading to an efficient commitment of precious organisational resources.



5.4. Features of Decision-Making

(i) Decision-Making is Goal-Oriented:

Each and every decision of management major or minor must make, at least, some contribution towards the attainment of organisational objectives. In case otherwise, decision-making is a wasteful activity; involving only a sheer wastage of the time, energy and efforts of managers, and precious organisational resources.

(ii) Decision-Making is Pervasive:

There are three dimensions of the pervasiveness of decision-making; viz:

(a) All managers in the management hierarchy take decisions, within the limits of their authority, pertaining to their areas of functioning.

(b) Decision-making is done in all functional areas of management e.g. production, marketing, finance, personnel, research and development etc.

(c) Decision-making is inherent in all functions of management i.e. planning, organising, staffing, directing and controlling.

(iii) Decision-Making is an Intellectual Exercise:

Decision-making calls for creativity and imagination on the part of managers; in that decision-making forces managers to think in terms of developing best objectives and best alternatives for attaining those objectives. In fact, the more intelligent a manager is; the better would be the decision-making done by him.

(iv) Decision-Making Involves a Problem of Choice:

Decision-making is fundamentally a choosing problem i.e. a problem of choosing the best alternative, from out of a number of alternatives, in a rational and scientific manner. If in a managerial decision-making situation, alternatives do not exist; then there is no decision-making problem involved in that situation.

Further, more are the alternatives that are available in a situation; the more complicated the decision-making process is likely to be.

(v) Decision-Making is a Continuous Process:

Decision-making process commences since the inception of business and continues throughout the organisational life. All managers take decisions for organisational purposes; so long as the enterprise is in existence. In fact, decision-making is also involved in the process of liquidating or winding up a business enterprise.

(vi) Decision-Making is the Basis of Action:

All actions of people operating the enterprise are based on the decisions taken by management vis-a-vis organisational issues. In fact, the quality of actions by people well depends on the quality of decisions taken by management.

(vii) Decision-Making Implies a Commitment of Organisational Resources:

Commitment of organisational resources time, efforts, energies, physical resources etc. is implied both during the process of taking decisions and more particularly, at time of implementation of decisions. Right decisions, accordingly, imply a right commitment of resources; and wrong decisions imply a wrong commitment of precious organisational resources.

(viii) Decision-Making is Situational:

Decision-making much depends on the situation facing the management; at the time when a decision-making problem crops up. Whenever the situation changes; decision-making also changes; e.g. decision-making by management on similar issues is radically different during boom conditions and during conditions of recession or depression.

5.5. Major Classification of Decisions

In fact, is a sort of Herculean task to list out all the decisions which managers take during the course of organisation life; as decisions taken by managers are numberless stretching from tiny to gigantic decisions? Yet, one could attempt the following classifications of managerial decisions – to have an idea of the basic nature and varieties of managerial decisions.

(i) Personal and Organisational Decisions:

Personal decisions are those which are taken by managers concerning their personal life matters. On the other hand, organisational decisions are those which are taken by managers, in the context of organisation and for furthering the objectives of the organisation.

The highlight of the above distinction between personal and organisational decisions is that sometimes, personal decisions of managers have got organisational implications; and then such personal decisions must be taken by managers, in the best interests of the organisation.

For example, the decision of a manager to proceed on a long leave is a personal decision of the manager. But then, in the interest of the organisation, he must appoint some deputy to act on his behalf, till he returns.

(ii) Casual and Routine Decisions:

Casual decisions (whether more significant or less significant) are those which are taken only on some special issues concerning organisational life e.g. a decision to install a new piece of machinery. Casual decisions of a significant nature are taken at upper levels of management. Insignificant casual decisions may, however, be permitted even at lower levels of management.

On the other hand, routine decisions are those which are taken in large numbers during the normal course of organisational life, with repeated frequency. A major number of routine decisions are taken at operational levels of management.

(iii) Strategic and Tactical Decisions:

Decisions relating to designing of strategies are strategic decisions i.e. decisions of utmost significance for the organisation. Such decisions are taken at uppermost levels of management. For implementation purposes, strategies are translated into operational plans or tactical decisions. Such tactical decisions are taken at middle and lower levels of management.

(iv) Policy and Operative Decisions:

A policy decision is a decision in the nature of guidance and instruction; which defines and confines the area of discretion of subordinates, in matters of decision-making. Naturally policies are decided by superiors for the guidance of subordinates. Decisions of subordinates taken within the prescribed limits and guidance of policies are, in management terminology, called operative decisions.

(v) Programmed and Non-Programmed Decisions:

Programmed decisions are those which are taken within the framework of the existing plans of the organisation; and for taking which prescribed policies, rules, procedures and methods are available with the organisation. Such decisions do not pose much problem for managers.

On the other hand, non-programmed decisions are those for taking which there is no provision in the existing planning framework of the organisation. Such decisions are warranted by extraordinary exceptional or emergency situations.

For example, if workers are on strike on a particular day; such a situation will call for an un-programmed decision as to how to deal with the work- situation on that day. Non-programmed decisions are taken by managers confronting emergency situations, in consultation with higher levels of management.

(vi) Individual and Collective Decisions:

This classification of decisions rests on the manner of decision-making. An individual (not personal) decision is one which is taken by a manager in his individual capacity, without being in consultation with any other person, whatsoever. Such decisions are dictatorial or authoritarian in nature, and are taken by 'big bosses' of the organisation.

On the other hand, collective decisions are those which are jointly taken by a group of managers and other persons – through a process of mutual consultations – in meetings or committees or other joint forum. Such decisions are democratic in nature.

(vii) Financial and Non-financial Decisions:

Financial decisions are those which involve financial implications or commitment of organisational finances. In fact, most of the management decisions are financial in nature. On the other hand, non-financial decisions are those which do not involve financial implications; e.g. a decision-asking people to be punctual for the organisation or a decision-asking people not to accept gifts from suppliers or others.

In a way, non-financial decisions may also be very significant for the organisation.

- **Additional observations on classifications of decisions:**

Decisions may also be classified according to functional areas of management; e.g. production decisions, marketing decisions, accounting decisions, research decisions and so on. Further, decisions may be classified according to basic functions of management; e.g. planning decisions, organising decisions, staffing decisions, directing decisions and controlling decisions.

Rationality in Decision-Making:

- **Economic-Man Model:**

Economic man model of human behaviour is a gift of Economic Theory, and is propagated by Adam Smith and other classical economists. According to them, man is a completely rational being (a rational being is one who proceeds according to logic, in all his/her actions).

For example, a consumer will always try to maximize his satisfaction from the use of limited means, at his disposal by being fully rational in his approach to consumption.

A producer, likewise, will always try to maximise his profits by attempting an optimum combination of factors of production or by deriving maximum output from minimum inputs by following a fully rational approach vis-a-vis his productive operations.

This economic-man model cannot be applied to managers while taking decisions. A rational manager is one who analyses all the alternatives in the decision-making situation; and then takes a decision in a fully rational manner. Managers must be rational in decision-making; but cannot be absolutely rational in their approach-as suggested by 'economic-man model', because of practical limitations.

- **Administrative Man Model:**

Administrative man model of human behaviour is suggested by Prof. Herbert Simon, a well-known Economist and Nobel laureate. This model of human behaviour is the practical man model and is based on the principle of 'bounded rationality' (i.e. limited rationality); according to which managers can be rational only in a limited way, during the process of decision-making.

They cannot develop and evaluate all the possible alternatives in the decision-making situation. They just analyse a limited number of alternatives and take a decision which is just 'good-enough'.

5.6. Characteristics of Decision-Making

The important characteristics of decision-making may be listed thus:

- **Goal-Oriented:**

Decision-making is a goal-oriented process. Decisions are usually made to achieve some purpose or goal. The intention is to move 'toward some desired state of affairs'.

- **Alternatives:**

A decision should be viewed as 'a point reached in a stream of action'. It is characterized by two activities – search and choice. The manager searches for opportunities, to arrive at decisions and for alternative solutions, so that action may take place. Choice leads to decision. It is the selection of a course of action needed to solve a problem. When there is no choice of action, no decision is required. The need for decision-making arises only when some uncertainty, as to outcome exists.

- **Analytical-Intellectual:**

Decision-making is not a purely intellectual process. It has both the intuitive and deductive logic; it contains conscious and unconscious aspects. Part of it can be learned, but part of it depends upon the personal characteristics of the decision maker. Decision-making cannot be completely quantified; nor is it based mainly on reason or intuition. Many decisions are based on emotions or instincts. Decision implies freedom to the decision maker regarding the final choice; it is uniquely human and is the product of deliberation, evaluation and thought.

- **Dynamic Process:**

Decision-making is characterized as a process, rather than as, one static entity. It is a process of using inputs effectively in the solution of selected problems and the creation of outputs that have utility. Moreover, it is a process concerned with 'identifying worthwhile things to do' in a dynamic setting. A manager for example, may hire people based on merit regularly and also pick up candidates recommended by an

influential party, at times. Depending on the situational requirements, managers take suitable decisions using discretion and judgment.

- **Pervasive Function:**

Decision-making permeates all management and covers every part of an enterprise. In fact, whatever a manager does, he does through decision-making only; the end products of a manager's work are decisions and actions. Decision-making is the substance of a manager's job.

- **Continuous Activity:**

The life of a manager is a perpetual choice making activity. He decides things on a continual and regular basis. It is not a one shot deal.

- **Commitment of Time, Effort and Money:**

Decision-making implies commitment of time, effort and money. The commitment may be for short term or long-term depending on the type of decision (e.g., strategic, tactical or operating). Once a decision is made, the organisation moves in a specific direction, in order to achieve the goals.

- **Human and Social Process:**

Decision-making is a human and social process involving intellectual abilities, intuition and judgment. The human as well as social impacts of a decision are usually taken into account while making the choice from several alternatives. For example, in a labour-surplus, capital-hungry country like India managers cannot suddenly shut down plants, lop off divisions and extend the golden handshake to thousands of workers, in the face of intense competition.

- **Integral Part of Planning:**

As Koontz indicated, 'decision making is the core of planning'. Both are intellectual processes, demanding discretion and judgment. Both aim at achieving goals. Both are situational in nature. Both involve choice among alternative courses of action. Both are based on forecasts and assumptions about future risk and uncertainty.

5.7. Process and Steps in Decision-Making

In decision-making process steps normally refers to processes, procedures and phases which are usually followed for better decision.

According to Stanley Vance decision-making consists of the following six steps:

1. Perception.
2. Conception.
3. Investigation.
4. Deliberation.
5. Selection.
6. Promulgation

1. Perception:

Perception is a state of awareness. In a man consciousness arises out of perception. Consciousness gives tilt to the decision-making process. The executive first perceives and then moves on to choose one of the alternatives and thus takes a decision. Perception is, therefore, an important and first step without which decisions relating to any of the problems of the organisation cannot be taken. Other steps follow “perception” is the first step in decision-making.

2. Conception:

Conception means designs for action or programme for action. Conception relates to that power of mind which develops ideas out of what has been perceived.

3. Investigation:

The investigation provides equipment with the help of which the manager tries to go ahead with a debate either in his mind independently or with his co-workers. Perception is a sort of location of the problem whereas conception is the preparation of design or programme for solving the problem. But only perception and conception cannot offer the solution.

For solution investigation is to be carried out. Information’s relevant to a particular concept is to be sought, acquired and then analysed. Relative merits and demerits of a different analysed concepts should be measured. Alternative course of action is to be thought,

analysed and compared to. This needs investigation with which the manager should be armed.

4. Deliberation:

Weighing the consequences of possible course of action is called deliberation. The manager may either weigh the relative merits and demerits and the following consequences in his own mind or share his mental exercise with others to equip himself better. The deliberations remove bias and equip the manager with different ideas and alternatives and help him in arriving at a decision which may safely be ascribed as good decision.

5. Selection:

Selection is an act of the choice which in management terminology is known as decision. After deliberations one of the alternatives, the best possible in the circumstances, is selected.

6. Promulgation:

Perception, conception, investigation, deliberation and lastly selection will carry weight only when selected – the chosen alternative, that is, the decision – is properly and timely communicated to all those who are concerned and for whom the decision is meant. Only proper promulgation will help its execution.

According to the views of Mrityunjoy Banerjee – discrimination among the available alternatives is designated as the decision. For him also decision is an act of choice – selection from different available alternatives.

5.8. Elements of Decision-Making

The following are the five important elements of decision-making:

- (1) Concept of good decision.
- (2) Environment of decision.
- (3) Psychological elements in decision.
- (4) Timing of decision.
- (5) Communication of decision.

(1) Concept of Good Decision:

The most important task before the manager of any enterprise is to take a good decision. The objectives of an enterprise can be achieved only by a good decision. A good decision is always acceptable to all reasonable persons and is based on sound judgement and factual information's. No decision should be taken without examining the situation, correlating it with the facts and scientifically analysing the facts. Such a decision satisfies the concept of good decision.

(2) Environment of Decision:

The success and failure of the whole enterprise depends on the nature; procedure and standard of a decision taken by its manager. The organisational environment and formal structure decides the relationship between units on the one hand and individuals on the other.

This relationship forms the basis of environment prevailing in an organisation and indirectly affects a decision. Similarly, political, social and economic situation in and outside the organisation affects a decision which the manager takes for implementation by the enterprise.

(3) Psychological Elements is Decision:

Every manager takes decision on the basis of the given facts, information and scientific analysis. But out of many alternatives his choice falls on this element. It is this choice on which his psychological impact is felt. In fact psychologically manager comes closer to the choice and that is why he feels like choosing the one which he feels is in the best interest of the whole enterprise.

The manager's habits, temperament, social environment, upbringing, domestic life and political leanings all have a trace on his choice of alternative, consequently on his decisions.

(4) Timing of Decisions:

Decision if taken at a time when it is needed helps the management in achieving the objectives more successfully. Any decision taken in time obviously leaves a lasting impression on the minds of those who are affected by the decision. The impact of the decision will have lasting effect on the personnel of the enterprise and its effect will be on the working of the enterprise.

(5) Communication of Decision:

The communication of decision is as important as taking of the decision. Both go together. Decisions if not properly and timely communicated carry no weight howsoever important or good they may be. A good decision is based on scientific analysis of facts and is taken and communicated when it is needed the most.

5.9. Principles of Decision-Making

Eminent authors of management are of this opinion that on right and appropriate decisions, the success and failure of the enterprise depend. Therefore, a manager has to take all precautions before arriving at a decision.

(1) Marginal Theory of Decision-Making:

Marginal theory of decision-making has been suggested by various economists. Economists believe that a business undertaking works for earning profit. To earn profit is their prime motto. That is why they agree that the manager must take every decision with the aim in view that the profit of his organisation goes on increasing till it reaches its maximum. Therefore, the economists argue that an organisation with sole aim of maximisation of profit needs a marginal analysis of all its profit. Decision-making too should be based on marginal analysis.

According to economists marginal analysis of a problem is based on Law of Diminishing Returns. With extra unit of labour and capital put in production, the production increase but it increases at a proportionately reduced rate. From every extra unit of labour and capital the production diminishes and a time comes when the increase in production stops with 'zero' as the production of the last unit used therein.

At this stage further production is discounted. A decision is taken to the effect that no additional unit of labour and capital now is required to be introduced in the production. Production of the last unit is marginal one where – after further introduction of extra unit becomes uneconomical or non-yielding.

The marginal principle can be effectively used while taking decision on matters relating to – (i) production, (ii) sales, (iii) mechanisation, (iv) marketing, (v) advertising, (vi) appointment and other

matters where marginal theory can be scientifically and statistically used and a good decision is rendered possible.

(2) Mathematical Theory:

It will be wrong if we say that the decision-making techniques owe too much to the mathematical theory of taking decisions. Venture analysis, game theory, probability theory, waiting theory are a few of the theories on the basis of which a manager analyses a given fact and takes decision accordingly. This has given rise to a scientific approach to the decision-making process.

(3) Psychological Theory:

The nature, size and purpose, of the organisation play an important role in decision-making. Manager's aspirations, personality, habits, temperament, political leanings and social and organisational status, domestic life, technological skill and bent of mind play a very important role in decision making. They do help in decision-making.

They all in some form or the other leave an impact on the decisions taken by the manager. No doubt the manager is not free to decide whether he wishes to. He is also bound by his responsibilities and answerability. But psychology of the manager has a bearing on the decision he takes and this fact cannot be brushed aside. Decision-making is a mental process and the psychology of those who are deliberating and of the people who take the final decision has a definite say in decision-making.

(4) Principle of Limiting Factors:

The decisions taken are based on limited factors nevertheless they are supposed to be good because of the simple fact that under the circumstances it was the only possibility. From this principle it emerges that though there are numerous alternative available to a decision-making but he takes cognizance to only those alternatives which suit the time, purpose and circumstances and which can be properly and thoroughly analysed considering the human capacity and then finally one of the alternatives is chosen which forms the basis of a decision.

(5) Principle of Alternatives:

Decision is an act of choice. It is a selection process. Out of many available alternatives the manager has to choose the one which he considers best in the given circumstances and purpose.

(6) Principle of Participation:

This principle is based on human behaviour, human relationship and psychology. Every human being wants to be treated as an important person if it is not possible to accord him a V.I.P. treatment. This helps the organisation in getting maximum from every person at least from those who have been given place of importance and honour.

Participation signifies that the sub-ordinates, even if they are not concerned, should be consulted and due weight age should be given to their viewpoint. Japanese do this. Japanese institutions – business or government make decisions by consensus. This makes all of them feel that they are very much part of the decision. The Japanese debate a proposed decision throughout its length and breadth of the organisation until there is an agreement.

5.10. Approaches to Decision-Making

The approaches to decision-making are discussed below:

1. Centralised and Decentralised Approach:

In centralised approach to decision-making, maximum decisions are taken by top-level managers though some responsibility is delegated to middle-level managers. In the decentralised approach, the authority to take decisions is delegated to lower-level managers. In case of programmed decisions, decentralised approach is followed. Centralised approach is used to make non-programmed decisions.

2. Group and Individual Approach:

Managers take decisions with their employees/ subordinates in the group approach to decision-making process. In the individual approach, decisions are taken by the manager alone. It is the one-manager decision-making approach. The individual approach is appropriate when (i) there is emergency for taking decisions, i.e., time at the disposal of the decision-maker is limited, and (ii) resources are

limited. Cost of individual decision-making is less than that of group decision-making.

Group decision-making, in most circumstances, is better than individual decision-making as decision-makers have more information to make decisions. Group decisions are easier to implement since members are morally committed to the decisions.

This approach ensures better quality and greater accuracy of decisions, improves employees' morale, increases job satisfaction, enhances coordination and reduces labour turnover. The limitation of group decision-making is that it is "a process whereby, in response to social pressures, individuals go along with a decision even when they do not agree with it and, in order to avoid conflicts, do not even voice their reservations".

Group decision-making has the following advantages:

(a) Decision-makers collect more information and decisions are, therefore, more scientific and accurate.

(b) Members make decisions through group thinking and are, therefore, committed to implement the decisions.

(c) Continuous interaction amongst superiors and subordinates enhances subordinates' morale and job satisfaction. This increases communication and coordination amongst the activities of group members.

(d) It promotes creativity and innovative abilities of subordinates to make quality decisions.

Group decision-making suffers from the following limitations:

(a) It is costly and more time consuming than individual decision-making.

(b) Some members accept group decisions even when they do not agree with them to avoid conflicts.

(c) Sometimes, groups do not arrive at any decision. Disagreement and disharmony amongst group members leads to interpersonal conflicts.

(d) Some group members dominate others to agree to their viewpoint. Social pressures lead to acceptance of alternatives which all group members do not unanimously agree to.

(e) If there is conflict between group goals and organisational goals, group decisions generally promote group goals even if they are against the interest of the organisation. Though cost of group decision-making is more than individual decision-making, its benefits far outweigh the costs and enable the managers to make better decisions.

3. Participatory and Non-Participatory Approach:

In the participatory approach, managers seek opinion of those who are directly affected by the decisions. There is no formal gathering of superiors and subordinates as in group decision-making; the decision-maker only seeks information and suggestions from employees and reserves the right of making decisions with him. There is participation of employees in achieving the decision objectives.

In the non-participatory approach, managers do not seek information from employees as the decisions do not directly affect them. They collect information, assess it in the light of present circumstances, make decisions and communicate them to the organisational members.

4. Democratic and Consensus Approach:

In democratic approach, decisions are based on the system of voting by majority. In the consensus approach, participants discuss the problem and arrive at a general consensus. It is similar to group decision-making, where many people are involved in the decision-making process. However, in group decision-making, some people agree to others because of social or psychological pressure. Group decision-making reflects the opinion of a few and consensus decision-making reflects the opinion of all the group members.

5.11. Models of Decision-Making

Models represent the behaviour and perception of decision-makers in the decision-making environment. There are two models that guide the decision-making behaviour of managers.

These are:

1. Rational/Normative Model-Economic Man
2. Non-Rational/Administrative Model

1. Rational/Normative Model:

These models believe that decision-maker is an economic man as defined in the classical theory of management. He is guided by economic motives and self-interest. He aims to maximise organisational profits. Behavioural or social aspects are ignored in making business decisions.

These models presume that decision-makers are perfect information assimilators and handlers. They can collect complete and reliable information about the problem area, generate all possible alternatives, know the outcome of each alternative, rank them in the best order of priority and choose the best solution. They follow a rational decision-making process and, therefore, make optimum decisions.

This model is based on the following assumptions:

- i. Managers have clearly defined goals. They know what they want to achieve.
- ii. They can collect complete and reliable information from the environment to achieve the objectives.
- iii. They are creative, systematic and reasoned in their thinking. They can identify all alternatives and outcome of each alternative related to the problem area.

iv. They can analyse all the alternatives and rank them in the order of priority.

v. They are not constrained by time, cost and information in making decisions.

vi. They can choose the best alternative to make maximum returns at minimum cost.

Limitations of the Model:

Actual decision-making is not what is prescribed by the rational models. These models are normative and prescriptive. They only describe what is best, what decision-makers should actually do to make the best decisions and describe the norms that decision-makers should follow in making decisions. They do not describe how decision-makers actually behave in different decision-making situations (This is explained in the non-rational models). They only describe what the best is.

The best is, however, not achieved in real life situations because of the following constraints that managers face while making decisions:

i. They face multiple, conflicting goals and not a well-defined goal that they intend to achieve.

ii. They are constrained by their ability to collect complete information about various environmental variables. Information is future-oriented and future being uncertain, complete information cannot be collected. Many uncontrollable factors influence their ability to collect complete information.

iii. They are constrained by time and cost factors to collect the information. They are limited in their search for all alternatives that affect decision-making situations. Their decisions are based on whatever information they can collect and not complete information.

iv. They are constrained by their ability to analyse every factor that affects the decision- process. They have limited knowledge to assess all the alternatives.

v. They may base decisions on subjective and personal biases. They consider only those facts which are relevant for decision-making.

vi. Continuous researches, innovations and technical developments can turn the best decisions into sub-optimal ones. Managers are, thus, constrained by technological factors.

vii. Changing economic and social factors (economic and political policies, socio- cultural values, ethics, traditions, customs etc.) also inhibit the ability of managers to make rational decisions.

2. Non-Rational/Administrative Models:

Non-rational models are descriptive in nature. They describe not what is best but what is most practical in the given circumstances. They believe that managers cannot make optimum decisions because they are constrained by many internal and external organisational factors. Managers cannot collect, analyse and process perfect and complete information and, therefore, cannot make optimum decisions. Absolute rationality is rare.

It is seldom achieved. Based on whatever information decision-makers can gather and process, they arrive at the best decisions in the given circumstances. They are good enough and do not put undue pressure on organisational time and resources. They are easy to understand and implement. These decisions are made within the constraints or boundaries of available information and managers' ability to process that information.

They are not optimum decisions. They are satisfying decisions. The concept of making decisions within the boundaries or limitations of managers to collect and analyse all the relevant information for decision-making is known as 'principle of bounded rationality'. This principle was introduced by Herbert Simon.

This model is realistic in nature as it presents a descriptive and probabilistic rather than deterministic approach to decision-making. Rather than searching for all alternatives for making decisions and analysing their outcomes, decision-makers use value judgments and intuition in analysing whatever information they can collect within the constraints of time, money and ability and arrive at the most satisfying decision. This model does not represent optimum situation for decision-making. Instead, it represents the real situation for decision-making.

The decision-maker is not an economic man but an administrative man who combines rationality with emotions, sentiments and non-economic values held by the team members. He follows a flexible approach to decision-making which changes according to situations. Managers make feasible decisions which are less rational rather than rational decision which is less feasible.

“Bounded rationality refers to the limitations of thought, time and information that restrict a manager’s view of problems and situations.” — Pearce and Robinson

“Managers try to make the most logical decisions given the limitations of information and their imperfect ability to assimilate and analyse that information.” —Herbert Simon.

5.12. Importance of Decision-Making

Decision-making is an indispensable component of the management process. It permeates all management and covers every part of an enterprise. In fact whatever a manager does, he does through decision-making only; the end products of manager’s work are decisions and actions.

For example, a manager has to decide:

(i) What are the long term objectives of the organization, how to achieve these objectives, what strategies, policies, procedures to be adopted (planning);

(ii) How the jobs should be structured, what type of structure, how to match jobs with individuals (organizing);

(iii) How to motivate people to peak performance, which leadership style should be used, how to integrate effort and resolve conflicts (leading);

(iv) What activities should be controlled, how to control them, (controlling). Thus, decision-making is a central, important part of the process of managing. The importance of decision-making in management is such that H.A. Simon called management as decision-making. It is small wonder that Simon viewed decision-making as if it were synonymous with the term 'managing'. Managers are essentially decision makers only.

Let Us Sum Up

In this unit, we dealt about the types of Information System, Concepts of Decision making, Features of Decision-Making, Major Classification of Decision and Characteristics of Decision-Making.

Check Your Progress

1. _____ were the original type of information system developed to support managerial decision making.
2. An interface computer-based system which supports managers in making instructed decision_____.
3. The decision making environment of an operation level manager can be characterised as _____.
4. Selecting a best course of action among the alternatives is called as_____.
5. Decision making helps in the smooth function of the_____.
6. Write note on investigation.

Glossaries

Keywords	Explanation
Technology Dimension	Management uses technology to carry out their functions. It consists of – computer hardware/software, data management technology, networking/telecom technology. It's one of the many tools managers use to cope with the change
Psychological Elements is Decision	Every manager takes decision on the basis of the given facts, information and scientific analysis. But out of many alternatives his choice falls on this element. It is this choice on which his psychological impact is felt.
Pervasive Function	Decision-making permeates all management and covers every part of an enterprise.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://www.indeed.com/career-advice/career-development/types-of-management-information-system>
2. <https://www.managementstudyguide.com/decision-making.htm>

Answers to Check Your Progress

1. Management information systems
2. MIS.
3. Structured
4. Decision making
5. Business
6. **Investigation:** The investigation provides equipment with the help of which the manager tries to go ahead with a debate either in his mind independently or with his co-workers. Perception is a sort of location of the problem whereas conception is the preparation of design or programme for solving the problem. But only perception and conception cannot offer the solution.

Unit -6

Decision support systems (DSS)-Concepts, Methods and Functions

Overview

Learning objectives

Decision Support Systems (DSS)

Categories of Decision Support Systems (DSS)

Attributes of a Decision Support Systems (DSS)

Characteristics of Decision Support Systems (DSS)

Benefits of Decision Support Systems (DSS)

Components of Decision Support Systems (DSS)

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Instructions

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about DSS-Concepts, Methods and Functions.

Learning Objectives

At the end of this unit you will be able to understand

- Concepts,
- Methods and Functions of DSS

6.1 Decision Support Systems (DSS)

Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

DSS uses the summary information, exceptions, patterns, and trends using the analytical models. A decision support system helps in decision-making but does not necessarily give a decision itself. The decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

Decision support systems generally involve non-programmed decisions. Therefore, there will be no exact report, content, or format for these systems. Reports are generated on the fly.

Brief History of Decision Support System

The journey of decision support system began in the late 1960s with model-driven DSS. 1970s saw theory development in this area and it was in mid 1980s when implementation of spreadsheet based DSS, financial planning systems and Group DSS took place. Late 1980s and early 1990s saw the evolution of business intelligence, data warehouses, ODSS (Organization Decision Support System) and EIS (Executive Information System). Mid 1990s marked the beginning of knowledge-based and web-based decision support systems.

6.2 Categories of Decision Support Systems (DSS)

The Decision Support Systems can be divided into following categories:

- **Model-driven DSS**

A model-driven DSS was based on simple quantitative models. It used limited data and emphasized manipulation of financial models. A model-drive DSS was used in production

planning, scheduling and management. It provided the most elementary functionality to manufacturing concerns.

- **Data-driven DSS**

Data-driven DSS emphasized the access and manipulation of data tailored to specific tasks using general tools. While it also provided elementary functionality to businesses, it relied heavily on time-series data. It was able to support decision making in a range of situations.

- **Communication-driven DSS**

As the name suggests, communication-driven DSS uses communication and network technologies to facilitate decision making. The major difference between this and the previous classes of DSS was that it supported collaboration and communication. It made use of a variety of tools including computer-based bulletin boards, audio and video conferencing.

- **Document-driven DSS**

A document-driven DSS uses large document databases that stores documents, images, sounds, videos and hypertext docs. It has a primary search engine tool associated for searching the data when required. The information stored can be facts and figures, historical data, minutes of meetings, catalogs, business correspondences, product specifications, etc.

- **Knowledge-driven DSS**

Knowledge-based DSS are human-computer systems that come with a problem-solving expertise. These combine artificial intelligence with human cognitive capacities and can suggest actions to users. The notable point is that these systems have expertise in a particular domain.

- **Web-based DSS**

Web-based DSS is considered most sophisticated decision support system that extends its capabilities by making use of

worldwide web and internet. The evolution continues with advancement in internet technology.

- **Text Oriented DSS** – It contains textually represented information that could have a bearing on decision. It allows documents to be electronically created, revised and viewed as needed.
- **Spreadsheet Oriented DSS** – It contains information in spread sheets that allows create, view, modify procedural knowledge and also instructs the system to execute self-contained instructions. The most popular tool is Excel and Lotus 1-2-3.
- **Solver Oriented DSS** – It is based on a solver, which is an algorithm or procedure written for performing certain calculations and particular program type.
- **Rules Oriented DSS** – Procedures are adopted in rules oriented DSS. Expert system is the example.
- **Compound DSS** – It is built by using two or more of the five structures explained above.
- **Status Inquiry System** – It helps in taking operational, management level, or middle level management decisions, for example daily schedules of jobs to machines or machines to operators.
- **Data Analysis System** – It needs comparative analysis and makes use of formula or an algorithm, for example cash flow analysis, inventory analysis etc.
- **Information Analysis System** – In this system data is analyzed and the information report is generated. For example, sales analysis, accounts receivable systems, market analysis etc.
- **Accounting System** – It keeps track of accounting and finance related information, for example, final account, accounts receivables, accounts payables, etc. that keep track of the major aspects of the business.
- **Model Based System** – Simulation models or optimization models used for decision-making are used infrequently and creates general guidelines for operation or management.

6.3. Attributes of a Decision Support Systems (DSS)

- Adaptability and flexibility
- High level of Interactivity
- Ease of use
- Efficiency and effectiveness
- Complete control by decision-makers
- Ease of development
- Extendibility
- Support for modelling and analysis
- Support for data access
- Standalone, integrated, and Web-based

6.4. Characteristics of Decision Support Systems (DSS)

- Support for decision-makers in semi-structured and unstructured problems.
- Support for managers at various managerial levels, ranging from top executive to line managers.
- Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level.
- Support for interdependent or sequential decisions.
- Support for intelligence, design, choice, and implementation.
- Support for variety of decision processes and styles.
- DSSs are adaptive over time.

6.5. Benefits of Decision Support Systems (DSS)

- Improves efficiency and speed of decision-making activities.
- Increases the control, competitiveness and capability of futuristic decision-making of the organization.
- Facilitates interpersonal communication.
- Encourages learning or training.

- Since it is mostly used in non-programmed decisions, it reveals new approaches and sets up new evidences for an unusual decision.
- Helps automate managerial processes.

6.6. Components of Decision Support Systems (DSS)

Following are the components of the Decision Support System –

- **Database Management System (DBMS)** – To solve a problem the necessary data may come from internal or external database. In an organization, internal data are generated by a system such as TPS and MIS. External data come from a variety of sources such as newspapers, online data services, databases (financial, marketing, human resources).
- **Model Management System** – It stores and accesses models that managers use to make decisions. Such models are used for designing manufacturing facility, analyzing the financial health of an organization, forecasting demand of a product or service, etc.
- **Support Tools** – Support tools like online help; pulls down menus, user interfaces, graphical analysis, error correction mechanism, facilitates the user interactions with the system.

Summary

- a computer-based application or program
- that compiles, combines and analyzes raw data, documents, fundamentals of social science, applied science, mathematics and managerial science, and personal knowledge (of decision maker/s)
- to identify problems and determine their solutions
- in order to facilitate optimal decision making

A decision support system is an interactive computer application that has complete access to information about your organization. When used, it offers comparative figures between one period and the next. It projects revenue figures based on assumptions related to product sales. A DSS is smart enough to help you understand the expenses involved in and consequences resulting from different decision alternatives.

A decision support system helps overcome the barriers to a good decision making, including:

- lack of experience
- biasness
- shortage of time
- wrong calculations
- not considering alternatives

Let Us Sum Up

In this unit, we dealt about the DSS-Concepts, Methods and Functions.

Check Your Progress

1. A ____ is a computer application used to support determinations, Decisions and courses of action in an organization or a business.
2. A Decision Support System (DSS) is an application for information systems that helps in ____
3. A Decision Support System (DSS) gathers and analyzes data, produce it to create comprehensive information ____
4. DSS is most widely used in the ____, analysis in an organization.
5. What is called Model Management System?

Glossaries

Keywords	Explanation
Web-based DSS	Web-based DSS is considered most sophisticated decision support system that extends its capabilities by making use of worldwide web and internet.
Data-driven DSS	Data-driven DSS emphasized the access and manipulation of data tailored to specific tasks using general tools.
Model Based System	Simulation models or optimization models used for decision-making are used infrequently and creates general guidelines for operation or management.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://www.investopedia.com/terms/d/decision-support-system.asp>
2. <https://corporatefinanceinstitute.com/resources/management/decision-support-system-dss/>

Answers to Check Your Progress

1. Decision Support System (DSS)
2. Decision Making
3. Reports
4. Planning
5. Model Management System – It stores and accesses models that managers use to make decisions. Such models are used for designing manufacturing facility, analyzing the financial health of an organization, forecasting demand of a product or service, etc

Unit -7

Executive information system and Management Information System (MIS)

Overview

Learning objectives

7.1 Executive Information System (EIS) – Meaning

7.2 Characteristics of Executive Information System (EIS)

7.3 Advantages of Executive Information System (EIS)

7.4 Disadvantages of Executive Information System (EIS)

7.5 Difference between Executive Information System (EIS) and Decision Support System (DSS)

7.6 Management Information System (MIS)

7.7 Evolution of Management Information System (MIS)

7.8 Objective of Management Information System (MIS)

7.9 Characteristics of Management Information System (MIS)

7.10 Advantages of Management

7.11. Disadvantages of Management Information System (MIS)

7.12. Types of Management Information System (MIS)

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Meaning of Executive Information System (EIS) Characteristics of Executive Information System (EIS), Advantages of Executive Information System (EIS), Disadvantages of Executive Information System (EIS) Difference between Executive Information System (EIS) and Decision Support System (DSS), Management Information System (MIS), Evolution of Management Information System (MIS), Objective of Management Information System (MIS) Characteristics of Management Information System (MIS),

Advantages of Management Information System (MIS), Disadvantages of Management Information System (MIS) and Types of Management Information System (MIS)

Learning Objectives

At the end of this unit you will be able to understand

- Executive Information System (EIS) Characteristics of Executive Information System (EIS)
 - Management Information System (MIS)
 - Characteristics of Management Information System (MIS)
-

7.1 Executive Information System (EIS) - Meaning

Executive Information System (EIS) is a kind of decision support system (DSS) used in organizations to help executives in decision making. It does so by providing easy access to important data needed in an organization to achieve strategic goals. An **EIS** usually has graphical displays on a user-friendly interface.

Executive information systems can be used for monitoring company performance in many different types of organizations as well as for identifying opportunities and problems.

Early executive information systems were developed on mainframe computers as computer-based programs to provide the description, sales performance and/or market research data for senior executives of a company. Executives, however, were not all literate or confident about the computers. Also, **EIS** data endorsed only executive-level decisions that did not necessarily support the entire company or enterprise.

Current **EIS** data is available on local area networks (LANs) throughout the company or enterprise, facilitated by personal computers and workstations. Employees can access company data to help make decisions in their workplaces, departments, divisions, etc. This enables employees to provide relevant information and ideas above and below the level of their company.

Executive support systems are intended to be used directly by senior managers to support unscheduled strategic management decisions. Often such information is external, unstructured and even uncertain. Often, the exact scope and context of such information are not known in advance.

This information is based on data,

- Business intelligence
- Financial intelligence
- Data with technology support to analyze

7.2 Characteristics of Executive Information System (EIS)

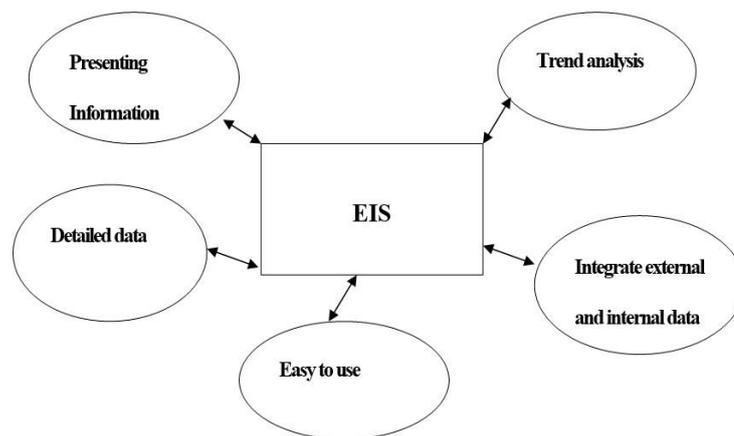


Figure.7.1. Characteristics of Executive Information System

-
- **Detailed data** – EIS provides absolute data from its existing database.
 - **Integrate external and internal data** – EIS integrates integrate external and internal data. The external data collected from various sources.
 - **Presenting information** – EIS represents available data in graphical form which helps to analyze it easily.
 - **Trend analysis** – EIS helps executives of the organizations to data prediction based on trend Data
-

- **Drill-Down Capabilities** : This helps the executive to get the details from particular information, e.g., drop in corporate sales in a particular region. In systems that use graphical user interface, hypertext-style connections are used for information gathering. In menu-driven systems, sub-menus are used to access the detailed information at each level.

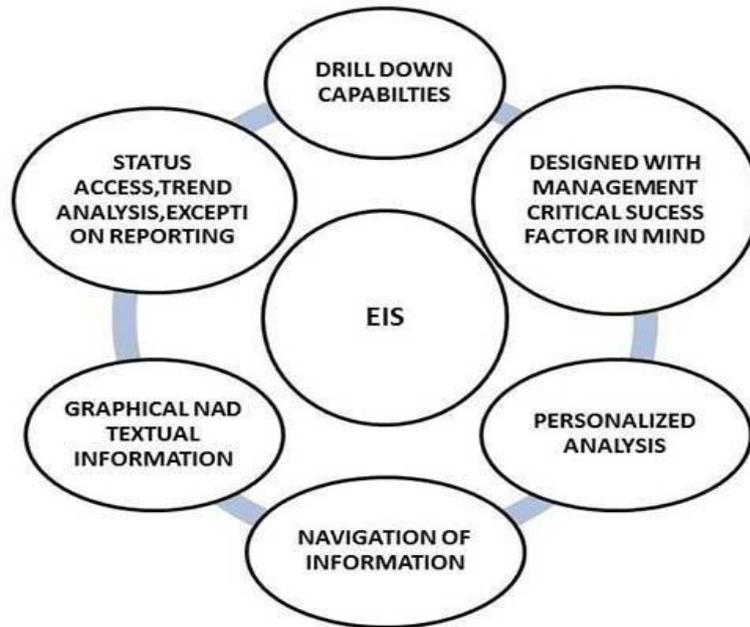


Figure.7.2. Executive Information System

- **Designed with Management's Critical Success Factors In Mind :**

Each company has its own critical aspects to achieve the organisational objectives. These aspects can be at the individual, departmental and organisational level.

- **Status Access, Trend Analysis and Exception Reporting :**

This permits executives to get the recent data on any key variable. Trend analysis supports the executive to study data over a given timeline. Hence, timing and significance of information are too crucial. Permission to highlight deviations from the established norm in

the organisation is allowed in case of exception reporting, which also include reason of deviation.

- **Personalized Analysis :**

Built-in functions are used to examine problematic situations in EIS. With the help of these functions, executives become capable to specify the data required for the analysis and the format type (in which results are displayed) of results.

- **Navigation of Information :**

This allows access of large amounts of data in a very short time span with accurate results. Forward and backward path access, skipping screens while accessing a selected part of the system are the examples of it.

- **Presents Graphical, Tabular and/or Textual Information :**

Terminal presentation of gathered information to executive users may be in various formats like textual formats, tabular and/or graphical.

7.3 Advantages of Executive Information System (EIS)

- Executive Support System or Executive Information System can be easily used by super level executives for decision-making, as extensive computer knowledge is not required for this.
- It has trends analysis capability.
- Enhances the manager's leadership skills.
- Helps in better personal thinking and decision making.
- It involves strategic control flexibility.
- Leads to healthy competition in the market place.
- Existing information can be easily accessed.
- Acts as an instrument of change.
- An executive time horizon is increased.
- Leads to a better reporting system.
- Helps executives to get a better mental model of business.
- Assists in consensus building and communication.

- Adds to the efficiency, timeliness, and accuracy of office automation.
- Considerably reduces time taken for finding and integrating information.
- Organisation's performance can be recognized early.
- Detailed scrutiny of critical success factors.
- Provides better understanding of enterprise operations.
- Increases productivity by helping time and team coordination.
- Capacity and quality of communication is increased.

7.4 Disadvantages of Executive Information System (EIS)

- Its functions are limited, as it cannot perform complex calculations.
- It is difficult to quantify the advantages and justify its implementation.
- Information overload is encountered by executives.
- Systems are prone to become slow, large and hard to manage.
- Keeping recent data is tough.
- Leads to less reliable and insecure data.
- Huge cost of implementation encountered by small scale organisations.
- Due to technical functions, not to easy to use by everyone
- Difficult to manage database due to the large size of data
- Excessive costs for small business organizations

7.5. Difference between Executive Information System (EIS) and Decision Support System (DSS)

The table shows the comparison between the EIS and DSS:

Dimension	Executive Information System	Decision Support Systems
Focus	Accessing of Status, drill down.	Analysis for decision support.
Typical Users	Senior administrators.	Professionals, Analysts, managers.
Impetus	Expediency	Effectiveness
Application	Performance evaluation, environmental scanning, identification of problems and opportunities.	They are applicable in different areas where managerial decisions are made.
Decision Support	Supports indirectly high-level and unstructured decisions and policies.	Supports semi-structured and non-programmed decision-making, ad-hoc decisions etc.
Type of Information	News items. customers information, Information supporting particular situations, competitors, and the external environment: scheduled and demand reports on internal operations.	Information supporting particular situations.
Principal Use	EIS is used for tracking and controlling as well as identification of opportunity.	DSS are mainly used for planning, organising, staffing, and controlling.
Adaptability to Individual Users	Custom-made to the decision-making style of each individual executive, offers several alternatives of outputs.	Permits individual judgments, what-if capability some choice of dialog style.
Graphics	Graphics are necessarily used for EIS	It is the main part of many DSS.
User Friendliness	User-Friendliness is necessary for EIS.	If no intermediaries are used, then user-

		friendliness is must for DSS.
Processing of Information	Tracks critical data and information, filters and compresses information.	EIS generates questions and answers worked out by using the DSS and gives back to the EIS.
Supporting Detailed Information	Immediate access the supporting details of any summary.	This can be programmed into the DSS but generally not happens.
Model Base	Limited built-in functions.	Model base is core of the DSS.
Construction	The vendors or IS specialists generally DSS is constructed by users. constructs the EIS.	DSS is constructed by users.
Hardware	RISC Workstations, Mainframe, Web, LANs or distributed system.	RISC workstations, Mainframe, LANs, or distributed systems.
Nature of Software Packages	Easy access to multiple databases.	Large computational capabilities, modelling languages and simulation, application and DSS generators.
Nature of Information	Shows the pre-generated information about the past and present generates new information about the past, present, and future.	Generates new information about the past, present and future.

7.6. Management Information System (MIS)

Management Information Systems (MIS) are used by tactical managers to monitor the organization's current performance status. The output from a transaction processing system is used as input to a management information system.

The MIS system analyzes the input with routine algorithms i.e. aggregate, compare and summarizes the results to produced reports that tactical managers use to monitor, control and predict future performance.

For example, input from a point of sale system can be used to analyze trends of products that are performing well and those that are not performing well. This information can be used to make future inventory orders i.e. increasing orders for well-performing products and reduce the orders of products that are not performing well.

Examples of management information systems include;

- **Sales management systems** – they get input from the point of sale system
- **Budgeting systems** – gives an overview of how much money is spent within the organization for the short and long terms.
- **Human resource management system** – overall welfare of the employees, staff turnover, etc.

Tactical managers are responsible for the semi-structured decision. MIS systems provide the information needed to make the structured decision and based on the experience of the tactical managers, they make judgement calls i.e. predict how much of goods or inventory should be ordered for the second quarter based on the sales of the first quarter.

A management information system (MIS) is a computer system of hardware and software that acts as the foundation for an organization's operations. An MIS collects data from various online systems to support management decision-making, analyses the information, and reports data.

In an organization, it is utilized for information coordination, control, analysis, and visualization. People, procedures, and technology are all involved in studying management information systems in an organizational setting. It provides businesses and organizations with technology that facilitates communication and information flow, assisting in issue-solving and giving an organization a competitive edge.

7.6. 1. Role of Management Information System (MIS)

A management information system (MIS) is a computerized financial data database set up and designed to generate regular reports on operations for all levels of management within a firm. Additionally, specific reports can typically be easily obtained from the system. The major goal of the MIS is to provide managers with feedback on their performance so that upper management can keep an eye on the entire business. The MIS often compares "actual" data to "planned" outcomes and results from the previous year to gauge progress toward goals.

Data from corporate departments and functions are sent to the MIS. Some information is gathered automatically through computer-connected check-out counters, while other information is manually entered at regular intervals. Other reports are acquired using built-in query languages, while routine reports are pre-programmed and performed periodically or on demand. Managers use display functions integrated into the system to check progress at desk-side PCs connected to the MIS by networks. The performance of the company's stock is also tracked and shown by several sophisticated systems.

7.7. Evolution of Management Information System (MIS)

It's useful to divide the history of management information systems into four or five periods to make sense of its evolution.

Mid-1960s to mid-1970s:

Information systems were centralized during the early years of computerized MIS and were only focused on management and governance requirements. Accounting departments were in charge of most information systems and their reports.

Mid-1970s to mid-1980s:

Even though MIS was still primarily focused on management and oversight, additional departments were starting to take advantage of the

technology. The form and scope of additional Information Systems steering groups and user-led initiatives often established projects.

Mid-1980s to late 1990s:

This period saw the growth of centralized information systems and the decentralization of information. Every division has its computer network. Information management was frequently referred to as "herding cats." A new job to handle the acquisition and operation of various information systems evolved in many businesses during this time.

The late 1990s to today:

Information systems are still closely related to governance and management in the modern period, but they are extensively dispersed and accessible to almost every employee across several platforms. So that a client firm can easily access supplier information and their consumers, in turn, may access that information, many information systems are integrated amongst various companies.

Today forward:

The rapid growth in internet bandwidth has resulted in a significant reliance on cloud computing. Some claim that this heralds a new era in the rise of the worker and that this is the era of management information systems. Nowadays, almost any employee can make educated judgments because of the tools that are easily accessible across several platforms. The distinction between those who create and those who use MIS information is becoming increasingly hazy.

7.8. Objective of Management Information System (MIS)

The major objectives of an MIS are to assist executives in decisions that further the business's strategy and to implement the organizational structure and dynamics of the firm to manage the organization more effectively and gain a competitive advantage.

Some MIS objectives are as follows:

Data Capturing: Data is collected by MIS from various organizational internal and external sources. Data might be captured manually or via computer terminals.

Processing of Data: The recorded data is processed to create the necessary information. Data processing includes tasks including calculating, sorting, categorizing, and summarizing.

Storage of Information: The processed or unprocessed data is kept in the MIS for further use. Any information that is not immediately needed is preserved as a record for the organization to use later.

Retrieval of Information: As and when needed, the management information system gets data from its databases for various users.

Dissemination of Information: The organization's users receive information, a finished product of the management information system. It occurs regularly or online via a computer terminal.

7.9. Characteristics of Management Information System (MIS)

System approach: MIS adheres to the system approach, which denotes a step-by-step procedure for examining a system's operation in the context of the goal for which it was created. It entails having a comprehensive perspective on how organizational subsystems function.

Management-oriented: The management-oriented nature of MIS suggests that a top-down MIS design methodology must be used. According to a top-down approach, management needs and business objectives are decided upon at the start of system development. MIS suggests management that works dynamically with system development to reach management decision completeness.

According to requirements: The MIS should be designed and developed based on the data that managers need. Strategic planning, management control, and operational control are three separate levels at which the necessary design and development information is found. Accordingly, MIS should address the unique requirements of managers at various levels of an organization's hierarchy.

Future-focused: MIS should be designed and developed with the future in mind so that it is not limited to providing only historical data.

Integrated: A full MIS combines all its sub-components to deliver the pertinent data to make a wise decision. An essential element of MIS is an integrated system that combines data from several operating domains.

Common data flows: This idea underpins several fundamental perspectives on system analysis, including reducing duplication, merging related tasks, and streamlining processes. The increase of common data flow is a sensible and cost-effective idea.

Long-term planning: Since MIS entails logical planning for an organization's success, it should always be developed as a long-term plan. The analyst should consider the demands of the business and future-focused analyses when creating MIS.

Relevant relationship between subsystem planning: The development of the MIS should be broken down into its associated subsystems. These supporting systems must be useful with careful planning.

Central database: Data are presented in tabular form in the central database. This database contains data related to inventories, employees, clients, and other sources of information.

The database is responsible for record insertion, deletion, and updating processes.

7.10. Advantages of Management Information System (MIS)

Facilitates planning: With the size and complexity of organization's growing, managers now work remotely rather than from the place of operations, thanks to the useful information that MIS gives for effective decision-making.

Minimizes Information Overload: MIS aid in segmenting data into more manageable, pertinent components for decision-making. As a result, enormous amounts of organized data are less confusing.

MIS Encourages Decentralization: Decentralization of power is made possible via MIS. This aids in updating organizational policies and practices. As there are minority systems at lower levels of performance measurement, this is plausible.

Brings Coordination: All organizational decision-making nodes are connected through MIS. This guarantees an organization's efficient operation. It helps with the absorption of specialized activity so that each area can understand the needs and difficulties of others.

Makes Control Easier: MIS is a crucial instrument connecting managerial planning and control. MIS uses computers to expand data processing and storage capacity while decreasing costs. It improves management's capacity to assess and raise performance.

7.11. Disadvantages of Management Information System (MIS)

Quite expensive to set up and configure: The main drawback of MIS is that it is extremely expensive to deploy for a business. Numerous hardware and software components are needed for this information system to function.

Lack of Flexibility to Update Itself: MIS can't automatically update itself like many other applications. The system must be manually updated by collecting raw data and putting it into it for processing and updating previously stored data.

Risk of fraud: At every transaction stage, appropriate controls and checks must be made. Any breach could lead to potentially dangerous situations, such as an intruder posting unlawful transactions.

Takes into Account only Qualitative Factors: MIS ignores non-qualitative aspects, including employee morale, attitude, and motivation, in favour of just considering qualitative factors.

Heavy reliance on technology: In computerized information systems, technology is heavily reliant. Information cannot be accessible during any device or software failure until the necessary software or hardware has been replaced.

7.12. Types of Management Information System (MIS)

Management Reporting System

It is a database that tracks all the finances and business activities at various management levels. Middle-level managers typically utilize a management reporting system to produce frequent reports by comparing past and present financial performance to assess financial growth. The intermediate-level managers can also use it to analyze their performance. The senior-level managers compare the company's present financial situation and operational effectiveness against the

company's established goals using data supplied by the reporting system.



Figure.7.3. Management Reporting System

Process Control Systems

This system focuses on physical or industrial business activities, such as car assembly, oil refining, or metal manufacturing. The process control system continuously collects data and produces a report on the system's performance. The report helps the management assess how well the process is working and provides information on when a specific event occurred. Additionally, it reveals how frequently the production system deviates from a cyclical production process. This kind of data is useful for assessing the production system's effectiveness and maintaining control over worker and equipment safety.

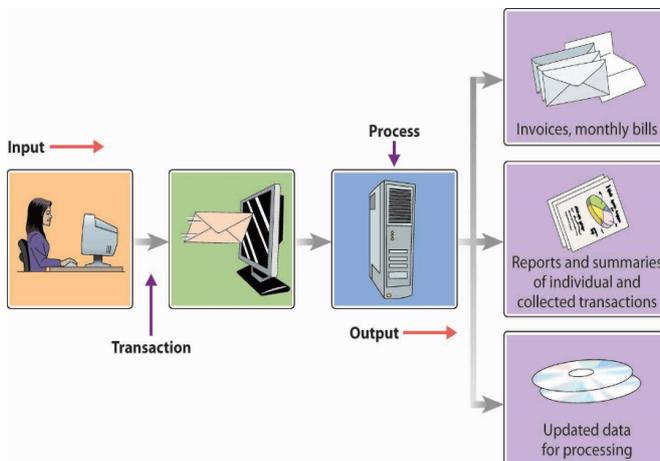


Figure.7.4. Process Control Systems

Sales and marketing system

Managers can monitor a company's sales and advertising effectiveness through sales and marketing systems. Through client reviews and comments, marketing systems can generate reports that assist managers in raising the calibre of their products. Marketing managers that utilize sales systems can use reports to learn more about expected sales and assess how they compare to present earnings. They can use this to recognize patterns and develop solutions for future development. These systems can keep track of price discrepancies between products and the current promotions and advertising campaigns that specific retailers use. Managers may use this information to track a product's sales and target additional promotions or discounts.



Figure.7.5.Sales and marketing system

Inventory control system

It keeps track of every inventory-related event, such as theft, spoilage, and inventory on hand, enabling management to see which products are selling out more quickly and require restocking, either in specific retail locations or the business warehouse. The movement of

inventory into the warehouse, from the warehouse to the stores, sales, and returns are all tracked by the inventory control system.



Figure.7.6. Inventory control system

Accounting and Finance systems

It keeps track of an organization's assets and investments. It compiles all the information relevant to the financial reports required by law for federal, state, and local taxes, payroll, and pension funds. If the institution publishes yearly reports, the accounting and finance system delivers the reports required for such audits. It also makes it easier to post daily transactions, such as sales revenue, returns, and bank deposits. This method is the foundation for monthly statements like the profit and loss and balance sheets. In addition, these statements assist managers in comparing the company's current financial success to its historical results and setting targets for future expansion.

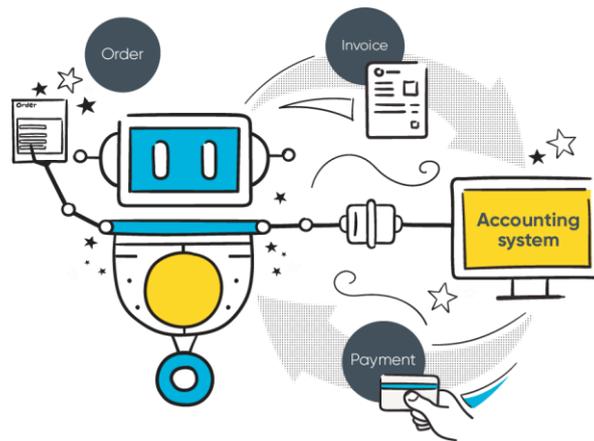


Figure.7.7. Accounting and Finance systems

Human resources

With the use of this information management system, management may regulate how information is distributed throughout the company. The office automation information system includes electronic tools that managers use to communicate with other departmental managers, their staff, or even with other employees. Payroll, benefits, and retirement are all financial components of the accounting and financial systems that are tracked by this system. The human resource system also tracks numerous more things. Providing notices of statutory compliance required training sessions, and HR regulations facilitate communication between staff members, HR, and management.



Figure: 7.8.Human Resource

Decision support system

Decision support systems collect information from both internal and external sources to assist managers in making business choices. Data from other departments, such as financial data, inventory data, or current sales margins for a quarter, are examples of data from internal sources. External data sources include industry developments, interest rates, and costs with rival businesses or suppliers. When making judgments on building growth, annual work quotas, or new policy creation, a manager may employ a decision support system.



Figure 7.8. Decision support system

Executive information system

The executive information system is made to help executive management oversee executives. By providing information in tables and charts, this system makes it simple for managers to analyze data and make informed judgments.



Figure.7.9. Executive information system

Marketing information systems

The Marketing Information System refers to the systematic gathering, analysis, interpretation, storage, and presentation of market information to marketers regularly and continuously from internal and external sources. It gives marketers important details to decide how best to carry out marketing operations, such as pricing, packaging, new product development, distribution, media, and promotion.



Figure.7.10. Marketing information systems

Transaction system

Transaction process systems capture data during an organization's daily transactional activity. They can also keep an eye on other regular operations like queues of goods or reservations for various commodities. Payroll and other corporate operations involving deposits can be automated with transaction systems.



Figure.7.11. Transaction system

School Information management system

A school information system (SIMS) enables a school to operate efficiently. Many schools are utilizing this technology to handle all of the behind-the-scenes operations of a school as well as meld the brains of young people. The school information system has decreased the workload of maintaining and managing student attendance records.

Let us Sum Up

In this unit, we dealt about the Executive Information System (EIS) Characteristics of Executive Information System (EIS), Difference between Executive Information System (EIS) and Decision Support System (DSS), Management Information System (MIS), Evolution of Management Information System (MIS), Objective of Management Information System (MIS) Characteristics of Management Information System (MIS).

Check Your Progress

1. .Executive Information Systems are ___based programs.
2. Projections and responses to queries are information output characteristics associated with an_____.
3. Summary transaction data, high-volume data, and simple models are information inputs characteristic of a(n)_____.
4. The systems _____present information in a very highly summarised form.
5. What is called MIS?

Glossaries

Keywords	Explanation
MIS Encourages Decentralization	Decentralization of power is made possible via MIS. This aids in updating organizational policies and practices.
Navigation of Information	This allows access of large amounts of data in a very short time span with accurate results.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Suggested Readings

1. <https://www.geeksforgeeks.org/difference-between-dss-and-ess/>
2. https://www.tutorialspoint.com/management_information_system/executive_support_system.htm

Answers to Check Your Progress

1. Main frame
2. ESS
3. MIS
4. ESS
5. Marketing information systems-The Marketing Information System refers to the systematic gathering, analysis, interpretation, storage, and presentation of market information to marketers regularly and continuously from internal and external sources. It gives marketers important details to decide how best to carry out marketing operations, such as pricing, packaging, new product development, distribution, media, and promotion.

Unit - 8

Transaction Processing System (TPS), Executive support Systems (ES)

Overview

Learning objectives

8.1 Transaction Processing System (TPS)

8.2 Transaction System Components

8.3 Importance of Transaction Processing System

8.4 Transaction Process System Activities

8.5 Objectives of Transaction Process System

8.6 Characteristics of Transaction Process System

8.7 Transaction Processing System Advantages & Disadvantages

8.8 Executive Support System

8.9 Advantages and Disadvantage of Executive Support System

9.0 Expert System and its components

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Instructions

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Transaction Processing System (TPS) and its Components, Importance of Transaction Processing System, Transaction Characteristics of Transaction Process System, Transaction Processing System Advantages & Disadvantages, Executive Support System, Advantages and Disadvantage of Executive Support System, Expert System and its components.

Learning Objectives

At the end of this unit you will be able to understand

- Transaction Processing System (TPS) and its Components,
- Importance of Transaction Processing System, Transaction Characteristics of Transaction Process System,
- Transaction Processing System Advantages & Disadvantages ,
- Executive Support System, Advantages and Disadvantage of Executive Support System,
- Expert System and its components

8.1 Transaction Processing System (TPS)

Transaction processing systems are used to record day to day business transactions of the organization. They are used by users at the operational management level. The main objective of a transaction processing system is to answer routine questions such as;

- How printers were sold today?
- How much inventory do we have at hand?
- What is the outstanding due for John Doe?

By recording the day to day business transactions, TPS system provides answers to the above questions in a timely manner.

- The decisions made by operational managers are routine and highly structured.
- The information produced from the transaction processing system is very detailed.

For example, banks that give out loans require that the company that a person works for should have a memorandum of understanding (MoU) with the bank. If a person whose employer has a MoU with the bank applies for a loan, all that the operational staff has to do is verify the submitted documents. If they meet the requirements, then the loan application documents are processed. If they do not meet the

requirements, then the client is advised to see tactical management staff to see the possibility of signing a MoU.

Examples of transaction processing systems include;

- **Point of Sale Systems** – records daily sales
- **Payroll systems** – processing employee's salary, loans management, etc.
- **Stock Control systems** – keeping track of inventory levels
- **Airline booking systems** – flights booking management

Transaction Processing System

A TPS is software that ensures the completion of a business transaction and also keeps track of transactions. An online transaction processing system (OTPS) is an equivalent system that online merchants use for e-commerce. The TPS ensures that each transaction is successful by storing, sending and receiving information via a database. It supplements the business point of sale system (POS), which is the unit that reads credit cards, prints receipts and accepts and stores cash. For example, if a customer purchases a book from a shop, they might pay with a credit card. A TPS takes the customer's card information, communicates with their bank and approves or declines the purchase based on their account balance.

What is a Transaction Processing System?

It is an information processing system that captures and processes every single transaction that takes place within the organization. These transactions include activities involving collection, retrieval, modification, and all other sets of activities that trigger the retrieval of all transactions. A transaction processing system is highly reliable, consistent, and efficient. Transaction processing systems may also be referred to as real-time processing systems.

Transaction processing is often compared with batch processing. These two are fundamentally different processing systems that vary in their speed, processing manner, and accuracy of the events.

Since a TPS is a real-time processing system, all the events and transactions that occur in the organization or over the system are processed immediately causing no delay. It is one of the most used technologies in all online transactions and is called an Online Transaction Processing System (OLTP).

8.2 Transaction System Components

- **Inputs**

An input is an original request for a product or payment that an outside party sends to a company's TPS. If your company uses batch processing, its TPS stores groups of inputs and then processes them at a later time. In comparison, if your company uses a real-time system, it processes each input as it arrives.

Inputs typically include:

- Invoices
- Bills
- Coupons
- Custom orders

- **Processing System**

The processing system reads each input and creates a useful output, such as a receipt. This element can help you define the input data and what the output should be. Based on the kind of TPS your company is using, processing times can vary.

- **Storage**

The storage component of TPS refers to where a company keeps its input and output data. Some companies store these documents in a

database. The storage component ensures the organization, security and accessibility of every document for later use.

For example, if a vendor would like to confirm that your company has paid an invoice, you can check your system's storage to find the invoice and determine if you delivered a payment.

- **Output**

TPS outputs are documents the system generates once it completes processing all inputs, such as receipts the company stores in its records. These documents can help validate a sale or transaction and provide important reference information for tax and other official purposes.

8.3 Importance of Transaction Processing System

- **Handling and Managing Operations**

TPS is an excellent technology in handling and managing the everyday operations of any given organization. It allows multitasking at a wider level with an unmatched ability to process thousands of transactions at the same time without any delay or break-down.

- **Tapping the Raw Markets**

TPS is a carrier tool for any business since it gives businesses the freedom to operate in different segments of society by working remotely. This operability gives the businesses an opportunity to tap, exist and grow in newer markets that are raw and full of opportunities.

8.3. Different Types of Transaction Processing System

There are basically two types of transaction processing:

- **Batch Processing**

As the name suggests, the processing of transactions takes place over batches. These batches can be customized as per

organization requirements. For example, a company may want to process the payroll of its employees in a weekly or bi-weekly manner, thus the batches of employee salaries will be processed over a span of one and two weeks respectively. There is generally a time delay in this type of processing.

- **Real-time Processing**

Under real-time processing, every single transaction is processed with immediate effect. There is no time delay in the real-time processing system.

8.4. Transaction Process System Activities

Processing business transactions was the first application of computer of most firms. Since the 1950s, Transaction processing system (TPS) have evolved from slow, manual systems to advanced computerized system. TPS, a cross-functional information system were among the earliest computerized systems developed to record, process, validate, and store business for future use or retrieval. Transactions are the economic events or exchange between two or more business entities. Basically, TPS is an organized collection of people, procedures, databases, and devices used to record completed business transaction and store data about these transaction.

- **Data collection:** The process of capturing and gathering the needed data to complete transactions. Data collection can be manual process or automated process. The usage of automated data collection devices have made data collection faster, more efficient and reliable and allow firms to use the collected data in much more flexible ways. For example, retail stores use scanners to read the bar code from product packages and automatically enter the price item to TPS. Once the price data is entered, the computer will determine customer's bill.
- **Data manipulation:** The process of performing calculation and other data transformation related to business transactions and store data and information in organization's database for further

processing. For example, in a payroll TPS, managers multiply employee's hours worked times the hourly pay rate.

- **Data storage:** Data storage involves placing transaction data or information in database. The stored data can be further processed and manipulated by other information system. In other words, the data appears to be the source of data for other information systems
- **Data production:** The process of outputting records and reports. The documents may be in the form of hard copy paper reports or soft copy where documents are displayed on computer screens.

8.5. Objectives of Transaction Process System

Organizations expect their TPS to accomplish a number of specific objectives such as:

- **Process data generated by and about transactions:** The primary objective of TPS is to capture, gather, process, and store transactions and to produce useful documents related to routine business activities to managers.
- **Maintain high degree of accuracy:** One of the objectives of TPS is error free data input and processing. In manual TPS, the resulting transactions were often inaccurate because human are fallible, resulting in wasted time, effort and requiring resources to correct them. In contrast, with computerized TPS, transaction processed appeared to be accurate or errors were minimized because accuracy checks were done by both humans and computer system.
- **Ensure data and information integrity:** TPS ensure that all the data and information stored in databases are always accurate, current, appropriate and up to date.
- **Produce timely documents and reports:** Manual TPS take longer time than computerized TPS to produce routine documents. Computerized TPS and the improvements in information technology (IT) allow transaction to be processed in a very short period of time.
- **Increase labour efficiency:** Manual TPS were labour intensive in which the process of business transaction is done by hand. With computerized

TPS, firms can reduce the need of many labours as computer can replace human labours, thus saving the cost.

- **Help provide increased and enhanced services:** TPS assist organization in providing superior customer service. For example, computerized TPS enable customer to place orders for raw materials electronically and helps firms to track customer orders through all stages from order to delivery to receipt of payment. Thus, this allows firms to be more responsive to customer needs and queries.

8.6. Characteristics of Transaction Process System

- **Rapid response:** In order to shorten the waiting time of the users, TPSs are modified to process transactions instantly to ensure the data will be available in the shortest waiting time.
- **Reliability:** Due to the involvement of cash, the reliability of TPS has to be in place. TPSs have to be designed in a way to avoid the transactions slip past the net in the same time remain themselves operating permanently. Also the failure rate has to be remained within the tolerance levels. With that comprehensive safeguards and disaster recovery systems have to be incorporated by the designed TPSs.
- **Inflexibility:** Mistakes or errors can occur once the steps alter. To maximize the efficiency of the TPS, transactions have to be processed in the same order. With that, TPS interfaces have to be designed so that the identical data for each transaction can be acquired.
- **Controlled Processing:** Transaction processing monitor is found at every end of the computer to ensure that the transactions are correctly inputted. Still it requires human controls on it. TPSs can be used even in modify the data and fraudulent the transactions. With that the user of the system has to be restricted only for people who have the authorities.

- **Similar Structure and Integrity**

There are certain features of the TPS that need to stay intact to work the way it is supposed to. In order to ensure that the processing system works exactly the same way for every organization every single time, the structure must stay intact.

- **Authorised Control**

A good and ideal TPS allows only the authorized personnel to conduct the processing activities anytime. With the recent advancements, the newer versions even allow authorized personnel to gain access from a remote location as well but with high and stringent security checks.

- **User-friendliness**

A good TPS must be easy to use and user-friendly in order to promote increased usage of it. An easily operable TPS would also ensure there are minimal errors in the inputting data and conducting the processing activities.

How does a Transaction Processing System work?

The working of a transaction processing system can be conducted in two ways:

- **Processing in a Batch**

Batch processing is the traditional way of processing transactions. In this method, the transactions are collected, combined, and grouped in batches. These batches can be identified based on several parameters. Generally, the FIFO method is followed to do so. These batches are collected and stored and can be processed at any time. There is usually some time delay in the batch processing method.

- **Processing in real-time**

Real-time processing is a fruit of technological advancements. It was developed to cater to the needs to fast processing and real-time reflection of revenue entries for an organization. The time delay in the batch processing method accounted for a fair amount of loss in the revenues. Under this method, the transactions are processed in real-time and provide instant verification for the same as well.

8.7. Transaction Processing System Advantages & Disadvantages

Advantages of using TPS

1. It is a highly cost-effective and fast solution to all the revenue-related operations of any given organization.
2. It works through a highly stable and reliable database that stores and reflects the information as and when desired without any risk of information loss.
3. It allows for a quick recovery from any operational failure causing a very little delay in the transaction processing.
4. It allows remote functioning giving the freedom of free operation to businesses who want to grow across the globe.
5. It can be used both in a real-time manner and batch-processing manner.

Disadvantages of using TPS

1. Every business has different needs that must be dealt with exclusively. This calls for designing a customized solution for every single business that has some specific requirements.
2. Though it is a cost-effective solution, the initial cost of setting up and installation can be on the higher side.
3. Even with a highly sophisticated setup, you may need to deploy a large number of workforces for data input, managing and recording inventory, etc.

4. Though TPS is designed for handling a lot of data and work, overloading may lead to a system crash.
5. You need to have a certain specification of the hardware for TPS software to work smoothly.

Using the Transaction Processing System has revolutionized the way businesses were conducted across the globe. This infotech has eased out the revenue management system across organizations through its sophisticated and delicately designed operations. Learning designing and coding of Transaction Processing System can open up several opportunities for budding technology enthusiasts. To know more about TPS, reach out in the comments section below.

Transaction processing system (TPS), an information system (IS) mostly used by managers in operational management to record internal transactions, economic events that occur within an organization and external transactions where the business event took place outside the organization to make operational decision. TPS supports different tasks by setting a set of rules and guidelines that specify the ways to capture or collect process and store any transaction in a form of data or information.

8.8. Executive Support Systems

Executive support systems are intended to be used by the senior managers directly to provide support to non-programmed decisions in strategic management.

These information are often external, unstructured and even uncertain. Exact scope and context of such information is often not known beforehand.

This information is intelligence based

- Market intelligence
- Investment intelligence
- Technology intelligence

Examples of Intelligent Information

Following are some examples of intelligent information, which is often the source of an ESS

- External databases
- Technology reports like patent records etc.
- Technical reports from consultants
- Market reports
- Confidential information about competitors
- Speculative information like market conditions
- Government policies
- Financial reports and information.

8.9. Advantages and Disadvantage of Executive Support Systems

Advantages of Executive Support System (ESS)

- Easy for upper level executive to use
- Ability to analyze trends
- Augmentation of managers' leadership capabilities
- Enhance personal thinking and decision-making
- Contribution to strategic control flexibility
- Enhance organizational competitiveness in the market place
- Instruments of change
- Increased executive time horizons.
- Better reporting system
- Improved mental model of business executive
- Help improve consensus building and communication
- Improve office automation
- Reduce time for finding information
- Early identification of company performance
- Detail examination of critical success factor
- Better understanding
- Time management
- Increased communication capacity and quality

Disadvantage of Executive Support System (ESS)

- Functions are limited
- Hard to quantify benefits
- Executive may encounter information overload
- System may become slow
- Difficult to keep current data
- May lead to less reliable and insecure data
- Excessive cost for small company

8.10. Expert System and its components

An **expert system** is the highest form of automation of the management computing office which allows document communication and manipulation. Decision support systems help with problem-solving by allowing data and model manipulation. **Expert systems** go beyond conventional manipulation of this kind, as they allow experts to 'teach' computers about their fields so that fewer expert decision-makers can support the system more of the decision-making process.

Expert systems are one of the most cutting-edge information technology facts. That is, in some of the most complex and least-understood human information handling tasks, i.e. decision-making, problem-solving, diagnosis and learning, they help people. We do this by holding a large amount of factual information on a subject area, along with lines of reasoning employed in that field by human experts.

Expert System Components

The key components of Expert System are as followings,

1. **User Interface:** It contains a computerized system between the user and the machine for friendly communication. This system provides an interface to the user in a graphical way.
2. **Interference Engine:** It regains & determines the data process. It performs this task to deduce new facts which are subsequently

used to draw further conclusions. This component is associated with an expert system as the brain of the expert system.

3. **Knowledge Base:** This is the most important element of an expert system because it holds the expert's knowledge of problem-solving. It is here that the expert's elicited knowledge is stored. It contains the rules, facts and object descriptions, etc. The knowledge base is always stored in the data with the newest expert system products. The knowledgebase information is all that is needed to understand & formulate the problem, and then solve it.
4. **Data Acquisition Sub system:** The specialist has to learn the information reflected in the knowledge base. Information acquisition software is used by a person who has problem experience to build, incorporate or modify the base of knowledge. Potential knowledge sources include human experts, research reports, textbooks, databases and the experience of the user himself.

8.10. Advantages and Disadvantages Expert System

Advantages of Expert System

Expert System (ES) gives clear responses for routine actions, procedures and activities.

- Expert System (ES) retains significant levels of the knowledge base.
- Expert System (ES) supports organizations to explain the rationale of their decision-making.

Disadvantages Expert System

- Expert System (ES) doesn't reply creatively as a human expert in unusual ways.
- Expert System (ES) requires more technical aspects due to this difficult in use.
- Highly costlier system.

Let Us Sum Up

In this unit, we dealt about the Transaction Processing System (TPS) and its Components, Importance of Transaction Processing System, **Transaction Characteristics of Transaction Process System**, Transaction Processing System Advantages & Disadvantages, Executive Support System, Advantages and Disadvantage of Executive Support System, Expert System and its components.

Check Your Progress

1. A ____ is a set of information which processes the data transaction in database system that monitors transaction programs.
2. ____ processes multiple transactions at the same time.
3. ____ are designed to solve complex problems by reasoning through bodies of knowledge.
4. An Expert System is a ____ computer-based decision-making system.
5. What is called user interface?

Glossaries

Keywords	Explanation
User-friendliness	A good TPS must be easy to use and user-friendly in order to promote increased usage of it. An easily operable TPS would also ensure there are minimal errors in the inputting data and conducting the processing activities.
Data manipulation	The process of performing calculation and other data transformation related to business transactions and store data and information in organization's database for further processing.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Suggested Readings

1. <https://www.indeed.com/career-advice/career-development/what-is-transactionprocessing-system>
2. <https://www.includehelp.com/MIS/expert-system-in-management-information-system.aspx> .

Answers to Check Your Progress/Possible Answers

1. TPS
2. Batch
3. Expert Systems
4. Process and enhancement
5. **User Interface:** It contains a computerized system between the user and the machine for friendly communication. This system provides an interface to the user in a graphical way.

Block 3

Business Information system

Unit - 9 Business Information system and Functional Information System

Unit -10 Marketing Information System

Unit - 11 Personal Information Management Systems (PIMS), Manufacturing Information System, Quality Information System (QIS)

Unit - 9

Business Information system and Functional Information System

Overview

Learning objectives

9.1. Business Information system

9.2 Potential Careers in Business Information Systems

9.3. Characteristics of business information system

9.4 Components of Business Information System

9.5 Functional Information System and its Importance

9.5.1 Financial Information System

9.5.2 Marketing Information System

9.5.3 Production /manufacturing Information System

9.5.4 Human Resources Information System

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Business Information system, Potential Careers in Business, Information Systems, and Characteristics of business information system, Components of Business Information System, Functional Information System and its Importance.

Learning Objectives

At the end of this unit you will be able to understand

- Meaning and Definition of Management.
- Management as an Art, Science, Profession as a Process and Activity.
- Categories of Management.

9.1 Business Information system

Meaning

Business Information Systems is a field that involves information, technological systems, and people. This field is both applied and managerial and uses the tools, techniques, and concepts of various disciplines (such as computer science and management) to find solutions to a wide range of business problems.

9.2 Potential Careers in Business Information Systems

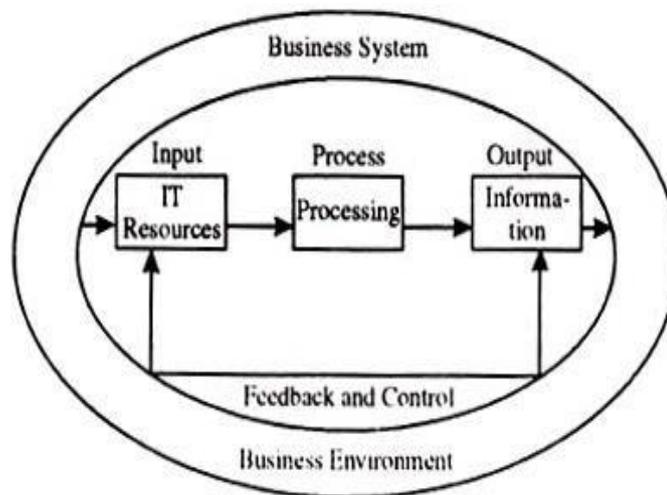


Figure.9.1. Potential Careers in Business Information Systems

Business information systems are sets of inter-related procedures using IT infrastructure in a business enterprise to generate and disseminate desired information.

Such systems are designed to support decision making by the people associated with the enterprise in the process of attainment of its objectives.

The business information system gets data and other resources of IT infrastructure as input from the environment and process them to satisfy the information needs of different entities associated with the business enterprise.



There are systems of control over the use of IT resources and the feedback system offers useful clues for increasing the benefits of information systems to business. The business information systems are sub-systems of business system and by themselves serve the function of feedback and control in business system.

9.3 Characteristics of business information system

The business information systems are subject to the dynamics of business environment and need to be flexible enough to absorb the inevitable changes in the information needs of business. They have to be efficient to satisfy the demanding and 'hard task masters,' the business managers. Thus, there is need to balance the conflicting objectives in the process of designing business information systems.

Business information systems need to be proactive. They should anticipate changes in information needs of users and accordingly adapt

themselves to suit their needs. This has become important because of the fact that the managers get involved in the routine activities to the extent that the decision making becomes a matter of imitating what competitors are doing or planning to do, rather than making an informed choice. The purpose of business information system is to cater to the information needs for decision making in business.

The business information systems have to be designed keeping in view the availability of financial and human resources to the business enterprise.

The cost effectiveness is a matter of prime concern in the development and maintenance of business information systems. Economic justification for investment in IT infrastructure for business information systems is a pre condition for its existence and sustenance.

9.4 Components of Business Information System

Information systems can be described by four of their key components which are:

1. Decisions
2. Transactions and processing
3. Information and its flow
4. Individuals or functions involved.

It is difficult to observe the decision process through we can see and review the results of a decision. Transactions are usually more visible, though many current systems use computer programs, which are not easy to understand, to process transactions. In principle, an observer can see information and its flows. Individuals can be observed too, but it is not always easy to figure out the information processing functions they perform.

9.5 Functional Information System and its Importance

“A functional information system is a system that provides detailed information about a specific type of activity or a related group of activities, as well as summarized information for management control,” it says.

A functional information system is a system that enables a business to take input from various sources, process it and generate output that is useful for the business. The main purpose of a functional information system is to support the business functions of an organization.

There are many different types of functional information systems, but some common examples include financial systems, human resources systems, and marketing systems. Each of these systems serves a different purpose, but they all work together to help a business run smoothly.

A functional information system can be as simple as a spreadsheet that tracks sales data, or as complex as a system that includes all of the company’s financial data. Regardless of its size or complexity, a functional information system must be able to support the specific needs of the business it is designed for.

Functional Information System (FIS) is based on the various business functions such as Production, Marketing, Finance and HR etc. These departments or functions are known as functional areas of business. Each functional area requires applications to perform all information processing related to the function.

This functional information system supports the functions of human resource management of an organization. The human resource management function, in its narrow sense, it also known as personnel management. The function involves: Manpower planning.

Financial information system is a sub-system of organizational management information system. This sub-system supports the decision-making process of financial functions at the level of an organization.

Importance of Functional Information System

A functional information system (FIS) is a system that enables an organization to track and manage its activities and operations. The main features of a FIS include: The ability to track and manage data: A FIS enables an organization to track and manage data related to its activities and operations. This data can be used to improve the efficiency and effectiveness of the organization.

- The ability to generate reports: A FIS can generate reports that can be used to assess the performance of the organization. These reports can help the organization to identify areas where improvements can be made.
- The ability to streamline processes: A FIS can streamline processes by automating tasks. This can help to improve the efficiency of the organization.
- . The ability to integrate with other systems: A FIS can be integrated with other systems, such as accounting and customer relationship management (CRM) systems. This integration can provide the organization with a comprehensive view of its activities and operations.
- It is important for a business end user to understand how information systems affect a particular function say, finance, or a particular industry say, banking. This section deals with information systems that support various business functions such as marketing, manufacturing, and finance. The objective here is to give the reader an idea of the range of business information systems, which can be used by organizations. Diagram shows the different functional area information systems.

Functional Perspective in Information System

A functional perspective describes the analysis of business systems from their major business functions. Constituency perspectives include identifying systems within the various organizational groups that serve as a constituency.

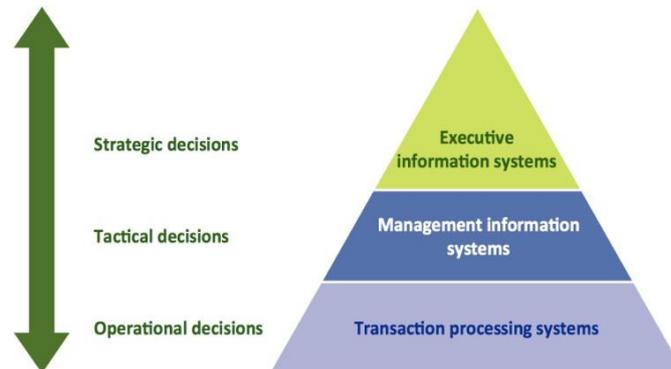


Figure.9.2. Functional Perspective in Information System

There are three major types of information systems: operational systems, management-level systems, and strategic-level systems.

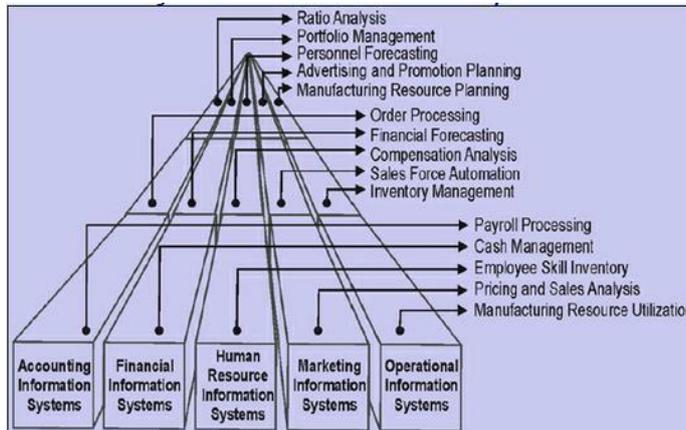
The term “information system” refers to technologies that people and organizations use, collect, store, and distribute information. The information system that provides the best information to decision makers should be of high quality. The term level of management refers to a division of responsibility between different managerial positions. Most organizations have three levels of management in most cases. The practice of supervisory management is also known as supervisory management. They study the organization and direction function of management. This level specifies the tasks that must be completed on a daily basis at the operational level. Managers in the lower levels include supervisors, foremen, gang bosses, accounts officers, and salespeople.

Cross Functional Information System

A cross functional information system (CFIS) is a type of information system that supports multiple business functions. A CFIS

typically includes a database, application software, and hardware. The CFIS may be used by employees in different departments, such as marketing, sales, and customer service.

Functional Information System:



Functional information system

Information systems in many large organizations are combinations of various functional information systems. They support various business processes such as product development, production, inventory management, sales, distribution, etc. IT can also be used for sharing informational resources to achieve efficiency and effectiveness in business processes. For instance, organizations can use Enterprise Resource Planning (ERP) and Supply Chain Management (SCM) systems to improve efficiency and effectiveness of their business processes.

9.5 The popular functional areas of the business organization

- Financial Information System
- Marketing Information System
- Production/ Manufacturing Information System
- Human Resource Information System

9.5.1 Financial Information System

A financial information system is an organized approach to collecting and interpreting information, which is usually computerized. A well-run financial information system is essential to a business, since managers need the resulting information to make decisions about how to run the organization.

This system can be used in many ways, including the following:

- Ensure that there are sufficient funds on hand to pay for obligations as they come due for payment
- Put excess funds to use in appropriate and reasonably liquid investments
- Determine which customers, products, product lines and subsidiaries are the most and least profitable
- Locate the bottleneck areas within the business
- Determine the maximum amount of funds that can safely be distributed to investors in the form of dividends
- Determine the maximum debt load that the organization can sustain

9.5.2 Marketing Information System

This sub-system of management information system provides information about various functions of the marketing system of an organization. Marketing is another functional area of the business organization, which is engaged in marketing (selling) of its products to its customers.

Important functions of the marketing process include the following.

- The marketing identification function
- The purchase motivation function.

- The physical distribution function
- The communication function
- The transaction function
- The post-transaction function

9.5.3 Production /manufacturing Information System

Manufacturing or production information system provides information on production /operation activities of an organization and thus facilitates the decision-making process of production managers of an organization.

The system can operate across multiple areas, including product definitions across the product life cycle, resource scheduling, order execution, and production analysis. The system creates a real-time record, capturing relevant data throughout the manufacturing process. This enables optimization of the process, increasing efficiency and potentially reducing errors and downtime. In today's competitive landscape, this is a key advantage of a smart manufacturing system. In addition, the documentation and record keeping that the system provides is especially useful in heavily regulated sectors, such as pharmaceuticals or food and beverage.

9.5.4 Human Resources Information System

This functional information system supports the functions of human resource management of an organization. The human resource management function, in its narrow sense, it also known as personnel management .The function involves:

- Manpower planning.
- Staffing
- Training and development
- Performance evaluation, and
- Separation activities

Let Us Sum Up

In this unit, we dealt about the Business Information system, Potential Careers in Business, Information Systems, and Characteristics of business information system, Components of Business Information System, Functional Information System and its Importance.

Check Your Progress

1. A system which record and report business transactions, flow of funds and generate financial statements is_____.
2. Deciding where to locate new production facilities is a(n) example of a manufacturing and production information system operating at the_____.
3. Assembling a product, identifying customers and hiring employee's are_____.
4. What is cross functional information system?

Glossaries

Keywords	Explanation
Production Information System	Manufacturing or production information system provides information on production /operation activities of an organization and thus facilitates the decision-making process of production managers of an organization.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Instructions

Instructions to Study:

- Learn Business Information system, Potential Careers in Business Information Systems, and Characteristics of business information system,
- Learn Components of Business Information System,
- Learn Functional Information System and its Importance.

Suggested Readings

1. <https://www.yourarticlelibrary.com/management/information-system/business-information-system-meaning-features-and-components/70319>
2. <https://matics.live/glossary/manufacturing-information-system/>

Answers to Check Your Progress

1. Accounting information system
2. Strategic Level
3. Business processes
4. A cross functional information system (CFIS) is a type of information system that supports multiple business functions. A CFIS typically includes a database, application software, and hardware.

Unit - 10

Marketing Information System

Overview

Learning objectives

- 10.1 Marketing Information System**
- 10.2 Components of Marketing Information System**
- 10.3 Characteristics of Marketing Information System**
- 10.4 Types of Marketing Decisions**
- 10.5 Marketing Information System Process**
- 10.6 Importance of Marketing Information System**
- 10.7 Use of Marketing Information System**
- 10.8 Types of Data in Marketing Information System**

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Instructions

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Marketing Information System, Components of Marketing Information System, Characteristics of Marketing Information System, Types of Marketing Decisions, Marketing Information System Process, Importance of Marketing Information System and Use of Marketing Information System Types of Data in Marketing Information System.

Learning Objectives

At the end of this unit you will be able to understand

- Marketing Information System and its Components
- Characteristics of Marketing Information System,
- Types of Marketing Decisions,
- Marketing Information System Process, Importance of Marketing Information System and Use of Marketing Information System.

10.1 Marketing Information System

Functional MIS (A) 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 carryout marketing analysis, planning, implementation and control without monitoring and researching customers, competitors, and 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.

Marketing Information System is a continuing and interacting structure of people, equipment 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.

Marketing Information System

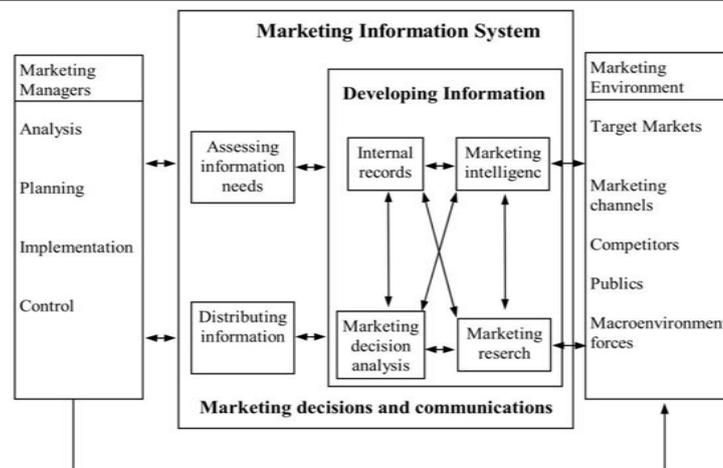


Figure.10.1. Marketing Information System

Definition: The **Marketing Information System** refers to the systematic collection, analysis, interpretation, storage and dissemination of the market information, from both the internal and external sources, to the marketers on a regular, continuous basis.

The marketing information system distributes the relevant information to the marketers who can make the efficient decisions related to the marketing operations viz. Pricing, packaging, new product development, distribution, media, promotion, etc.

Every marketing operation works in unison with the conditions prevailing both inside and outside the organization, and, therefore, there are several sources (viz. Internal, Marketing Intelligence, Marketing Research) through which the relevant information about the market can be obtained.

A marketing information system consists of a structured, interacting complex of persons, machines, and procedures designed to generate an orderly flow of pertinent information, collected from both internal and external firm sources, for use as the basis for decision-making in specified responsibility areas of marketing management.

This suggests that marketing information systems are specially designed procedures for gathering and distributing data to managers.

A marketing information system can be defined as a process in which data from the market environment is collected systematically and comprehensively, evaluated in terms of its relevancy and accuracy, transformed to make it useful and usable by the managers, and conveniently stored or expeditiously transmitted to the managers.

Included in the MIS is a series of particular and important tasks. Unless each one is conducted properly, the system will not operate effectively and efficiently. Marketing Information Systems can be understood by looking at the following diagram developed by Dr. Kotler.



Figure.10.2. Marketing Information System

10.2 Components of Marketing Information System

The marketing information system integrates data collection, processing, analysis, and reporting for streamlining marketing activities using the four primary techniques or components. These components function within a framework of marketing decisions and communication.

A marketing information system's basic components are a data bank, analytical tools, and a communication network. The following diagram shows how managers interact with these components.

An MIS allows managers to retrieve selected historical figures from data files, process raw data with standard statistical programs, and test alternative strategies against complex planning models.

Managers may also call on MIS to generate various routine and special reports to help them in their day-to-day decision making. MIS, thus, can be used for both planning and controlling the marketing programs. Data banks draw most of their historical records from internal sales figures, call reports, and external materials published by research firms and governmental agencies.

The other type of data that may help managers is a record of past decisions and the assumptions used to make these decisions. In building a data bank, a key factor is considered in determining the amount of detail or aggregation level that should be used.

After the needed data files have been accumulated, several analytical tools can be used to process and summarize. Such statistical devices as programs for means, standard deviations, cross-tabulations, etc. are used to process, correlate, and summarize data.

Nowadays, managers often use computer models such as the simulation models to answer various "what if" type questions. This question usually arises when executives build marketing programs and attempt to solve problems after plans have been implemented.

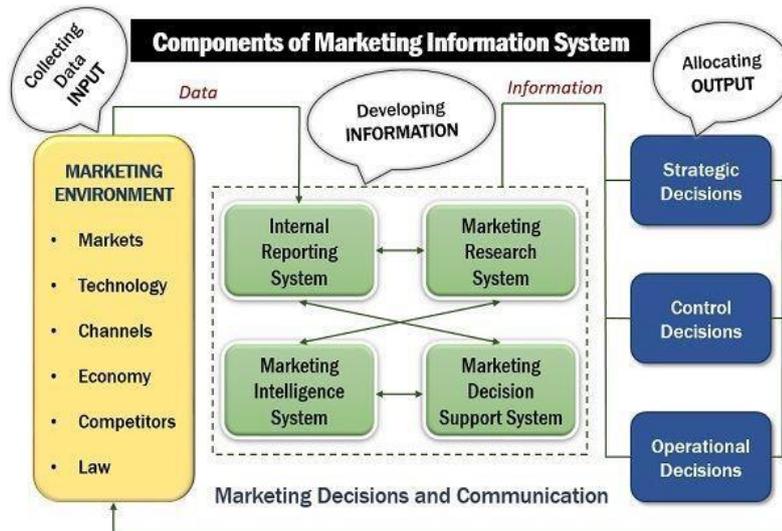
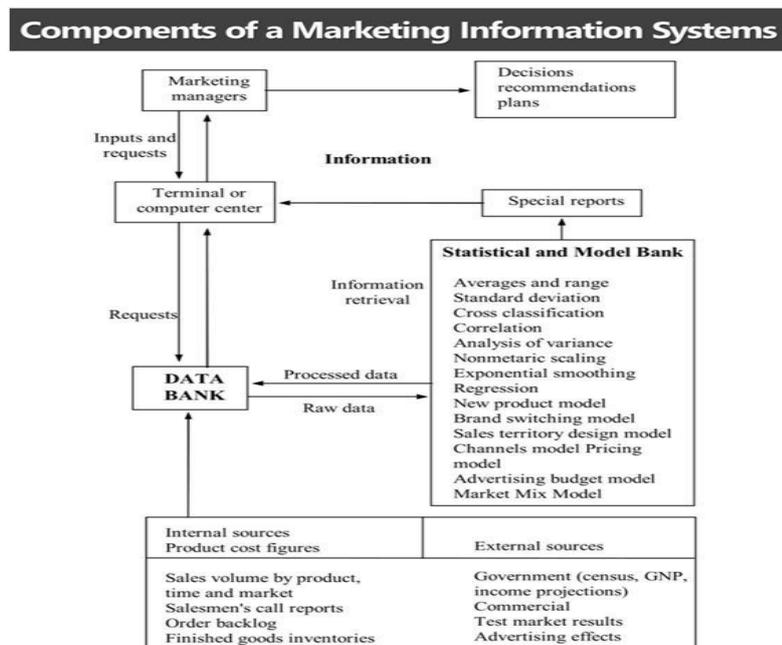


Figure.10.3.Components of Marketing Information System



1. **Internal Records:** The Company can collect information through its internal records comprising of sales data, customer database, product database, financial data, operations data, etc. The detailed explanation of the internal sources of data is given below:

- The information can be collected from the documents such as invoices, transmit copies, billing documents prepared by the firms once they receive the order for the goods and services from the customers, dealers or the sales representatives.
- The current sales data should be maintained on a regular basis that serves as an aide to a the Marketing Information System. The reports on current sales and the inventory levels help the management to decide on its objectives, and the marketers can make use of this information to design their future sales strategy.
- The Companies maintain several databases such as*Customer Database- wherein the complete information about the customer's name, address, phone number, the frequency of purchase, financial position, etc. is saved.

*Product Database- wherein the complete information about the product's price, features, variants, is stored.

*Salesperson database, wherein the complete information about the salesperson, his name, address, phone number, sales target, etc. is saved.

- The companies store their data in the data warehouse from where the data can be retrieved anytime the need arises. Once the data is stored, the statistical experts mine it by applying several computer software and techniques to convert it into meaningful information that gives facts and figures.

2. **Marketing Intelligence System:** The marketing intelligence system provides the data about the happenings in the market, i.e. data related to the marketing environment which is external to the organization. It includes the information about the changing market trends, competitor's

pricing strategy, change in the customer's tastes and preferences, new products launched in the market, promotion strategy of the competitor, etc.

In order to have an efficient marketing Information System, the companies should work aggressively to improve the marketing intelligence system by taking the following steps:

- Providing the proper training and motivating the sales force to keep a check on the market trends, i.e. the change in the tastes and preferences of customers and give suggestions on the improvements, if any.
- Motivating the channel partners viz. Dealer, distributors, retailers who are in the actual market to provide the relevant and necessary information about the customers and the competitors.
- The companies can also improve their marketing intelligence system by getting more and more information about the competitors. This can be done either by purchasing the competitor's product, attending the trade shows, reading the competitor's published articles in magazines, journals, financial reports.
- The companies can have an efficient marketing information system by involving the loyal customers in the customer advisory panel who can share their experiences and give advice to the new potential customers.
- The companies can make use of the government data to improve its marketing Information system. The data can be related to the population trends, demographic characteristics, agricultural production, etc. that help an organization to plan its marketing operations accordingly.
- Also, the companies can purchase the information about the marketing environment from the research companies who carry out the researches on all the players in the market.
- The Marketing Intelligence system can be further improved by asking the customers directly about their experience with the product or service via feedback forms that can be filled online.

3. **Marketing Research:** The Marketing Research is the systematic collection, organization, analysis and interpretation of the primary or the secondary data to find out the solutions to the marketing problems. Several Companies conduct marketing research to analyze the marketing environment comprising of changes in the customer's tastes and preferences, competitor's strategies, the scope of new product launch, etc. by applying several statistical tools. In order to conduct the market research, the data is to be collected that can be either primary data (the first-hand data) or the secondary data (second-hand data, available in books, magazines, research reports, journals, etc.)

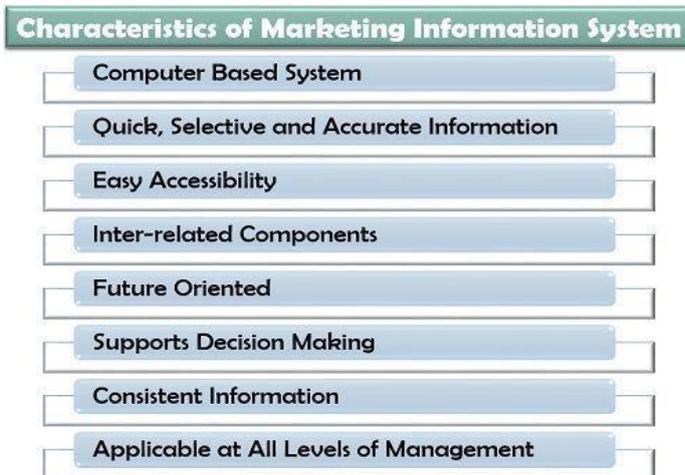
The secondary data are publicly available, but the primary data is to be collected by the researcher through certain methods such as questionnaires, personal interviews, surveys, seminars, etc.

A marketing research contributes a lot in the marketing information system as it provides the factual data that has been tested several times by the researchers.

4. **Marketing Decision Support System:** It includes several software programs that can be used by the marketers to analyze the data, collected so far, to take better marketing decisions. With the use of computers, the marketing managers can save the huge data in a tabular form and can apply statistical programs to analyze the data and make the decisions in line with the findings.

Thus, the marketers need to keep a check on the marketing environment, i.e. both the internal (within the organization) and the external (outside the organization, so that marketing policies, procedures, strategies can be designed accordingly.

10.3 Characteristics of Marketing Information System



- **Computer-Based System:** In the marketing information system, all the information is gathered, analyzed and communicated through a computer device, and the useful marketing information is stored in microfilms.
- **Quick, Selective and Accurate Information:** The organization can maintain relevant marketing database through marketing information system which can be immediately and accurately accessed anytime.
- **Easy Accessibility:** The information maintained with the help of the marketing information system can be easily viewed and utilized through a computer system.
- **Inter-related Components:** In marketing decisions and communication, all the four components are inter-linked, i.e., the information provided by one element is useful for the functioning of the other aspects.

These interconnected components include internal report, marketing research, marketing intelligence and marketing decision support systems.

- **Future-Oriented:** The marketing information system initiates strategy formulation and planning for future marketing operations.
- **Supports Decision Making:** Since this system provides an accurate marketing database, it can be certainly used for instantaneous decision making, by the marketing managers.
- **Consistent Information:** Marketing information system enables the management and decision-makers to assess relevant, updated and valuable marketing information.
- **Applicable at All Levels of Management:** Every manager uses the marketing information system to decide marketing strategies, plans, policies and procedures prepared at all managerial levels.
- **Data Collection**

The initial task in any MIS is a data-collection activity, which is not really a single action.

Rather, it comprises several processes, each designed to obtain particular data used for unique purposes. The type and amount of data collected depend on how much is available and how much information executives want and are willing to pay for.

- **Data Evaluation**

An MIS includes an activity to evaluate the relevance and accuracy of collected data. Data are raw facts whose value to decision-makers is uncertain. On the other hand, the information comprises facts whose accuracy has been measured and is in a usable form and considered useful to decision-makers.

- **Data Transformation**

Ideally, data coming into an MIS should be in a form that can be used immediately. However, this seldom occurs. Some data must be analyzed through statistical testing; others have to be broken apart or

combined somehow. Nearly all data will need to be condensed and placed in the formats the users' desire.

- **Data Transmission**

All the MIS operations are worthless if the information is not transmitted to the right people on time. To ensure that information does not get lost, distorted, or unnecessarily delayed in transmission, a dissemination activity is required. Information can be routed by intra office or intra company mail, or different sophisticated electronic mediums can transmit it. If left to an informal process, the information will almost surely be lost or delayed.

Besides, a good MIS system to have a computerized data bank should also be flexible to adapt to the special needs of the business environment.

It should be developed in such a way that it generates enough data relevant to a particular problem. But, care must be exercised not to load executives with an overabundance of irrelevant data.

There should be a built-in-system in an MIS to filter and condense data and assemble information to help managers reach accurate and timely decisions. It should also have safeguards so that the chances of erasing data and modifying programs are eliminated. Moreover, the system should also have to use passwords to prevent unauthorized access to ensure data security and protect business interest.

Subsystems Constituting the Marketing Information System (MIS)

A marketing information system includes four subsystems;

1. The internal accounting system, which provides measures of current activity and performance;
2. The marketing intelligence system, which gathers and makes available information on developments in the environment;

3. The marketing research system, which gathers, evaluates, and reports the information required by executives for problem-solving, planning, and development of marketing strategies; and
4. The marketing management science system or decision support system helps executives analyze complex marketing problems and operations, often through analytical models.

10.4 Types of Marketing Decisions

The marketing information system is all about making a correct decision by the marketing personnel at the right time to serve the organizational objectives.

Following are the three major marketing decisions taken with the help of the marketing information system:

- **Strategic Decisions**

The higher-level managers make such decisions since these are related to the organizational objectives, structure and policies which are crucial and affect the whole organization.

E.g. Decisions concerning global marketing and market acquisition.

- **Control Decisions**

These are the fundamental managerial decisions which are taken as corrective actions (by middle-level managers) in case of any deviation. This preceded by proper evaluation and monitoring of the implementation of the strategic plans so formed by the higher-level managers. E.g. adopting a suitable marketing strategy for potential market acquisition.

- **Operational Decisions**

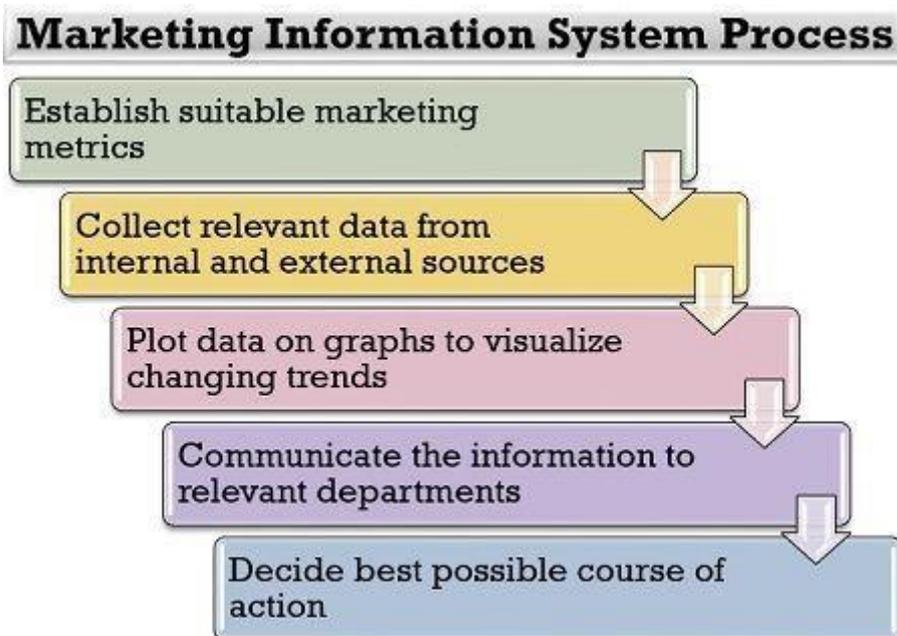
These decisions deal with the day to day activities performed for the accomplishment of specific tasks (such as proper utilization of

resources), essential for adequate implementation of the plans formed by top and middle-level managers.

E.g. directing the efforts of the sales team towards the successful application of the marketing strategy so decided.

10.5 Marketing Information System Process

To know how a marketing information system operates, please go through its sequential process, given below:



Since every piece of information involves some opportunity cost as well as a real cost. It is essential to wisely select the subject or area requiring the application of a marketing information system and deciding a suitable metrics, accordingly.

Next comes the collection of required data as per the selected metrics from various internal sources (books of accounts, a sales record, sales reports and analytics) and external sources (customer surveys, economic or financial metrics, social media insights and competitor results).

Then, the gathered data needs to be organized and plotted systematically on a graph to facilitate comparative analysis, future prediction and interpretation.

The fourth step is to communicate the graphical information to the various departments for a better interpretation and analysis of the available data and the determination of multiple alternatives (decisions) as per organizational goals.

The last step is to decide the best possible course of action of the marketing metrics and applying it to the business to enhance the marketing results.

10.6 Importance of Marketing Information System

The marketing information system has simplified the task of decision making for the marketing managers and has also provided as a useful tool for strategic planning of the business activities.

Let us now understand its various other benefits:



- **Fills up Information Gap:** Marketing information system facilitates the companies involved in global retailing and other

international trade practices. The purpose is to meet their information needs and being aware of the world-wide scenario.

- **Facilitates Decision Making:** It is a useful tool for future decision making involving the strategic, operational and control related decisions.
- **Marketing Planning:** Marketing information system assesses the market demand and prospective sales to ensure effective planning of the marketing operations.
- **Competing Over Non-Price Factors:** MIS is used for adopting non-price competition strategies. It facilitates brand image, product customization, product differentiation, public relations, additional services, etc., to retain consumers without any price war.
- **Demand Creation and Fulfilment:** It also provides information on customer requirements. Thus, generating the need for those products which are desired by the consumer's subconscious mind, through marketing research and then meeting such needs in reality.
- **Saves Cost and Time:** Marketing information system targets the problem area and take desired decisions to avoid the wastage of time, cost and efforts on unnecessary activities.
- **Systematic Recording of Data:** It provides for an orderly arrangement of the gathered data to provide useful information for further marketing planning and decision making.
- **Better Evaluation and Control:** Marketing information system helps to monitor and evaluate the marketing operations and programmes. It also provides for taking corrective actions in case of not acquiring the desired outcomes.

- **Coping Up with Marketing Environment and Trends:** It regularly keeps an eye on any changing trends in the economic, political, technological and competitive environments. It helps to grab new opportunities and prepare for the upcoming challenges.

10.7 Use of Marketing Information System

A marketing information system helps organizations collect, store, and analyze data about customers. This data can then be used to aid in decision-making about a large range of marketing activities (e.g., product positioning, pricing, customer segmentation). The system can also be used to monitor market trends, analyze customer preferences and needs, and track customer purchase behavior. The following section will provide an in-depth overview of some of the most important and common uses:

- **Positioning:** A marketing information system can be used to assess the current position of a product or service in terms of its brand recognition and market share. This helps organizations to understand where their products and services stand in relation to the competition.
- **Gaining Data Access:** By utilizing a marketing information system, organizations can gain access to customer data that would otherwise be difficult or expensive to obtain. This includes demographic and psychographic information as well as behavioral data.
- **Informed Decision-Making:** As previously mentioned, the data gathered and analyzed by the system can be used to make more informed decisions about marketing activities. This includes decisions related to advertising, product development, and pricing.
- **Lead Conversions:** A marketing information system can also be used to track leads and conversions. This helps organizations understand which of their marketing efforts are working and which may need improvement.

- **Revenue Generation:** By using the system to assess customer needs and preferences, organizations can develop strategies to increase their revenue. They can also use it to identify opportunities for new products or services.
- **Competitive Edge:** By leveraging the data provided by a marketing information system, organizations can gain a competitive edge in the market. This can help them to stand out from their competition and capitalize on emerging trends.

These are just some of the ways that a marketing information system can help organizations make informed decisions related to their marketing activities.

10.8 Types of Data in Marketing Information System

Aside from the variety of uses of marketing information systems, it is also important to understand the many types of data that are used with them. This is because understanding the types of data and product information required can help organizations choose the most suitable types of marketing information systems for their needs. The types of data can range from customer data (demographics, psychographics, and behaviour) to market data (trends, performance of competitors). Each type of data has its own purposes and uses in marketing decision-making. The following list provides one method of classifying the various types of data collected and used in marketing information systems.

- **Acquired Database:** These are databases that have been purchased or otherwise acquired from external sources. This type of data is usually used to gain access to insights about customer behaviour and preferences that a company may not have access to. For example, a company may purchase databases that contain information on a specific industry's customer demographics, purchase history, and online activity. Public government databases are another common example.
- **Internal Company Data:** Internal company data is collected and stored by the company itself. It includes customer contact information, demographics, purchase histories, and more.

Internal company data often centres around existing customers, making it a valuable source of insights for marketing decision-making.

- **Marketing Intelligence:** This type of data is collected from internal and external sources in order to gain a better understanding of the competitive environment. It includes data on competitors' marketing strategies, performance metrics, and customer feedback.
- **Marketing Research:** Marketing research data is often collected through interviews, surveys, and focus groups to gain insights into what customers want and need. This type of data can be used to inform product development decisions and to identify new opportunities for growth.

Let us Sum Up

In this unit, we dealt about the Marketing Information System and its Components. Characteristics of Marketing Information System, Types of Marketing Decisions, Marketing Information System Process, Importance of Marketing Information System and Use of Marketing Information System

Check Your Progress

1. The effectiveness of information system depends to a larger extent of _____ from market place to the firm.
2. The _____ information system deals with the flow of information about people working with the people
3. _____ details are given by management to marketing service system.
4. Write note on Marketing Intelligence.
5. What is Data Evaluation?

Glossaries

Keywords	Explanation
Positioning	A marketing information system can be used to assess the current position of a product or service in terms of its brand recognition and market share. This helps organizations to understand where their products and services stand in relation to the competition.
Consistent Information	Marketing information system enables the management and decision-makers to assess relevant, updated and valuable marketing information.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://businessjargons.com/marketing-information-system.html>
2. <https://sendpulse.com/support/glossary/marketing-information-system>.

Answers to Check Your Progress

1. Feed Back
2. Personnel
3. Supplier
4. **Marketing Intelligence:** This type of data is collected from internal and external sources in order to gain a better understanding of the competitive environment. It includes data on competitors' marketing strategies, performance metrics, and customer feedback.

5. **Data Evaluation**- An MIS includes an activity to evaluate the relevance and accuracy of collected data. Data are raw facts whose value to decision-makers is uncertain.

Unit - 11

Personal Information Management Systems (PIMS), Manufacturing Information System, Quality Information System (QIS)

Overview

Learning objectives

11.1 Personnel Information Management System

11.2 Components of the Personal Information Systems

11.3 Manufacturing Information System

11.4 Elements of a Manufacturing Information System

11.5 Quality Information System (QIS) and its Elements

11.6 Characteristic Features for Information Quality

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Personnel Information Management System, Components of the Personal Information Systems, Manufacturing Information System and Elements of a Manufacturing Information System, Quality Information System (QIS) and its Elements

Characteristic Features for Information Quality.

Learning Objectives

At the end of this unit you will be able to understand

- Personnel Information Management System, Components of the Personal Information Systems
- Manufacturing Information System and Elements of a Manufacturing Information System,
- Quality Information System (QIS) and its Elements

11.1 Personal Information Management Systems (PIMS)

Personal Information Management Systems (or PIMS) are systems that help give individuals more control over their personal data. PIMS allow individuals to manage their personal data in secure, local or online storage systems and share them when and with whom they choose.

Personal Information Systems (PIS) are those that support the information needs of individual decision-makers for solving structured, semi-structured, and unstructured problems.

For Example,

A manager may use a PIS to calculate the total amount due on a set of invoices (structured decision), to analyze market trends over the 5 years (semi-structured), or to evaluate the impact of a competitor's marketing strategy (unstructured).

Personal Information Systems (PIS) are sometimes, also known as human resource information systems (HRIS). These are software packages developed to help human resources professionals in handling data. Human resources professionals use these systems for facilitating workflow, improving efficiency, and storing and collecting information. Many organizations offer HRIS packages to employers. Employers can customize these packages according to their specific needs or requirements.

11.2 Components of the Personal Information Systems (PIS)

The different **Components of the Personal Information Systems (PIS)** are briefly explained below:

- **Database:** PIS core offering consists of a database for storing employee information. HR professionals can store all personnel data into the system that can be accessed from any time, from anywhere.
- **Time and Labour Management:** Functions like time and labour management requires a lot of time. PIS packages allow employees to input their hours worked and help managers to instantly verify vacation requests, and the information is fed to the payroll directly.
- **Payroll Activity:** Payroll activity is another important component of an HRIS or PIS model. HR can unload or download employee hours easily, and issue checks or payroll deposits to employees.
- **Benefits:** Some PIS packages allow employers to develop and maintain medical, retirement, and other benefits through their software.
- **Employee Interface:** Most PIS packages allow limited user access for an employee.
- **Hiring and Retention:** Hiring and retention are the most crucial components of PIS.

11.3 Manufacturing Information System

The manufacturing information system is a system that supports the manufacturing functions of purchasing, receiving, quality control, inventory management, material requirements planning, capacity planning, production scheduling, and plant design.

The term manufacturing information system **actually** applies to both manufacturing and service environments.

The **manufacturing information system** refers to the management information system that is designed for use anywhere

manufacturing or production is occurring. Generally, nowadays management information systems are computerized and are planned for collecting and presenting the data which managers require for planning and directing functions within the organization.

Manufacturing plant control includes many operational and tactical functions addressing different types of operations related to manufacturing. These operations range from receiving raw materials to the shipping of finished products, from production to equipment maintenance, through movements of inventory and quality tests of materials, and from lines of customer orders to dispatching of works. Along with these operations, the manufacturing operations are controlled.

An information system that is specially designed to automate manufacturing activities in an organization is known as manufacturing MIS.

To track the movement of materials and goods in the enterprise, a standard manufacturing MIS is used. Raw materials or parts are converted into finished goods in a manufacturing process and a manufacturing MIS is used at every point.

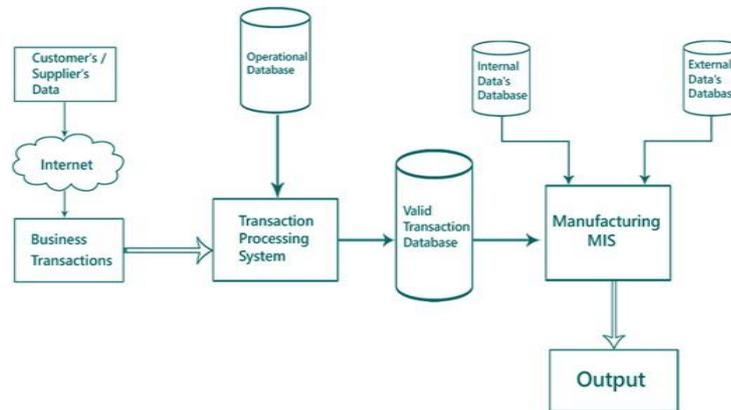
In a manufacturing MIS, some of the typical subsystems include design and engineering, planning of production, inventory management, process control, and quality control.

Definition

Manufacturing information system means “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 manufacturing the firm's products.”

The structure of a manufacturing information system has described below. The key components of the Manufacturing information system are as follows –

11.4 Elements of a Manufacturing Information System



Elements of a Manufacturing Information System

1. Business Transaction
2. Transaction Processing System
3. Operational database
4. Internal database
5. External Database
6. Database of validation Transactions
7. Manufacturing MIS
8. Manufacturing Application Database
9. Manufacturing Decision Support System
10. Manufacturing Executive System

The description of these elements is as follows -

1. **Business Transaction** - The transaction which occurs at a third party and records in MIS as a historic record so that it can be used for analysis whenever required.
2. **Transaction Processing System** - An Enterprise Information System (EIS) is a type of information system called "Transactions Processing System (TPS)" that is capable of storing, recording, updating, and retrieving the enterprise's transaction data. While transaction processing

systems need to be able to have highly consistent response times, this is a very important feature when it comes to trading systems.

3. **Operational database** - a database is an operational database that is designed to operate or run the day-to-day operations of the business. It also has a strong ability to act as an analytic engine, either through dashboards and web-based solutions or supporting the ability to incorporate analytics into organizational processes.
 4. **External database** - a database in which internal documents of organizations store. An internal database is a collection of one of company's records, gathered from employees using an internet-connected device. Digital files consist of decentralized, encrypted data, which are not known to anyone and include details such as, which purchases made up items.
 5. **Internal Database** - a database in which internal records of organizations store. Internal database - a database in which internal records of organizations store. An internal database is a compilation of company data collected by employees using Internet-connected computers. Decentralized digital databases provide data about the information on our business and customer activity in an electronic type of data.

 6. **Database of validation transactions** - the validations of transaction refers to the accuracy and completeness of the information.
 7. **Marketing MIS** - the marketing information system includes the systematic selection, analysis, interpretation, preservation, and distribution of all of the consumer information that is available to the company.
 8. **Marketing DSS** - marketing decision support systems is an information system that assists with decision making in the development of a marketing strategy.
 9. **Marketing ES** - marketing executive systems are intended to be used by the senior managers in decisions making.
 10. **Manufacturing Outputs** Manufacturing MIS output can be collected in the form of hard copies as well as in computerized form.
-

Overall Manufacturing MIS supports manufacturing business activities. These are as follows

- Design and engineering
- Scheduling manufacturing departments activities
- Quality control
- Manufacturing resource planning
- Just-in-time inventory and manufacturing
- Process control
- Computer-integrated manufacturing (CIM)
- MRP reports
- Quality control and testing

11.5 Quality Information System (QIS) and its Elements

A Quality Information System (QIS) is an integrated set of activities that provides timely, accurate, relevant, comprehensive, and reliable information about the quality of products or services produced by organizations.

Information is a vital resource for the success of any organization. Future of an organization lies in using and disseminating information wisely. Good quality information placed in right context in right time tells us about opportunities and problems well in advance.

Good quality information – Quality is a value that would vary according to the users and uses of the information.

Elements of Information Quality –

- **Intrinsic** – Accuracy, Objectivity, Believability, Reputation
- **Contextual** – Relevancy, Value-Added, Timeliness, Completeness, Amount of information
- **Representational** – Interpretability, Format, Coherence, Compatibility
- **Accessibility** – Accessibility, Access security

11.6 Characteristic of Information Quality

- **Reliability** – It should be verifiable and dependable.
- **Timely** – It must be current and it must reach the users well in time, so that important decisions can be made in time.
- **Relevant** – It should be current and valid information and it should reduce uncertainties.
- **Accurate** – It should be free of errors and mistakes, true, and not deceptive.
- **Sufficient** – It should be adequate in quantity, so that decisions can be made on its basis.
- **Unambiguous** – It should be expressed in clear terms. In other words, it should be comprehensive.
- **Complete** – It should meet all the needs in the current context.
- **Unbiased** – It should be impartial, free from any bias. In other words, it should have integrity.
- **Explicit** – It should not need any further explanation.
- **Comparable** – It should be of uniform collection, analysis, content, and format.
- **Reproducible** – It could be used by documented methods on the same data set to achieve a consistent result.

Let Us Sum Up

In this unit, we dealt about the Personnel Information Management System, Components of the Personal Information Systems, Manufacturing Information System and Elements of a Manufacturing Information System, Quality Information System (QIS) and its Elements.

Check Your Progress

1. The final element of feedback is essential for system operation and for _____.
2. The _____ information system deals with the flow of information about people working in an organisation.

3. An information system that is specially designed to automate manufacturing activities in an organization is known as _____.
4. What is personal Information System?

Glossaries

Keywords	Explanation
Time and Lab or Management:	Functions like time and labor management requires a lot of time. PIS packages allow employees to input their hours worked and help managers to instantly verify vacation requests, and the information is fed to the payroll directly.
Payroll Activity	Payroll activity is another important component of an HRIS or PIS model. HR can unload or download employee hours easily, and issue checks or payroll deposits to employees.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation.

Instructions

Instructions to Study:

- Learn Personnel Information Management System, Components of the Personal Information Systems
- Learn Manufacturing Information System and Elements of a Manufacturing Information System,
- Quality Information System (QIS) and its Elements

Suggested Readings

1. <https://www.smartcapitalmind.com/what-is-a-personnel-management-information-system.htm>
2. <https://the-definition.com/term/manufacturing-information-system>

Check Your Progress

1. Self regulation
2. Personnel
3. Manufacturing MIS

4. Personal Information Systems (PIS) are those that support the information needs of individual decision-makers for solving structured, semi-structured, and unstructured problems.

Block 4

Financial, Accounting and Human Resource Information system

Unit - 12 Financial Information system

Unit - 13 Accounting Information System

Unit - 14 Human Resource Information System

Unit - 12

Financial Information system

Overview

Learning objectives

12.1 Financial Information system

12.2 Principles of Financial Information system

12.3 Functions of Financial Information system

12.4 Components of Financial Information system

12.5 Financial Information system and Accounting Information system

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Financial Information system, Principles of Financial Information system, Functions of Financial Information system, Components of Financial Information system, Financial Information system and Accounting Information system.

Learning Objectives

At the end of this unit you will be able to understand

- Financial Information system and Principles of Financial Information system
- Functions of Financial Information system, Components of Financial Information system
- Financial Information system and Accounting Information system.

12.1 Financial Information System

A financial information system is an organized approach to collecting and interpreting information, which is usually computerized. A well-run financial information system is essential to a business, since managers need the resulting information to make decisions about how to run the organization.

A Financial Information System is a computer-based information system that gathers, stores, and analyses the financial information which is further useful for the decision making. Financial is also useful for the financial planning. It helps in the decision making and it is also work in conjunction with the decision support system. It also reduces the paperwork and maintains all the records up to date.

There are various activities under the financial management are:

- Cash management
- Investment Management
- Financial Planning
- Capital budgeting

All these activities require decisions which are taken with the help of financial information systems. FIS analyses whole finance related activities in the business and takes optimum decision which is helpful in achieving the goals of the organization.

A financial information system provides information to all the parties of the firm either internal or external in the form of reports and any other documents. It is useful system in the organization. As we all know finance plays most important role in the organization without finance no firm can survive for a long run. Finance is like a blood. If finance is the significant element then the information also plays most important role. It not only provides information to the executives but also useful for the public.

12.2 Principles of Financial Information System

- **Cost effectiveness:**

This system must be cost effective. It must outweigh information cost. It can provide desired output and flexible structure

- **Useful output:**

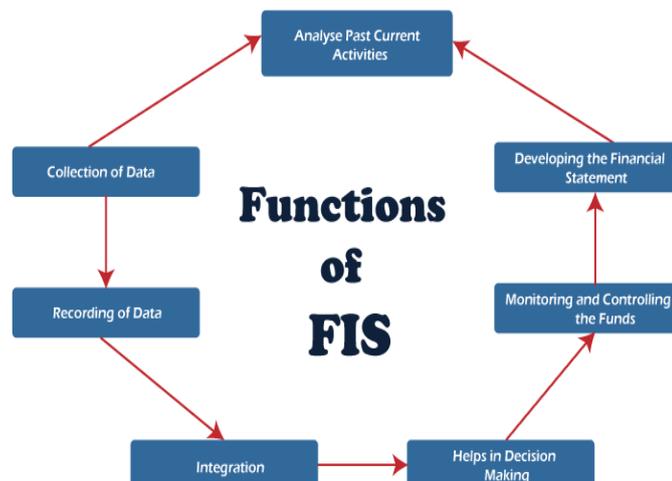
Financial information system must be able to provide necessary result the information must be understandable, relevant, reliable, timely and accurate.

- **Flexible:**

In accounting information system there must be provision of inclusion of changed information needed by different users. It must be able to meet the changed demand.

12.3 Functions of Financial Information System

The various functions of the financial information system are explained as under:



- **Collection of Data:**

Under the financial information system, the first main element is the collection of data. On the basis of data, the best decision is to be taken. Under this various activities are performed like collection, analyzing, maintaining the information.

- **Monitoring and Controlling the funds:**

Financial information system helps in controlling the funds. It tracks the revenue and expenditure in the organization. As FIS is a computer-based system which keeps record of the whole activities in it.

- **Analyze Past and Current Activities:**

Financial information system analyses whole activities. It checks the current as well as past activities so that future decisions can be easily taken. The main aim of the FIS is to maintain record of all the finance-related operations in the organization.

- **Helps in Decision Making:**

As we know, the DSS supports FIS with the help of financial information. The optimal decision is to be taken. All the financial-related decisions, budgeting, investment are taken with the help of the financial information system.

- **Generating Financial Statement:**

Financial information system collects whole finance-related information and after proper analysis the financial statement is to be generated so that which is useful for the management for decision making.

- **Recording of Data:**

Financial information system records whole data in the system which can be retrieved at any time when required. So whole data is saved or maintained under it which can be used at any time.

12.4 Components of Financial Information System

The various Components of Financial Information System are:

- **Financial Accounting:**

Financial accounting records all the financial transactions in accounts. It records all assets, liabilities, revenue and expenditure. Financial accounting is useful for the maintenance of the statements.

- **Fund Management:**

Under the financial information system, fund management plays an active role in the organization. It is a crucial aspect of financial management, the main aim of fund management is to maximize the profits from its investment.

- **Controlling:**

Controlling component is useful for the maintenance of whole activities in the organization. It records the revenue and expenditure of all the departments and lead desirable change by controlling the activities.

12.5 Financial and accounting information systems (FAIS)

Financial and accounting information systems (FAIS) are systems that provide information related to the accounting and financial activities of an organization.

Financial and accounting information systems (FAIS) include a large number of subsystems such as budgeting, cash and asset management, capital budgeting, portfolio analysis, general ledger, accounts receivable, inventory control, and payroll systems that address the operational, tactical, and strategic information needs of the business.

The subsystems under Financial and accounting information systems (FAIS) are briefly discussed below:

- **Budgeting:** Budgeting is the process of estimating the amount of money a person or entity must earn or save during a specific time period, and of planning how the person or entity will spend it.
- **Cash and Asset Management:** Cash management is a vast area of finance including the collection, usage, and handling of cash. It includes assessing cash flow, market liquidity, and investments. In the world of financial services, asset management is cash and securities' managed investment. In the industry of financial services, asset means cash and stocks, and securities. There are also other kinds of asset management, like the management of physical products and manufacturing assets, but this term is most commonly applied within the industry of financial services.
- **Capital budgeting:** Capital budgeting refers to the process, a firm or company undertakes for evaluating potential major investments or projects.
- **Portfolio analysis:** It is a study of the elements included in a combination of products for making such decisions that will improve overall return.
- **General ledger:** The general ledger gives a record of every financial transaction that occurs during the life of a functioning company.
- **Accounts receivable:** On the balance sheet, it is an asset account representing short-term due money to a company.
- **Inventory control:** Inventory control is also called stock control. It is maximizing and regulating the warehouse inventory of a company.
- **Payroll systems:** Payroll systems include everything dealing with the employees' payments and the employment taxes' filing.

Check Your Progress

1. Financial Management Process dealt with_____.
2. The_____ information system is concerned with producing output for external users.

3. What is Portfolio analysis?
4. Write a note on payroll system.

Glossaries

Keywords	Explanation
Portfolio analysis	It is a study of the elements included in a combination of products for making such decisions that will improve overall return.
Fund Management	Under the financial information system, fund management plays an active role in the organization.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://genuinenotes.com/wp-content/uploads/2020/02/Unit-9-Financial-Information-System-1.pdf>
2. <https://smallbusiness.chron.com/benefits-financial-management-information-system-71943.html>

Answers to Check Your Progress

1. Financial Decisions
2. Financial Accounting
3. Portfolio analysis: It is a study of the elements included in a combination of products for making such decisions that will improve overall return.
4. Payroll systems: Payroll systems include everything dealing with the employees' payments and the employment taxes' filing.

Unit - 13

Financial Information system

Overview

Learning objectives

13.1 Accounting Information System (AIS)

13.2 Benefits Accounting Information System (AIS)

13.3 Functions Accounting Information System (AIS)

13.4 Types Accounting Information System (AIS)

13.5 Uses of Accounting Information System (AIS)

13.6 Components Accounting Information System (AIS)

13.7 Advantages and Disadvantages Accounting Information System

13.8 Changes in Accounting Information System (AIS)

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Accounting Information System (AIS), Benefits and functions of Accounting Information System (AIS), Types Accounting Information System (AIS), Components Accounting Information System (AIS) and Advantages and Disadvantages Accounting Information System (AIS).

Learning Objectives

At the end of this unit you will be able to understand

- Accounting Information System (AIS), Benefits and functions of Accounting Information System (AIS),
- Types Accounting Information System (AIS),
- Components Accounting Information System (AIS) and
- Advantages and Disadvantages Accounting Information System (AIS)

13.1 Accounting Information System (AIS)

An AIS will collect, process, analyze and store financial data of a company. And when called upon it will retrieve and report such data to its users, namely accountants, consultants, financial officers CFO, auditors, government tax authorities etc.

13.2 Benefits of accounting information system

Since an accounting information system provides a seamless flow of crucial and relevant data across the organization, it has several benefits that help a business manage its operations even better. Let us take a look at these benefits.

Better interdepartmental communication

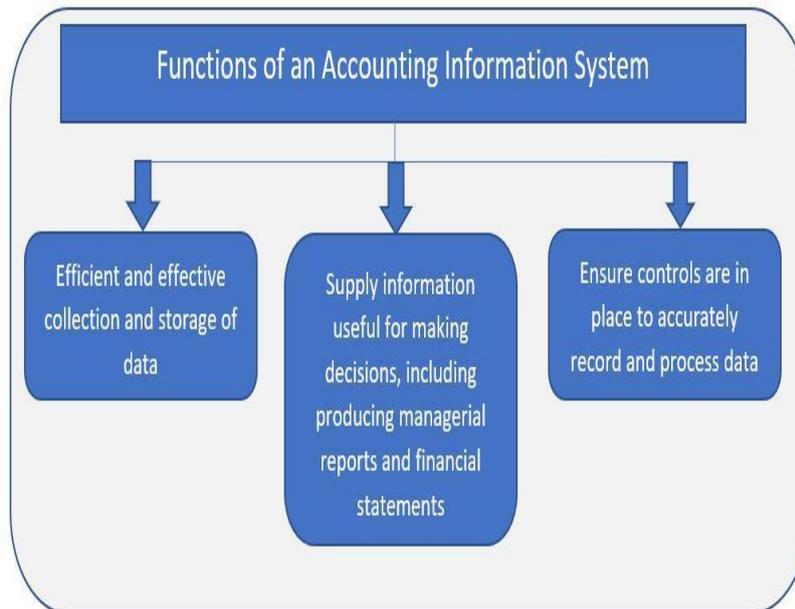
A solid AIS paves way for the proper flow of information across various departments within the organisation. Let's say the sales department has just uploaded the sales budget. This information is vital for the inventory department for better inventory planning and stock management. Now once the inventory is purchased based on the sales department's inputs and analysis, this information is shared with the accounts payable department whenever a new inventory is purchased for an invoice to be raised. In a nutshell, an AIS ensures complete visibility of the company's transactions within various functions for better business planning and forecasting.

Data access controls

AIS will allow users to define various security configurations based on the requirements. It is obvious that not all departments need information about everything that is going on in the organisation, right? Well, that's what AIS does. It ensures that only the relevant information is disseminated to a specific user by providing controlled data access. With various levels of security authorisations requiring approvals to access information, and AIS limits the information based on the permissions given by the main authority.

13.3 Functions of Accounting Information System (AIS)

An accounting information system helps the different departments within a company work together. Here are three basic functions of AIS:



13.4 Types of Accounting Information System (AIS)

An accounting information system comes in three types – Manual, Legacy and Modern/Integrated systems.

- **Manual systems** are primarily used by smaller organisations where the entire system is manual, with no technological integration. Because of the business size, the AIS need not be too complex, and all records can be maintained manually. However, a manual system would require, source documents, general ledger, general journal, and special journals or subsidiary journals for more accurate bookkeeping
- **Legacy systems** have been prevalent before the advent of high-end technology. While it does have some benefits of knowing the historical data of your firm and the ease of use, but it definitely lacks the flexibility and reliability that modern technology can offer
- **Modern/Integrated systems** are windows-based technologies that are considered to be much more user-friendly than legacy accounting systems. They generally cost less than legacy systems, can be quickly implemented, and have fewer bugs.

13.5 Uses of Accounting Information System (AIS)

An Accounting Information System is a broad structure of an organisation that deals in collecting, storing and processing financial and accounting data that are used by decision makers. It forms a centralised system where the financial information is stored by authorised personnel, and this information is then disseminated to various stakeholders in the organisation. Important data like revenue, purchases, employee, customer, tax, etc are stored in AIS.

An accounting information system has a database structure to store information. This database structure is typically programmed with a query language that allows for table and data manipulation. Since AIS has numerous fields that require necessary inputs (whether new or old),

it is crucial that the security is extremely strong to prevent any malicious virus attacks.

An accounting software such as Tally Prime allows you to handle multiple verticals of a business. Apart from just storing the data, it gives you the freedom to generate the most crucial financial reports, manage inventory, be tax compliant, seamlessly.

13.6 Componentsof Accounting Information System (AIS)

- **Person (Stakeholders)**

The starting and ending of every accounting aspect. There is a stakeholder who feeds information into the system, collects, analyses, reports, etc., and another person(stakeholder) needs information. For example, an accountant records various financial data and presents them for the use of multiple stakeholders like an owner, shareholders, creditors, government, etc.

- **Data**

It is all about various accounting transactions, events, and other monetary items. AIS will not record any information which does not have a monetary base. Data can be anything like sales ledger, customer account, vendors ledgers, financial reports like P&L and Balance sheet, cash flow statement, etc.

- **Established Procedures**

As stated in the definition, AIS follows predefined steps and procedures to perform various functions. Ensure consistency; this is one of the most basic needs of an AIS. AIS may act either with manual intervention or automatically. This action needs to be instructed to the person processing data or coded in the system in case of automatic systems.

- **Software (ERP)**

A software or, in broader terms, ERP is a computer-based program that performs the stated functions. ERP is a database software package system that supports business processes and operations, including manufacturing, marketing, financial, human resources, etc. It forms one of the main components of the Accounting Information System (AIS).

- **Information System Infrastructure**

In simple terms, IT Infrastructure can be a consortium of various IT & IS hardware, tools, and accessories. For example, computers, printers, scanners, etc.

- **Internal Controls**

Internal controls are the basic need of every business organization. These are tools, checks, procedures, systems adopted by an organization to ensure the integrity of financial information, prevention of frauds, errors, safeguarding of assets, etc.

13.7 Advantages and Disadvantages of Accounting Information System

Advantages of Accounting Information System

- **Cost-Effectiveness** – In the era of digitalization and artificial intelligence, each organization is moving towards cost-cutting using artificial intelligence. AIS has helped reduce manual efforts and can perform the same operation more cost-effectively.
- **Time Effectiveness** – AIS has assisted business organizations in reducing the amount of time involved in recording, classifying, and reporting any financial information. AIS can complete a large quantum of manual work with much less effort and time.
- **Easy Access (Portability)** – Data stored in AIS can be retrieved via an information system connected to the internet anywhere and at any time. Where manually prepared books of accounts cannot be carried easily, AIS data can be.
- **Accuracy** – With the involvement of AIS, the reliability of data is increased. As discussed earlier in this article, an AIS follows a predefined set of instructions. Therefore chances of error-prone information are less, and therefore AIS has an added advantage of accurate data.

Disadvantages

- **Initial Cost of Instalment and Training** – While we discussed that an AIS is cost-effective, the same may not be accurate in the case of small business enterprises. The initial setup cost may be high and may not generate value for the organization.
- **Manual Intervention** – Although we discussed that AIS reduces manual intervention, the same cannot be eliminated. AIS need manual intervention at a certain point, which may bring inefficiency to the system.
- **Error Cannot be Completely Eliminated** – We discussed that AIS reduces the chances of error, but there are chances of wrong coding in software, which may lead to error-prone results. Also, manual intervention is still present here, generating an error.
- **Confidentiality** – Although we discussed the portability of AIS data, the same can also be disastrous for an organization If such information is hacked, i.e., stolen. An intruder may amend the information or can disclose sensitive financial information.
- **Virus Attack** – Any data stored on IS can be infected with a virus that may disrupt and modify financial information stored on AIS.
- **Cost:** We already discussed the cost of AIS as a disadvantage.
- **Training:** There is a need to train users to feed, retrieve, or use AIS in the desired manner. If the concerned person does not get trained well, it can lead to inaccurate data preparation and presentation. Also, there are frequent transfers, promotions, resignations, retirement in a large organization. In all these cases, there is a regular need for training for replacements.
- **Absolution:** In the era of digitalization, technology is changing at a swift pace. It takes very few moments for technology to get obsolete. This generates needs for an organization to adopt the changes at the earliest. Otherwise, it may lead to error-prone data.

13.8 Changes in Accounting Information System (AIS)

In the era of rapidly changing technology and adaptation of technological advancements, significant changes are occurring in AIS. The latest changes include cloud computing, cloud accounting, real-time accounting, or mobile accounting.

This has made accounting much easier and more convenient than the old ways of accounting. Advancement has reached a level that records, classifies, analyses, and reports figures and predicts future trends, which may help to face an actual situation with much preparedness.

Conclusion

Accounting Information System (AIS) can be described as a boon to any organization as we studied both advantages and disadvantages, limitations of AIS. However, overall it is very beneficial for an organization to migrate from manual accounting to AIS-based accounting. For overcoming various disadvantages, and limitations of AIS, there is software that secures the organization's AIS from viruses, hackers, and other attacks.

Artificial Intelligence, an extended version of the Accounting Information System (AIS), has already started reducing manual intervention and will grow at a breakneck pace soon.

Every organization generates a huge amount of financial information in their day to day operations. Earlier the information was stored manually by writing them down in journals. As the economy became global and organizations started to expand. It became impossible to store data manually. So Accounting Information System helps in the secure storage of financial information that is generated at several stages of operation by a firm.

Check Your Progress

1. In an accounting information system the inputs are usually_____.
2. A system which record and report business transactions, flow of funds and generate financial statements is_____.
3. What is virus attack?

Glossaries

Keywords	Explanation
Cost-Effectiveness	In the era of digitalization and artificial intelligence, each organization is moving towards cost-cutting using artificial intelligence. AIS has helped reduce manual efforts and can perform the same operation more cost-effectively.
Accuracy	With the involvement of AIS, the reliability of data is increased. As discussed earlier in this article, an AIS follows a predefined set of instructions. Therefore chances of error-prone information are less, and therefore AIS has an added advantage of accurate data.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://www.investopedia.com/terms/a/accounting-information-system-ais.asp>
2. <https://corporatefinanceinstitute.com/resources/accounting/accounting-information-system-ais/>

Answers to Check Your Progress

1. Economic Events
2. Accounting information system
3. **Virus Attack** – Any data stored on IS can be infected with a virus that may disrupt and modify financial information stored on AIS.

Unit - 14

Financial Information system

Overview

Learning objectives

14.1 Human Resource Information System (HRIS)

14.2 Functions of Human Resource Information System (HRIS)

14.3 Types of Human Resource Information System

14.4 Pricing and Best HR software of Human Resource Information System

14.5 Uses of Human Resource Information System

14.6 Advantages and Disadvantages of Human Resource Information System

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your progress

Overview

In this unit, we will learn about Human Resource Information System and its Functions, Types of Human Resource Information System, Pricing and Best HR software of Human Resource Information System , Uses of Human Resource Information System. Advantages and Disadvantages of Human Resource Information System.

Learning Objectives

At the end of this unit you will be able to understand

- Meaning of Human Resource Information System Functions, and it's, Pricing and Best HR software of Human Resource Information System .
- Advantages and Disadvantages of Human Resource Information System.

14.1 Human Resource Information System (HRIS) and it's Elements

Human Resource Information system (HRIS) automates manual and repetitive operations and increases efficiency and productivity. This, in turn, gives HR more time to address more important and strategic business activities. HRIS uses IT technology to manage various functions that include human capital management capabilities. The two most popular features are Payroll and Time and Labour management.

HRIS stands for Human Resources Information System. The HRIS is a system that is used to collect and store data on an organization's employees. In most cases, an HRIS encompasses the basic functionalities needed for end-to-end Human Resources Management (HRM). It is a system for recruitment, performance management, learning & development, and more.

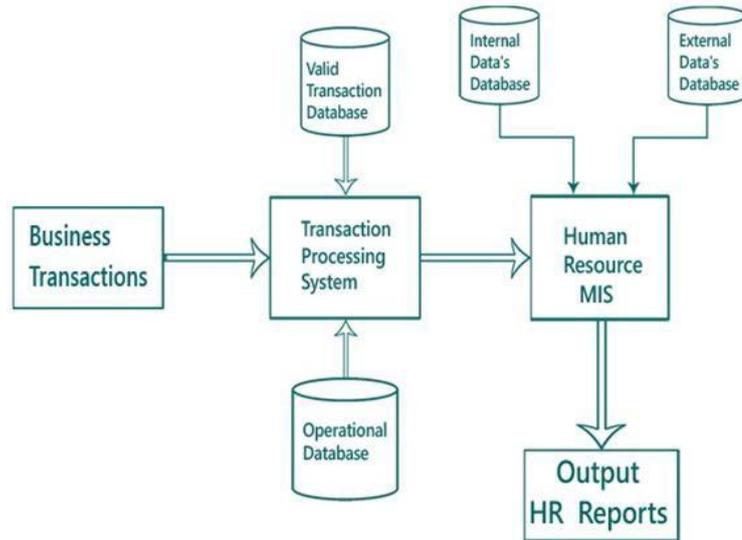
An HRIS is also known as HRIS software. This is a bit confusing as it implies that different systems can have different software running on them. However, this is not the case. The HRIS is, in essence, an HR software package.

The HRIS can either run on the company's own technical infrastructure, or, more common nowadays, be cloud-based. This means that the HR software is running outside of the company's premises, making it much easier to update.

Other commonly used names are HRIS system and HRMS, or Human Resources Management system. These are all different words for the same thing. Collectively, these systems are also called Human

Capital Management systems, or HCM. In this article, we will use the terms HRIS and HRIS systems interchangeably

Human Resource Management Information System



Elements of a Human Resource Management Information System

The structure of a Human Resource Management Information System has described below. The key components of the human resource information system are as follows –

1. Training records
2. Transaction Processing System
3. Operational database
4. Internal database
5. External Database
6. Database of validation Transactions
7. Human resource MIS
8. Human resource Application Database
9. Human resource Decision Support System
10. Human resource Executive System

The description of these elements is as follows -

1. **Training records** - the training data records of employees are captured through MIS as a historic record so that it can be used for analysis whenever required.
 2. **Transaction Processing System** - An HR Information System (HRIS) is a type of information system called "Human Resource Management Information System (HRMIS)" that is capable of storing, recording, updating, and retrieving the employee's information system. While transaction processing systems need to be able to have highly consistent response times, this is a very important feature when it comes to trading systems.
 3. **Operational database** - a database is an operational database that is designed to operate or run the day-to-day operations of your business. It also has a strong ability to act as an analytic engine, either through dashboards and web-based solutions or supporting the ability to incorporate analytics into organizational processes.
 4. **External database** - a database in which internal documents of organizations store. An internal database is a collection of one of your company's records, gathered from employees using an internet-connected device. Digital files consist of decentralized, encrypted data, which are not known to anyone and include details such as, which purchases made up items.
 5. **Internal Database** - a database in which internal records of organizations store. Internal database - a database in which internal records of organizations store. An internal database is a compilation of company data collected by employees using Internet-connected computers.
 6. **Database of validation transactions** - the validations of transaction refers to the accuracy and completeness of the information.
 7. **Human Resource MIS** - the Human Resource information system includes the systematic selection, analysis, interpretation, preservation, and distribution of all of the consumer information that is available to the company.
-

8. **Human Resource DSS** - Human Resource decision support systems is an information system that assists with decision making in the development of a Human Resource strategy.
9. **Human Resource ES** - Human Resource executive systems are intended to be used by the senior managers in decisions making.

10. **Human resource Outputs** - Human resource MIS output can be collected in the form of hard copies as well as in computerized form.

Overall Human resource MIS supports human resource business activities. These are as follows -

- Design and engineering
- Training test scores
- Scheduling human resource departments activities
- Job applicant profiles
- Scheduling reports
- Human resource planning
- Just-in-time inventory and human resource
- Process control
- Computer-integrated human resource (CIHR)
- HRM reports
- Quality control and testing
- Needs and planning reports
- Salary surveys

The key Human Resource MIS functional areas are as follows -

The types of knowledge which the functional areas will include the following:

- Tracking leaves.
- Tracking the staff records in terms of permanent jobs and temporary job.
- Tracking workers whose jobs are deemed obsolete and who are subsequently rehired.

- Maintaining demographic details for areas such as succession planning and opportunities for early retirement.
- Collective bargaining, such as the cost of employee benefits and the cost of adjustment projections.
- Profile of the employee, including experience, training, professional membership and abilities.
- Performance assessments and the administration of overtime.

14.2 Functions of Human Resource Information System (HRIS)

There are different kinds of HRIS systems and software. Because an HRIS encompasses all the functionalities for HR, all separate functionalities are part of the system. These functionalities include:

Applicant Tracking System (ATS). This software handles all the company's recruiting needs. It tracks candidate information and resumes, enables recruiters to match job openings to suitable candidates from the company's application pool, and helps in guiding the hiring process.

- **Payroll.** Payroll automates the pay process of employees. Contractual data and information on new hires is often entered into this system – sometimes combined with time & attendance data – and at the end of the month, payments orders are created.
- **Benefits administration.** Another functionality of the HRIS is benefits management. Employee benefits are an important aspect of compensation and are also managed in this system. More advanced systems offer an employee self-service model for employee benefits. In this case, employees can select the benefits they are looking for themselves. One may want more paternity leave, the other one a more expensive company car. This self-service approach to benefits is also called a cafeteria model.

HRIS Functions



- **Time & Attendance.** This module gathers time and attendance data from employees. These are especially relevant for shift workers where employees clock in and out. Back in the day, employees often wrote down their working hours on a piece of paper. Then, the manager would manually enter the data into a time tracking system. Based on this data, payment orders were generated and paid to all employees. Nowadays, workers often check into work by fingerprint or a card that is synced with an HRIS. This gives an exact time for arrival and departure. Any issues with lateness are easily detected.
- **Training.** Learning and development is a key element when it comes to employee management. This module allows HR to track qualification, certification, and skills of the employees, as well as an outline of available courses for company employees. This module is often referred to as an LMS, or Learning Management System, when it's a stand-alone. An LMS usually includes available e-learning and other courses to be followed by employees.
- **Performance management.** Performance management is a key part of managing people. Performance ratings are generated once or multiple times a year by the direct manager or peers of the employee.
- **Succession planning.** Creating a talent pipeline and having replacements available for key roles in the organization is another key component of an HRIS.
- **Employee self-service.** Employee self-service has already been mentioned. Organizations are focusing increasingly on having

employees and their direct supervisors manage their own data. Requests like holidays can be asked for by the employee him/herself. After approval, these are then immediately saved into the system (and registered to track for payroll and benefits purposes).

- **Reporting & Analytics.** A much rarer module in HRIS systems is reporting and analytics. Modern systems enable the creation of automated HR reports on various topics like employee turnover, absence, performance, and more. Analytics involves the analysis of these insights for better-informed decision making. We'll explain more about this in the section below.

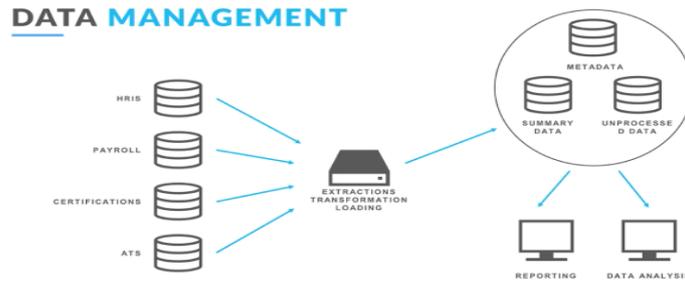
Reporting and analytics in an Human Resource Information System (HRIS)

The common characteristic for all HRIS systems is that they have been designed as **transactional systems**. They are databases that record a company's transactions. An example of a transaction is when new employees join the company.

A new employee record is entered, and the person is considered 'active'. If a person leaves the company three months later, a new transaction is recorded, setting the person's status to 'terminated'. The fact that these systems are designed as transactional systems, makes them bad at data reporting and analytics. They simply haven't been designed for this. In addition, not all HRIS systems have all the above capabilities built-in.

Some functionality, like payroll, LMS, or ATS could also be recorded in external systems. This makes HR reporting even more challenging, as it means that data is dispersed into multiple systems. In order to report data, a new layer needs to be added on top of all HR systems to report and analyze the HR data.

This is the second reason why the practical use of reporting and analytics for these systems is limited. Be aware of this when you are talking to HRIS providers, as they often tout their systems to be excellent in data reporting and analytics.



HRIS suppliers

The HRIS software market is fiercely competitive; there are thousands of HRIS suppliers to choose from. Gartner's Magic Quadrant below lists the best-known Human Capital Management suits for 1,000+ employee enterprises. These include Workday, Oracle, SAP, ADP, Ceridian, Kronos, and more. Listing all the HRIS suppliers or declaring the best HRIS, would be impossible.

It can't be generalized as the best HRIS for your company depends on the specific needs of an organization. These five HCMs are widely considered to be leaders:

Cornerstone

Cornerstone OnDemand, as one of the largest providers for Small and Medium businesses, offers different suites including recruiting, learning, performance management, and an e-learning LMS.

Workday

Workday is arguably one of the best-known HRIS out there. Founded in 2005, it has rapidly grown to a global HRIS giant with over 10,000 employees. Workday specifically tailors to mid- and large-sized businesses.

SAP

SAP is better known as an ERP, or Enterprise Resource System. These are systems that keep track of a company's resources, which include among other things financial assets, orders, and people. In 2011, SAP acquired Success Factors, making SAP Success Factors one of the major players in the HCM market, especially for large companies.

Oracle

Oracle HCM Cloud was released in 2011. It includes modules on talent management, workforce rewards, workforce management, and work-life solutions.

Ultimate Software

Ultimate Software was ranked by Forbes as the 7th Most Innovative Growth Company. The company provides one system of records for HR, payroll, and talent management. Systems include time and attendance, on boarding, performance management, compensation, succession management, and more.

HRIS specialist & HRIS analyst

In terms of job functions, there are two job roles that involve the HRIS. The first one is the Human Resource Information Specialist. The HRIS specialist is responsible for implementing and maintaining the HRIS for the organization. This also involves on-the-job training to HR professionals in the use of the system. This function is usually in the IT arm of the department. The HRIS analyst provides support for the HRIS. This includes researching and resolving HRIS problems and being a liaison with other parts of the business, like finance/payroll.

As an analyst, you are also involved in the generation of standard and ad-hoc HRIS reporting and improvements of HRIS processes. This means improving the employee experience in using the systems, coming up with user-friendly innovations, and implementing new policies to be reflected in the system. However, HRIS is now an essential skill for all HR employees. Your organization may not have dedicated HRIS personnel. Generally, large companies do so.

14.3 Types of Human Resource Information System (HRIS)

Along with the different features you can look for in an HRIS, there are different types of platforms that relate to different aspects of HR and use cases for data.

- **Operational HRIS:** This system tries to reduce – if not eliminate – the repetition in filing and organizing employee data. It can handle everything from employee needs to the interpersonal aspects of your workforce to compliance with government regulations.
- **Tactical HRIS:** This is an employee-facing system by nature. Built from the ground up to inform and support the allocation of company resources, a tactical HRIS helps with processes like recruitment, on boarding and job analysis.
- **Comprehensive HRIS:** As the name suggests, a comprehensive HRIS closely organizes and examines HR files. The platform serves as an integrated database to keep all sensitive worker data together in one place. These data points include an employee's position within the company, affirmative action files, skill inventory and other HR information.
- **Strategic HRIS:** A strategic HRIS deals with the entire workforce rather than just employee-facing functions. Some uses for this style of HRIS are workforce planning, labour negotiations (if your employees are unionized) and other specialized HR needs.

14.4 Pricing and Best HR software of Human Resource Information System (HRIS)

HRIS pricing

No two HRIS companies have the exact same pricing model. Since each service differs in its features and the number of users it supports, prices will vary. Since these platforms are usually cloud- or browser-based, they often charge a monthly fee per user. If your company needs access for only a handful of users, some vendors will offer their services for free, since you won't be taking up much

bandwidth and you'll already be in their ecosystem once you start experiencing growth. Paid accounts range from \$1 to \$15 per user per month, depending on factors like features and add-ons. Ask your potential HRIS provider about any additional costs, such as setup, consulting and support fees.

The best HR software

There is a wide range of software available to address HR needs – such a wide range, in fact, that it can be daunting to attempt to wade through and review them all to determine the best picks. We've done some of the legwork for you and have identified some of the best HR software on the market today. Our selections include the following:

- **Gusto:** In our Gusto review, we found the platform to be well suited for payroll processing and managing employee compensation.
- **Rippling:** In our Rippling review, we found the platform to be best for employee on boarding and setting new hires up for success with robust training options.
- **BambooHR:** In our BambooHR review, we found the system's performance management tools, like employee self-assessments, manager assessments and skill development features, to be outstanding.
- **GoCo:** GoCo's automation tools to be the easiest to use and the most efficient for saving HR professionals time and freeing them up to focus on higher-order tasks.
- **Paychex Flex:** In our Paychex Flex review, we found the platform to be best for organizations managing remote teams or hybrid workforces thanks to its ability to improve team communication and run payroll across multiple jurisdictions with ease.

14.5 Uses of Human Resource Information System (HRIS)

- **Timesaving:**

HRs doesn't have to manually enter every detail about the employees or maintain an attendance register. HRIS system is automated to do this process by accurately capturing and integrating the data. And so, the HRs doesn't have to devote their time to these monotonous tasks every day.

- **Self-service:**

HRIS has included various self-service features, leading to less time consumption and more productivity. For e.g., employees can access forms and generate payment statements on their own.

- **Centralized storage:**

HRIS stores all the information in one place, making it easy to access and retrieve information with a few clicks. This also improves the security of sensitive information with encryption and assigned permissions.

- **Accuracy:**

The biggest advantage of HRIS is that it has the ability to provide reports on financial data without errors.

- **Improved data management:**

HRIS helps HRs navigate and manage massive data bulks and makes data searching, filtering, and reporting much easier.

- **Rapid recruiting process:**

HRs can rely on automation solutions to alleviate administrative burdens and rapidly respond to the recruitment process. HRIS also uses unique features like using AI to segregate the right candidate.

- **Fewer systems to manage:**

A good HRIS system serves the organization with various critical purposes in just one. Various HR processes like payroll, hiring, and so on can be unified in one place. This means you only have to manage one system.

- **On-demand reporting:**

Report sharing becomes easier with other departments, and no time is consumed in going through different sheets and files.

Bitscape is an **HR management application** development company. We also provide custom HR management solutions. Our experts here at Bitscape help you integrate HRIS in the organization and collaborate with other information portals to seek data. Our team helps you develop HRIS according to the organizations' needs. We have a development team that manages the system and its development and integration. We've gained expertise in this field and can help you ease the work of HRs and automate trivial and monotonous processes that take up a lot of time.

14.6 Advantages and Disadvantages of Human Resource Information System (HRIS)

Advantages of an HRIS

- **One-stop shopping.** One of the most frequently mentioned advantages of an HRIS is that enter information only once for many HR-related employee tasks. And, similarly, need to update only one place when employee information changes.

- **Integration of data.** Furthermore, different parts of the system can “talk to each other” allowing more meaningful reporting and analysis capabilities, including internal evaluations and audits and preparation of data for outsiders.
 - **Accuracy.** Improved accuracy is likely assuming data are entered and manipulated correctly.
 - **Self service.** This feature can be a great timesaver for HR. Employees may enter the system to change data (for example, change their own addresses) and managers and supervisors may enter the system to enter data (for example, performance reviews) or to retrieve data without bothering HR.
 - **Automated reminders.** Systems can schedule events, such as performance appraisals and benefit deadlines, automatically notifying and nudging if actions have not been performed.
 - **Hosting of company-related documents.** The system can host such materials as employee handbooks, procedures, and safety guidelines. The materials are easily updated in one place.
 - **Benefits administration.** This could include enrollment, notices, changes, and reporting.
 - **Recruiting management.** This may include applicant tracking, management, and reporting.
- **Record-keeping.** An HRIS is a record-keeping system that keeps track of changes to anything related to employees. The HRIS can be seen as the single source of truth when it comes to personnel data.
 - **Compliance.** Some data is collected and stored for compliance reasons. This includes material for the identification of employees in case of theft, fraud, or other misbehaviours, first contact information in case of accidents, citizens identification information for the tax office, and expiration dates for mandatory certification. All this information can be stored in the HRIS. It is essential that data is stored safely and securely, in line with GDPR regulations.
 - **Efficiency.** Having all this information stored in one place not only benefits accuracy but also saves time. Some companies still keep a lot of data about employees as physical paperwork. Finding the right folder, and locating the right sheet, can take up a lot of staff time.

- **HR strategy.** The HRIS permits the tracking of data required to advance the HR and business strategy. Depending on the priorities of the organization, different data will be essential to track. This is where the HRIS shines.
- **Self-Service HR.** A final benefit is the ability to offer self-service HR to employees and managers. This enables employees to manage their own affairs. When done right, the HRIS can offer a good employee experience. Keep in mind that not all HRIS systems offer this in a user-friendly manner!

Working with an HRIS has multiple benefits for the organization, HR, and the employee. Using an HRIS becomes interesting when you have between 30 to 50 employees. At this time, managing this basic information in Excel becomes cumbersome and simple procedures like approving employee holidays need to be standardized. Using an HRIS is especially beneficial for large organizations which typically use more advanced HRIS systems to support different HR functions. Small businesses would suit a more basic HRIS.

Disadvantages

- **Security.** Security is one of the biggest worries. Systems must be designed to prevent unauthorized access to sensitive and confidential data and also the unintended publication of such information. This typically required many “compartments” and many levels of authority for access, all of which have to be monitored and maintained.
- **Cost.** Then there is the cost factor. Especially for smaller companies, this can pose a problem. With any system, there are acquisition costs and maintenance costs. SaaS (software as a service) systems are somewhat easier to handle from a cost standpoint since they are cloud-based and don’t require as much initial outlay.
- **Staffing.** With larger installations, there’s probably the cost of hiring an IT specialist to manage the system.

Check Your Progress

1. An HRIS that supports regular and ongoing decisions are called_____.
2. A key benefit of any HRIS is_____.
3. What is called record keeping?

Glossaries

Keywords	Explanation
HR strategy	The HRIS permits the tracking of data required to advance the HR and business strategy. Depending on the priorities of the organization, different data will be essential to track. This is where the HRIS shines.
Tactical HRIS	This is an employee-facing system by nature. Built from the ground up to inform and support the allocation of company resources, a tactical HRIS helps with processes like recruitment, on boarding and job analysis.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://corehr.wordpress.com/2013/05/31/what-is-mis-hris/>
2. <https://matics.live/glossary/manufacturing-information-system/>

Answers to Check Your Progress

1. Management Information Systems
2. The generation of Reports
3. **Record-keeping.** An HRIS is a record-keeping system that keeps track of changes to anything related to employees. The HRIS can be seen as the single source of truth when it comes to personnel data.

Block 5

System Development Life cycle

Unit – 15

System Development Life cycle and System Analysis

Overview

Learning objectives

15.1 Systems Development Life Cycle (SDLC)

15.2 Systems Development Life Cycle Models and it's Steps

15.3 Phases of Systems Development Life Cycle

15.4 Advantages and disadvantages of Systems Development Life Cycle

15.5 Features of Systems Development Life Cycle - Software

15.6 Systems Development Life Cycle Tool

15.7 The Most Popular SDLC Tools and SDLC Models Used Today

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Suggested Readings

Answers to check Your Answers/Possible Answers

Overview

In this unit, we will learn about meaning of Systems Development Life Cycle (SDLC), Systems Development Life Cycle Models and it's Steps, Advantages and disadvantages of Systems Development Life Cycle, Features of Systems Development Life Cycle – Software, Systems Development Life Cycle Tool, The Most Popular SDLC Tools and SDLC Models Used Today.

Learning Objectives

At the end of this unit you will be able to understand

- Systems Development Life Cycle Models and it's Steps,
- Advantages and disadvantages of Systems Development Life Cycle,
- Features of Systems Development Life Cycle – Software,
- Systems Development Life Cycle Tool

15.1 Systems Development Life Cycle (SDLC)

The systems development life cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. SDLC can apply to technical and non-technical systems.

The software development life cycle is a systematic process consisting of phases that enable development teams to create high-quality, sustainable, low-cost software in the shortest time possible. In addition, the SDLC process aims to produce functioning software that meets or exceeds customer requirements and expectations.

The systems development life cycle (SDLC) is a conceptual model used in project management that describes the stages involved in an information system development project, from an initial feasibility study through maintenance of the completed application. SDLC can apply to technical and non-technical systems. In most use cases, a

system is an IT technology such as hardware and software. Project and program managers typically take part in SDLC, along with system and software engineers, development teams and end-users.

Every hardware or software system will go through a development process which can be thought as an iterative process with multiple steps. SDLC is used to give a rigid structure and framework to define the phases and steps involved in the development of a system.

SDLC is also an abbreviation for Synchronous Data Link Control and software development life cycle. Software development life cycle is a very similar process to systems development life cycle, but it focuses exclusively on the development life cycle of software.

15.2 Systems Development Life Cycle (SDLC) Models and Steps

Various SDLC methodologies have been developed to guide the processes involved, including the original SDLC method, the Waterfall model. Other SDLC models include rapid application development (RAD), joint application development (JAD), the fountain model, the spiral model, build and fix, and synchronize-and-stabilize. Another common model today is called Agile software development.

Frequently, several models are combined into a hybrid methodology. Many of these models are shared with the development of software, such as waterfall or agile. Numerous model frameworks can be adapted to fit into the development of software.

In SDLC, documentation is crucial, regardless of the type of model chosen for any application, and is usually done in parallel with the development process. Some methods work better for specific kinds of projects, but in the final analysis, the most crucial factor for the success of a project may be how closely the particular plan was followed.

Steps in SDLC

SDLC can be made up of multiple steps. There is no concrete set number of steps involved. Around seven or eight steps appear commonly; however, there can be anywhere from five upwards to 12. Typically, the more steps defined in an SDLC model, the more granular the stages are.

In general, an SDLC methodology follows these following steps:

1. **Analysis:** The existing system is evaluated. Deficiencies are identified. This can be done by interviewing users of the system and consulting with support personnel.
2. **Plan and requirements:** The new system requirements are defined. In particular, the deficiencies in the existing system must be addressed with specific proposals for improvement. Other factors defined include needed features, functions and capabilities.
3. **Design:** The proposed system is designed. Plans are laid out concerning the physical construction, hardware, operating systems, programming, communications and security issues.
4. **Development:** The new system is developed. The new components and programs must be obtained and installed. Users of the system must be trained in its use.
5. **Testing:** All aspects of performance must be tested. If necessary, adjustments must be made at this stage. Tests performed by quality assurance (QA) teams may include systems integration and system testing.
6. **Deployment:** The system is incorporated in a production environment. This can be done in various ways. The new system can be phased in, according to application or location, and the old system gradually replaced. In some cases, it may be more cost-effective to shut down the old system and implement the new system all at once.
7. **Upkeep and maintenance:** This step involves changing and updating the system once it is in place. Hardware or software may need to be upgraded, replaced or changed in some way to better fit

the needs of the end-users continuously. Users of the system should be kept up-to-date concerning the latest modifications and procedures.

Other steps which may appear include project initiation, functional specifications, detailed specifications, evaluation, end-of-life and other steps that can be created by splitting previous steps apart further.

An effective System Development Life Cycle (SDLC) should result in a high quality system that meets customer expectations, reaches completion within time and cost evaluations, and works effectively and efficiently in the current and planned Information Technology infrastructure.

System Development Life Cycle (SDLC) is a conceptual model which includes policies and procedures for developing or altering systems throughout their life cycles.

SDLC is used by analysts to develop an information system. SDLC includes the following activities –

- requirements
- design
- implementation
- testing
- deployment
- operations
- maintenance

15.3 Phases of Systems Development Life Cycle (SDLC)

Systems Development Life Cycle is a systematic approach which explicitly breaks down the work into phases that are required to implement either new or modified Information System.

Life Cycle of System Analysis and Design

The following diagram shows the complete life cycle of the system during analysis and design phase.

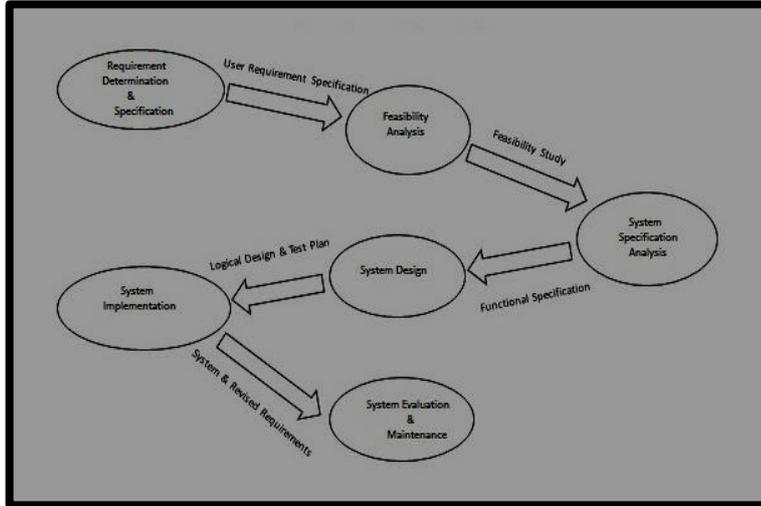
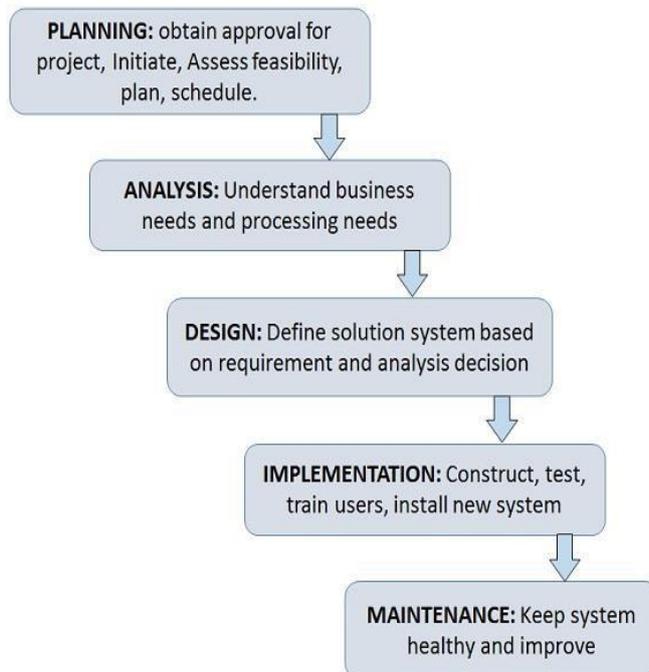


Figure-15.1. Life Cycle of System Analysis and Design



Feasibility Study or Planning

- Define the problem and scope of existing system.

- Overview the new system and determine its objectives.
- Confirm project feasibility and produce the project Schedule.
- During this phase, threats, constraints, integration and security of system are also considered.
- A feasibility report for the entire project is created at the end of this phase.

Analysis and Specification

- Gather, analyze, and validate the information.
- Define the requirements and prototypes for new system.
- Evaluate the alternatives and prioritize the requirements.
- Examine the information needs of end-user and enhances the system goal.
- A Software Requirement Specification (SRS) document, which specifies the software, hardware, functional, and network requirements of the system is prepared at the end of this phase.

System Design

- Includes the design of application, network, databases, user interfaces, and system interfaces.
- Transform the SRS document into logical structure, which contains detailed and complete set of specifications that can be implemented in a programming language.
- Create a contingency, training, maintenance, and operation plan.
- Review the proposed design. Ensure that the final design must meet the requirements stated in SRS document.
- Finally, prepare a design document which will be used during next phases.

Implementation

- Implement the design into source code through coding.
- Combine all the modules together into training environment that detects errors and defects.

- A test report which contains errors is prepared through test plan that includes test related tasks such as test case generation, testing criteria, and resource allocation for testing.
- Integrate the information system into its environment and install the new system.

Maintenance/Support

- Include all the activities such as phone support or physical on-site support for users that is required once the system is installing.
- Implement the changes that software might undergo over a period of time, or implement any new requirements after the software is deployed at the customer location.
- It also includes handling the residual errors and resolve any issues that may exist in the system even after the testing phase.
- Maintenance and support may be needed for a longer time for large systems and for a short time for smaller systems.

The system analyst is a person who is thoroughly aware of the system and guides the system development project by giving proper directions. He is an expert having technical and interpersonal skills to carry out development tasks required at each phase.

He pursues to match the objectives of information system with the organization goal.

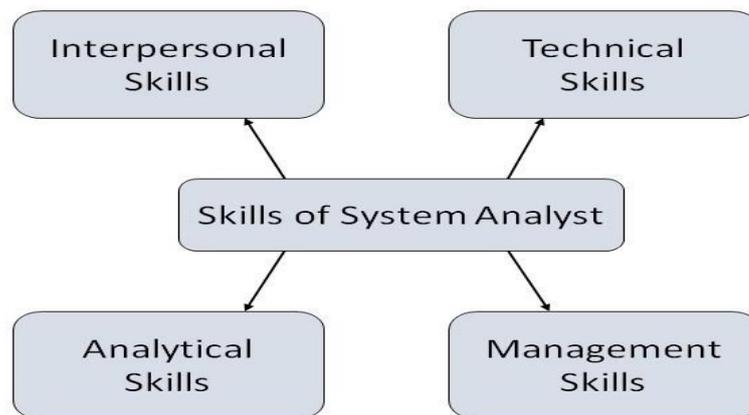
Main Roles

- Defining and understanding the requirement of user through various Fact finding techniques.
- Prioritizing the requirements by obtaining user consensus.
- Gathering the facts or information and acquires the opinions of users.
- Maintains analysis and evaluation to arrive at appropriate system which is more user friendly.
- Suggests many flexible alternative solutions, pick the best solution, and quantify cost and benefits.
- Draw certain specifications which are easily understood by users and programmer in precise and detailed form.

- Implemented the logical design of system which must be modular.
- Plan the periodicity for evaluation after it has been used for some time, and modify the system as needed.

Attributes of a Systems Analyst

The following figure shows the attributes a systems analyst should possess –



Interpersonal Skills

- Interface with users and programmer.
- Facilitate groups and lead smaller teams.
- Managing expectations.
- Good understanding, communication, selling and teaching abilities.
- Motivator having the confidence to solve queries.

Analytical Skills

- System study and organizational knowledge
- Problem identification, problem analysis, and problem solving
- Sound commonsense
- Ability to access trade-off
- Curiosity to learn about new organization

Management Skills

- Understand users jargon and practices.
- Resource & project management.
- Change & risk management.
- Understand the management functions thoroughly.

Technical Skills

- Knowledge of computers and software.
- Keep abreast of modern development.
- Know of system design tools.
- Breadth knowledge about new technologies.

15.4 Advantages and disadvantages of Systems Development Life Cycle

- Having a clear view of an entire project, workers involved, estimated costs and timelines.
- Gives project managers a projected base cost of the project.
- Goals and standards are clearly defined.
- Developers can move back a step if something does not go as expected.

Disadvantages

Due to assumptions made at the beginning of a project, if an unexpected circumstance complicates the development of a system, then it may stockpile into more complications down the road. As an example, if newly installed hardware does not work correctly, then it may increase the time a system is in development, increasing the cost.

- Some methods are not flexible.
- It can be complicated to estimate the overall cost at the beginning of a project.
- Testing at the end of development may slow down some development teams.

The software development life cycle is a scripted process that, when applied correctly, produces functioning software that meets a customer's requirement. Various SDLC tools and available development

models are explored here to help software development managers select the best for their development teams.

15.5 Features of Systems Development Life Cycle (SDLC) Software

Rarely is the first release of an application fully operational, so one of the must-have features in SDLC software is error monitoring and crash reporting.

The software should also have an automated software delivery process that moves developed code from a testing environment to a production environment after the code has been thoroughly tested in the test environment. Other must-have features include:

- **Automated security testing** identifies flaws in developed code and validates the developed software is meeting the expected results.
- **Version control** allows multiple programmers to work on different parts of an application and track changes to the code. Version control collates each piece of changed code and creates the latest version that can be sent to programmers for added changes and tracked with a different version number as required.
- **Collaboration tools** allow programming team members to communicate during the application development process.

What Are the Must-Have Integrations?

Integration is a must-have feature in SDLC software because it allows software development teams to test a software solution with all of the required hardware and software components. Defect tracking, requirement management, testing management, and source control management are integration tools that help applications get deployed into production faster.

- **Defect tracking** tracks a group of changes to individual files that become a specific defect record.

- **Requirement management** involves documenting, analyzing, and tracking agreed-upon software requirements and communicating any changes to interested parties.
- **Testing management** involves managing the test cases and recording the results against a provided software baseline. Testing management integrates with requirement management to validate every requirement. Defect testing tracks every failed test case.
- **Source control management** tracks and controls software changes with revision numbers that become created software baselines.

Integrated development environment (IDE) code editors provide a compiler and debugger and have built-in automation tools to perform some of the integrated testing tasks.

15.6 Top 8 Systems Development Life Cycle (SDLC) Tools

Software development life cycle tools don't always offer the same features or integrations. Therefore, we will review some available tools on the market to allow software managers and developers to see a subset of SDLC tools available to help them better define their business requirements to meet their software development needs.

SDLC Software Comparison Chart

SDLC Software Tool	Bug/Defect Tracking	Iteration Management	Version Control	Release Management	Third Party Integration	Collaboration Tools
ClickUp	No	Yes	Yes	Yes	Yes	Yes
Implementer	Yes	No	Yes	Yes	Yes	No

SDLC Software Tool	Bug/Defect Tracking	Iteration Management	Version Control	Release Management	Third Party Integration	Collaboration Tools
Jama Connect	Yes	Yes	Yes	Yes	No	Yes
Open DevOps	Yes	Yes	Yes	Yes	Yes	Yes
Orcanos	Yes	Yes	Yes	Yes	No	Yes
SpiraTeam	Yes	Yes	Yes	Yes	Yes	Yes
Waydev	No	No	Yes	No	No	No

ClickUp

ClickUp is a productivity platform that can natively integrate with GitHub, GitLab, and Bitbucket software development tools to track all the commits, merges, and push requests during the software development process. In addition, developers can use the Agile project management framework provided by ClickUp to prioritize requests and execute project planning with a clear understanding of the objectives. Using Agile, users can organize sprints and collaborate with team members during the development process.

Best For: Software development teams

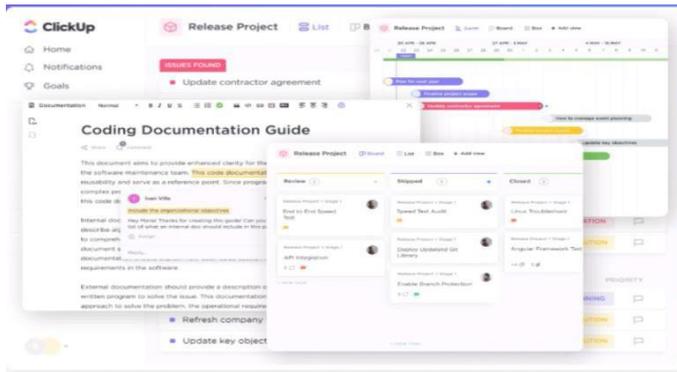


Image: ClickUp

Implementer

Implementer is designed to be easy for beginners with its graphical user interfaces (GUI). IBM's Implementer offers a software configuration manager (SCM) and an application life cycle manager (ALM) that simplifies the software development process. In addition, Implementer allows users to track previously compiled objects as historical information to help identify any unique characteristic changes from earlier or recent compiles.

Concurrent development effort allows different developers to work on copies of the same source code that helps expedite the development process. In addition, Implementer protects code from unauthorized access with its secure promotion technology.

Best For: IBM users

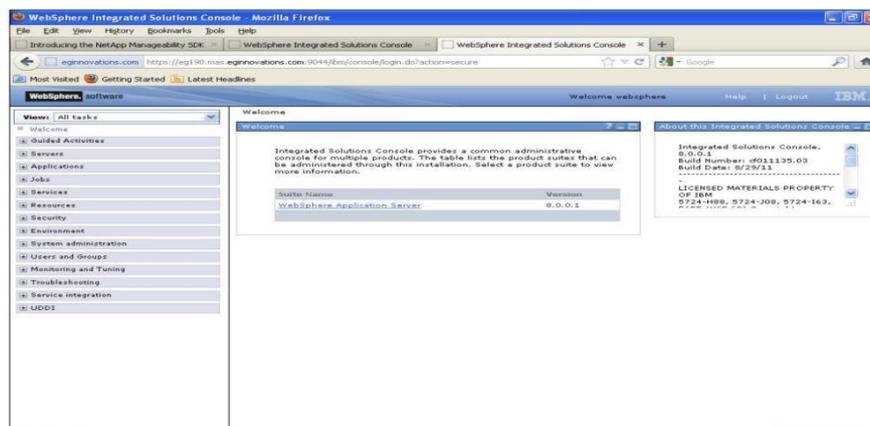


Image: Implementer

Jama Connect

Jama Connect is a product development platform that can help companies reduce development time for complex software. Jama Connect offers catalogs of reusable software versions and sets of requirements that can be reused for future needs. By reusing existing code, design inconsistencies can be reduced with versioning, baselining, and change management.

Jama Connect improves change management by using a live traceability function by linking requirements across the entire SDLC process. Tracing code changes helps teams maintain a formal change process, execute impact analysis, and show interdependencies amongst processes that help decision-making processes.

Best For: Test and system engineers, product managers, and business analysts who want to manage projects while tracking changes

Jama Requirement		Tests			Files		Reviews			
Key	Summary	Success %	Total	✓	✗	⚠	📁	👤	🗒	💬
12376	LTC_002 Initialize ECU	N/A	6	3	2	1	N/A	N/A	0 / 0	0 / 0
12379	LTC_003 Finalization State	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12388	LTC_004 Output messages	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12391	LTC_005 Report Sensor Failure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12394	LTC_006 Monitor Sensor Deterioration	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12397	LTC_007 Test Operational States	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Image: Jama Connect

Open DevOps

Open DevOps is an Atlassian software development solution that uses the Agile model for code development. It integrates with Jira for Agile planning, Bitbucket for continuous integration and continuous

delivery (CI/CD) processes, Opsgenie for altering and incident response, and Confluence for documentation.

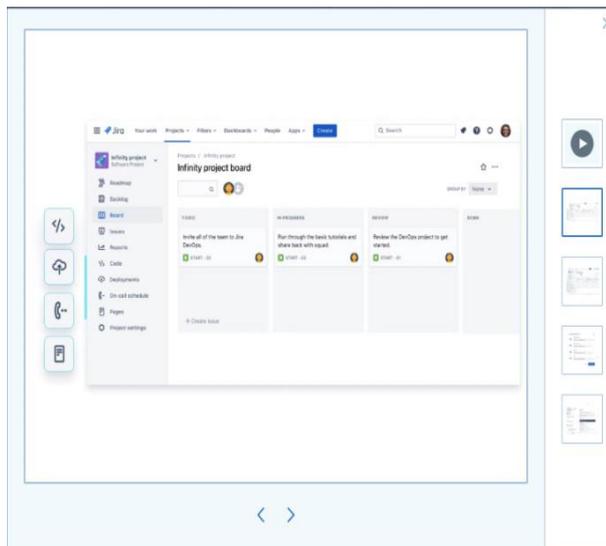
Each of these tools that integrate with Open DevOps significantly improves the software development process. For example, Bitbucket reduces time on code reviews, deploys code faster with its CI/CD tool, and helps developers detect code issues.

When integrated with Dynatrace, Jira lets developers see what is going on with branches and pull requests within the repositories a development team is working on. Jira allows the development team to see what the customer is using and what issues may arise from the latest release.

Confluence documents design specifications, release notes, and any information deemed necessary. Opsgenie alerts teams when critical problems are identified and any additional information to help developers resolve the issue quickly.

Best For: Software development businesses

Image: Open DevOps



Orfanos

Orfanos uses the application life cycle management model and quality management systems (QMS) development tools to help companies meet strict mandatory compliance requirements. In addition,

Orcanos uses compliance management software as a service (SaaS) to help manufacturing industries meet regulatory compliance for medical devices and automotive components.

Orcanos requirements management tools help medical device manufacturers address challenges in the developmental stages. The earlier the challenges are identified through requirements traceability, the better the chances are the medical device will remain in compliance with industry standards.

The risk automation feature can be set up using a risk calculation method to address business processes not meeting an established standard. In addition, Orcanos provides an online document repository that team members can use to collaborate to get the most accurate information for a given project.

Best For: Medical device manufacturers

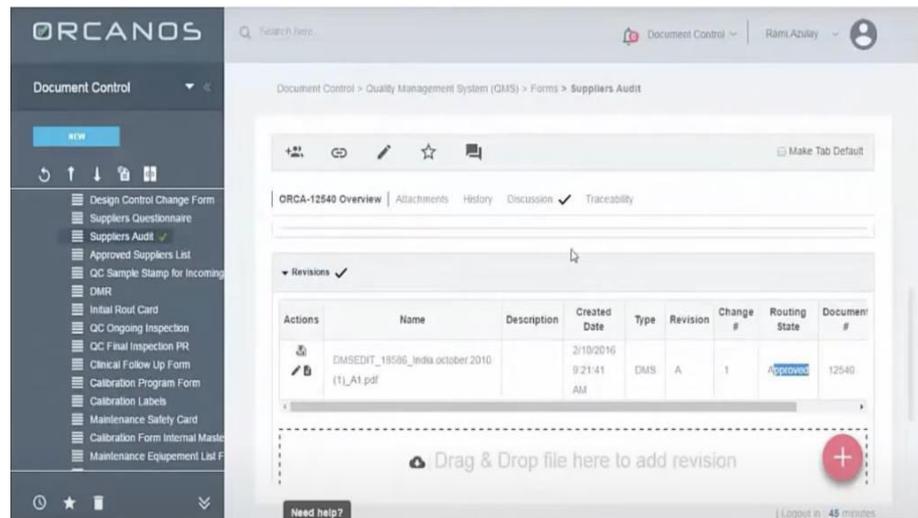


Image: Orcanos

SpiraTeam

SpiraTeam uses an ALM software development process that manages all code-related, project management, and documentation artifacts in one unified environment. In addition, SpiraTeam includes an extensive library of plug-ins and add-ons, allowing it to integrate with other software systems.

For example, SpiraTeam can be incorporated into a business's IDE and enable developers to view assigned requirements, incidents, and tasks in the same environment where code is developed. Furthermore, the bug and defect tracker can seamlessly integrate with other major bug-tracking systems using its data-synchronization infrastructure, which adds to the developer's ability to track and detect software bugs easier.

Best For: Project managers, business analysts, and QA managers who need to track the entire project from requirements to software product delivery.

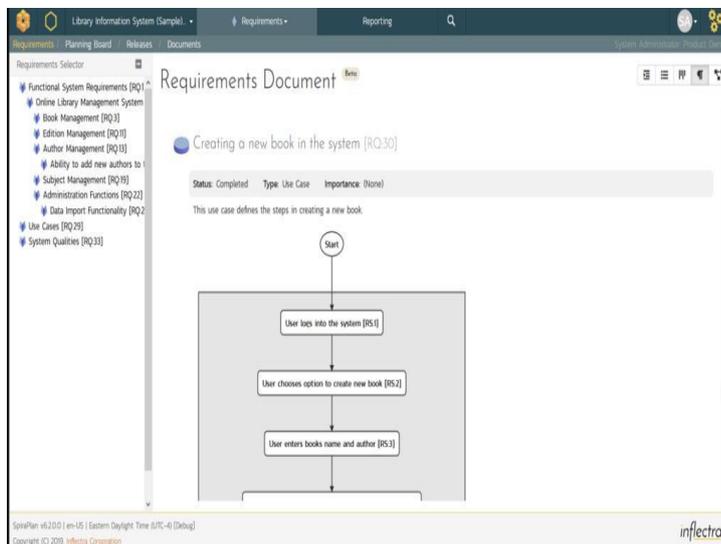


Image: SpiraTeam

Waydev

Waydev focuses on software engineers' efficiency by using data-driven information that helps software businesses deliver their software products to customers faster. Waydev analyzes codebases and software pull requests that will be integrated into a centralized project repository and track CI/CD activities to improve overall productivity. In addition, Waydev helps businesses measure organizational-level efficiencies to optimize the overall development process.

Best For: Technology companies with significant engineering staff.

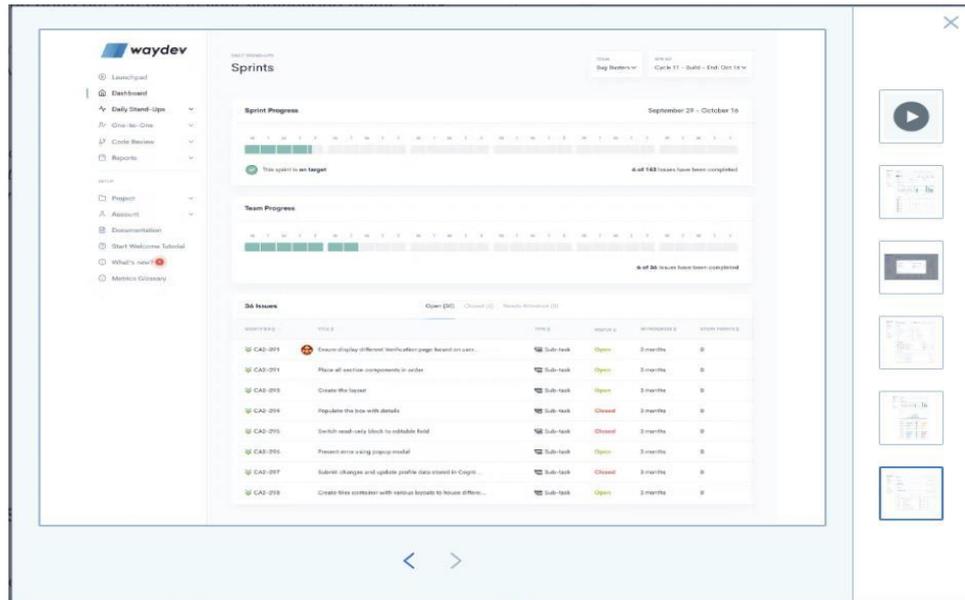


Image: Waydev

Significant Differences between Each Tool

All of the application development tools reviewed goals are to produce quality software or a specific product using the software. ClickUp and Open DevOps integrate with popular software development tools, such as Bitbucket, GitHub, and GitLab. Still, ClickUp and Open DevOps differ in that ClickUp has many easy-to-use templates for day-to-day business processes that DevOps does not.

Like ClickUp, Jama Connect offers solutions by industry. While ClickUp uses templates to expedite the creation of a business process, Jama Connect uses reusable versions of created software that can meet a similar business need. Jama Connect is a productivity platform focusing on companies building complex software and systems with its engineering staff.

Both Orcanos and Waydev have engineers on staff to develop their respective products. Waydev uses many of the same software development tools Open DevOps and ClickUp use. Still, WayDev uses a Git Analytics Intelligence Platform for engineers to optimize the software development process. Orcanos is a compliance management SaaS platform that focuses on making sure any medical devices it makes are in regulatory compliance.

Implementer uses proprietary IBM resources for its ALM and SCM in the software development process. The IBM Workbench uses a graphical user interface that is easy to use and speeds up the development process. SpiraTeam also uses an ALM development process to manage requirements, releases, and test cases in one unified environment with the ability to customize the dashboard. However, the Implementer is limited to IBM users. SpiraTeam can be used by a wider audience, even though both products can be used by project managers, business analysts, and quality assurance managers.

15.7 The Most Popular SDLC Tools and SDLC Models Used Today

Any SDLC model can be effective if it's used correctly. The iterative and spiral models can be used, but they are not as popular as some of the other SDLC models used today. The prototype model proves a programming application can work by executing some portion of a larger application.

Iterative Model

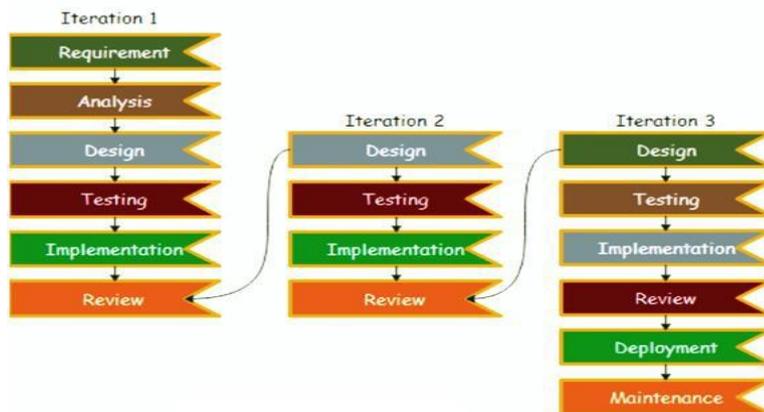


Figure.15.1. Iterative Model

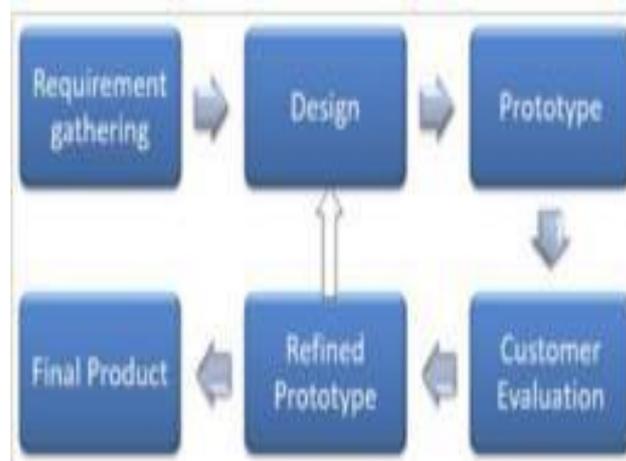


Figure.15.2. Spiral Model



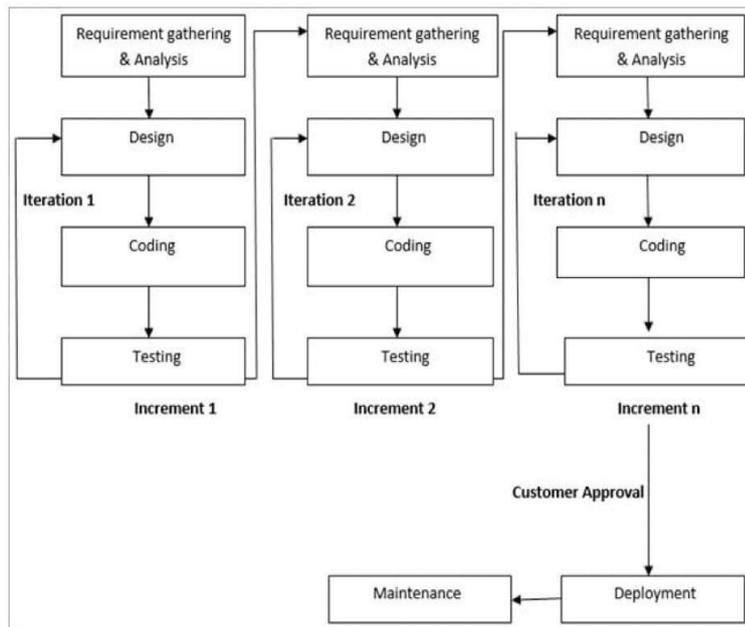
Today's most popular SDLC model is Agile SDLC, often paired with a proven project management methodology. Jira, Git, Confluence, Bamboo, Sourcetree, and Bitbucket are today's most popular software tools. Each of these products does something a little different. There may be some overlapping, but when combined correctly as part of a development application suite for a team of developers, customers can expect a software product to meet or exceed their business needs.

Agile software development model

The Agile software development iterative approach involves small incremental improvements of software code for frequent releases, also known as sprints. Agile focuses on repetitive customer interaction

through collaboration, incrementally executing functioning software code and responsiveness to changing requirements.

Figure.15.3. Agile software development model



V-shape software development model

The V-shape model enables businesses to deliver quality products with an improved system development process.

Figure.15.4. V-shape software development model

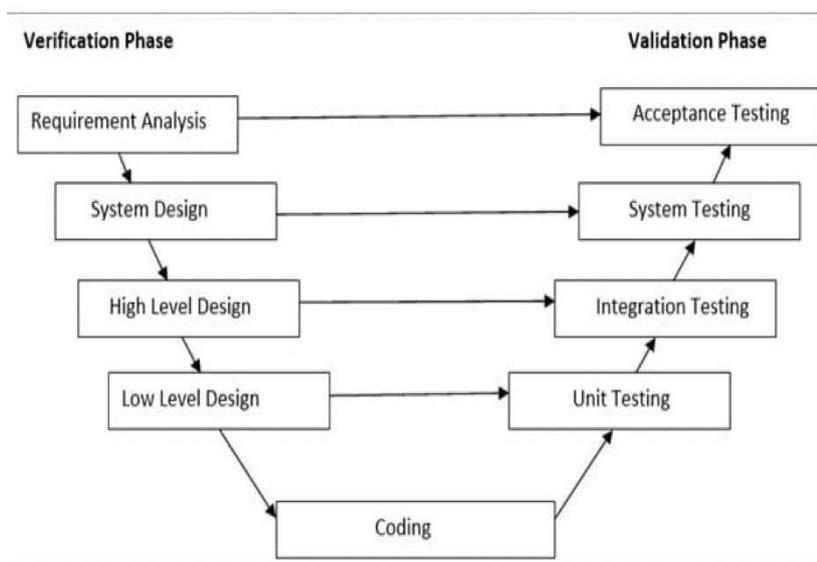
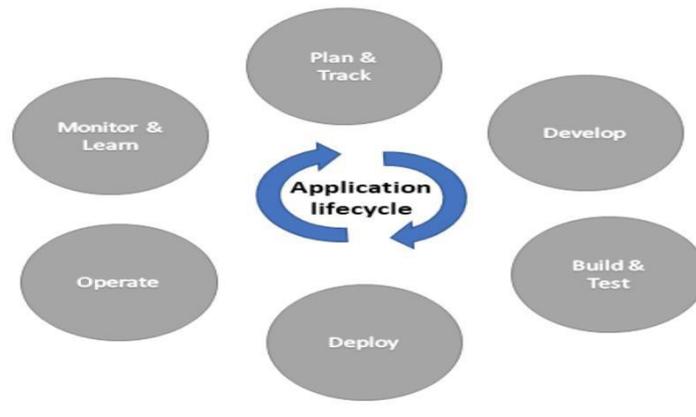


Figure.15.5. Application life cycle model (ALM)



ALM software development allows an application to be repetitively improved through the ALM model.

Waterfall model

The Waterfall model is a sequential set of steps from requirements to release. With some vendors, the Waterfall model is used as a hybrid development for companies that cannot use pure agile methodologies.



Figure.15.6. Waterfall model

Tools for system Development

A system development project includes a number of different phases, such as feasibility analysis, requirements analysis, software design, software coding, testing and debugging, installation and maintenance the all process can be maintain by different tools.

Check Your Progress

1. System Development Life Cycle (SDLC) is ___ used by the system experts to design a system..
2. SDLC models are also referred as ____
4. SDLC is ___process for building System.
5. A System life cycle model describes ___criteria for each phase
6. What is waterfall model?

Glossaries

Keywords	Explanation
Automated security testing	Automated security testing identifies flaws in developed code and validates the developed software is meeting the expected results.
Design	The proposed system is designed. Plans are laid out concerning the physical construction, hardware, operating systems, programming, communications and security issues.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

1. <https://www.techtarget.com/searchsoftwarequality/definition/systems-development-life-cycle>
2. https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_development_life_cycle.htm

Answers to Check Your Progress

1. Process
2. System Development Process Model
3. a Systematic
4. Entry and Exit
5. Waterfall model

The Waterfall model is a sequential set of steps from requirements to release. With some vendors, the Waterfall model is used as a hybrid development for companies that cannot use pure agile methodologies

Unit - 16

Data Flow Diagram, Data Dictionary and Decision Trees

Overview

Learning objectives

16.1 Data Flow Diagram and Data Dictionary

16.2 Decision Table ,Types, Benefits and Drawback

16.3 Decision Tree , Types, Benefits and Drawback

16.4 Data flow diagram Rules

16.5 Evolution of systems analysis techniques

Let Us Sum Up

Check Your Progress

Illustrations

Glossaries

Instructions

Suggested Readings

Answers to check Your Answers/Possible Answers

Overview

In this unit, we will learn about Data Flow Diagram and Data Dictionary, Decision Table and its Types, Benefits and Drawback of Decision Table, Decision Tree and its Types, Benefits and Drawback of Decision Tree, Data flow diagram Rules, Evolution of systems analysis techniques.

Learning Objectives

At the end of this unit you will be able to understand

- Data Flow Diagram and Data Dictionary, **Decision Table** and its Types, Benefits and Drawback of Decision Table
- **Decision Tree** and its Types, Benefits and Drawback of Decision Tree, Data flow diagram Rules
- Evolution of systems analysis techniques.

16.1 Data Flow Diagram (DFD)

A data dictionary is a structured repository that contains information about the data in the system. It includes all the data flows and the contents of all stores appearing on all data flow diagrams in a data flow diagram model.

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. They are often elements of a formal methodology such as Structured Systems Analysis and Design Method (SSADM).

Data Dictionary

A data dictionary contains metadata i.e data about the database. The data dictionary is very important as it contains information such as what is in the database, who is allowed to access it, where is the database physically stored etc. The users of the database normally don't interact with the data dictionary, it is only handled by the database administrators.

The data dictionary in general contains information about the following –

- Names of all the database tables and their schemas.
- Details about all the tables in the database, such as their owners, their security constraints, when they were created etc.
- Physical information about the tables such as where they are stored and how.
- Table constraints such as primary key attributes, foreign key information etc.
- Information about the database views that are visible.

This is a data dictionary describing a table that contains employee details.

Field Name	Data Type	Field Size for display	Description	Example
EmployeeNumber	Integer	10	Unique ID of each employee	1645000001
Name	Text	20	Name of the employee	David Heston
Date of Birth	Date/Time	10	DOB of Employee	08/03/1995
Phone Number	Integer	10	Phone number of employee	6583648648

Types of data dictionary

Active Data Dictionary

If the structure of the database or its specifications change at any point of time, it should be reflected in the data dictionary. This is the responsibility of the database management system in which the data dictionary resides.

So, the data dictionary is automatically updated by the database management system when any changes are made in the database. This is known as an active data dictionary as it is self updating.

Passive Data Dictionary

This is not as useful or easy to handle as an active data dictionary. A passive data dictionary is maintained separately to the database whose contents are stored in the dictionary. That means that

if the database is modified the database dictionary is not automatically updated as in the case of Active Data Dictionary.

So, the passive data dictionary has to be manually updated to match the database. This needs careful handling or else the database and data dictionary are out of sync.

16.2 Decision Table ,Types, Benefits and Drawbacks

Decision Table: Decision Table is just a tabular representation of all conditions and actions. Decision Table are always used whenever the processing logic is very complicated and involves multiple conditions. The main components used for the formation of the Data Table are Conditions Stubs, Action Stubs, and rules.

Types of decision tables:

- Extended entry table
- Limited entry table

Benefits:

- Visualization of Cause and effect relationships in the table.
- Easy to understand
- In the case of a complex table, it can be readily broken down into simpler tables.
- Tables are formatted consistently.
- Suggestions of possible actions need to be taken from the summarized outcomes of a situation.
- In these tables, semi-standardized languages might be used.
- Table users are not necessarily know how to use a computer.

Drawbacks:

- Decision tables are not well suited to large-scale applications. There is a requirement of splitting huge tables into smaller ones to eliminate redundancy.
- The complete sequence of actions is not reflected in the decision tables.
- A partial solution is presented.

16.3 Decision Tree , Types, Benefits and Drawbacks

Decision Tree: A decision tree is a graph that always uses a branching method in order to demonstrate all the possible outcomes of any decision. Decision Trees are graphical and show a better representation of decision outcomes. It consists of three nodes namely Decision Nodes, Chance Nodes, and Terminal Nodes.

Types of the decision tree:

- Categorical variable decision tree
- Continuous variable decision tree

Benefits:

- A decision tree is simple to comprehend and use.
- New scenarios are simple to add.
- Can be combined with other decision-making methods.
- Handling of both numerical and categorical variables
- The classification does not require many computations.
- Useful in analyzing and solving various business problems.

Drawbacks:

- They are inherently unstable, which means that a slight change in the data can have a result in a change in the structure of the optimal decision tree, and they are frequently wrong.
- These are less suitable for estimation tasks where the outcome required is the value of a continuous variable.
- The alternative options perform better with the same data. A random forest of decision trees can be used as a replacement but it is not as straightforward to comprehend as a single decision tree.
- Calculations can become quite complicated, especially when several values are uncertain and/or multiple outcomes are related.

16.3 Difference between Decision Table and Decision Tree

Decision Table	Decision Tree
-----------------------	----------------------

Decision Table	Decision Tree
<p>Decision Tables are a tabular representation of conditions and actions.</p> <p>We can derive a decision table from the decision tree.</p> <p>It helps to clarify the criteria.</p> <p>In Decision Tables, we can include more than one 'or' condition.</p> <p>It is used when there are small number of properties.</p> <p>It is used for simple logic only.</p> <p>It is constructed of rows and tables.</p> <p>The goal of using a decision table is the generation of rules for structuring logic on the basis of data entered in the table.</p>	<p>Decision Trees are a graphical representation of every possible outcome of a decision.</p> <p>We can not derive a decision tree from the decision table.</p> <p>It helps to take into account the possible relevant outcomes of the decision.</p> <p>In Decision Trees, we can not include more than one 'or' condition.</p> <p>It is used when there are more number of properties.</p> <p>It can be used for complex logic as well.</p> <p>It is constructed of branches and nodes.</p> <p>A decision tree's objective is to provide an effective means to visualize and understand a decision's available possibilities and range of possible outcomes.</p>

16.3 Data flow diagram and its steps

A technique for graphically depicting, at levels of increasing detail, the transformation of data into information by processes

1. Data flow -- data moves from one place of the system to another
2. Data store -- data at rest
3. Process -- work/actions performed on data
4. External entity -- origin/destination of the data

Steps in developing DFDs

List business activities to identify processes, external entities, data flows, and data stores

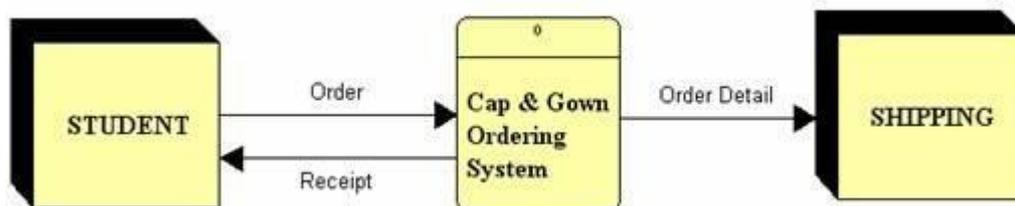
1. Create a context diagram
2. Create the next level diagram
3. Create child diagrams
4. Check for errors
5. Develop a physical DFD

An example: UK bookstore cap and gown order processing

Step 1: A list of business activities

1. Students place orders by filling out a form.
2. Order department receives orders by mail, fax, or personal delivery.
3. Order department processes orders by verifying that all order information is accurate and that the item ordered is currently available in stock.
4. Information from valid orders is used to update the student and item master records.
5. Valid orders are forwarded to the shipping department to be filled.
6. A receipt is produced notifying the student the status of his/her order.

Step 2: Context diagram



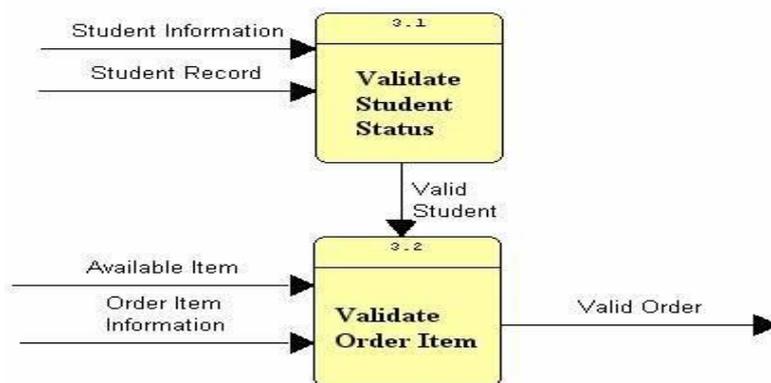
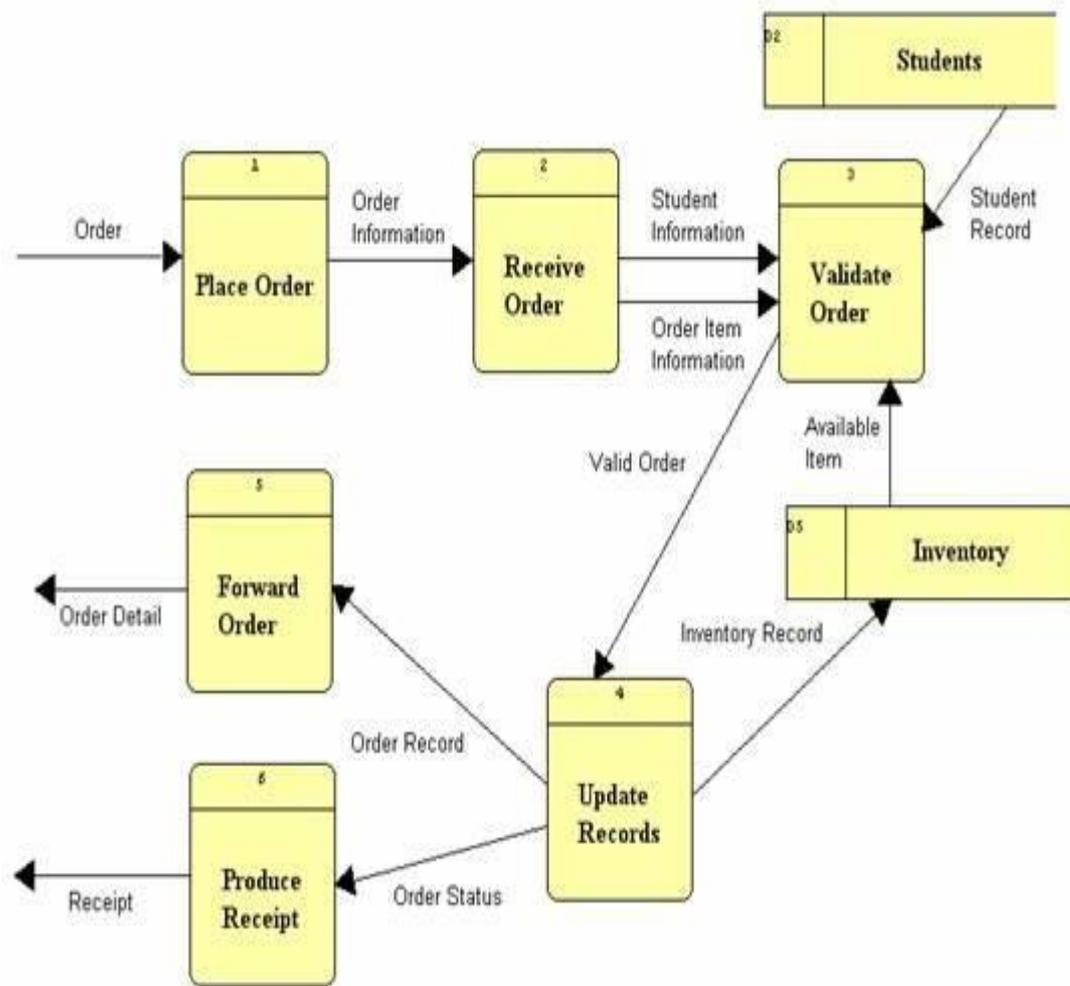


Figure.16.1. Data flow diagram

16.4 Data flow diagram Rules

Internal consistency rules

Elements	Rules
DFD	<ul style="list-style-type: none">· At least one process· No more than 9 processes
Context diagram	<ul style="list-style-type: none">· Contains only one process numbered 0· At least one input from an external entity and one output to an external entity
External entity	<ul style="list-style-type: none">· Appears only on the context diagram· Connected to a process· Labeled with noun phrase
Process	<ul style="list-style-type: none">· At least one input data flow and one output data flow· Inputs to process are different from outputs of that process· Labeled with verb phrase
Data flow	<ul style="list-style-type: none">· Has only one flow direction· No split· No loop· Labeled with noun phrase
Data store	<ul style="list-style-type: none">· An interface between two processes· Labeled with noun phrase

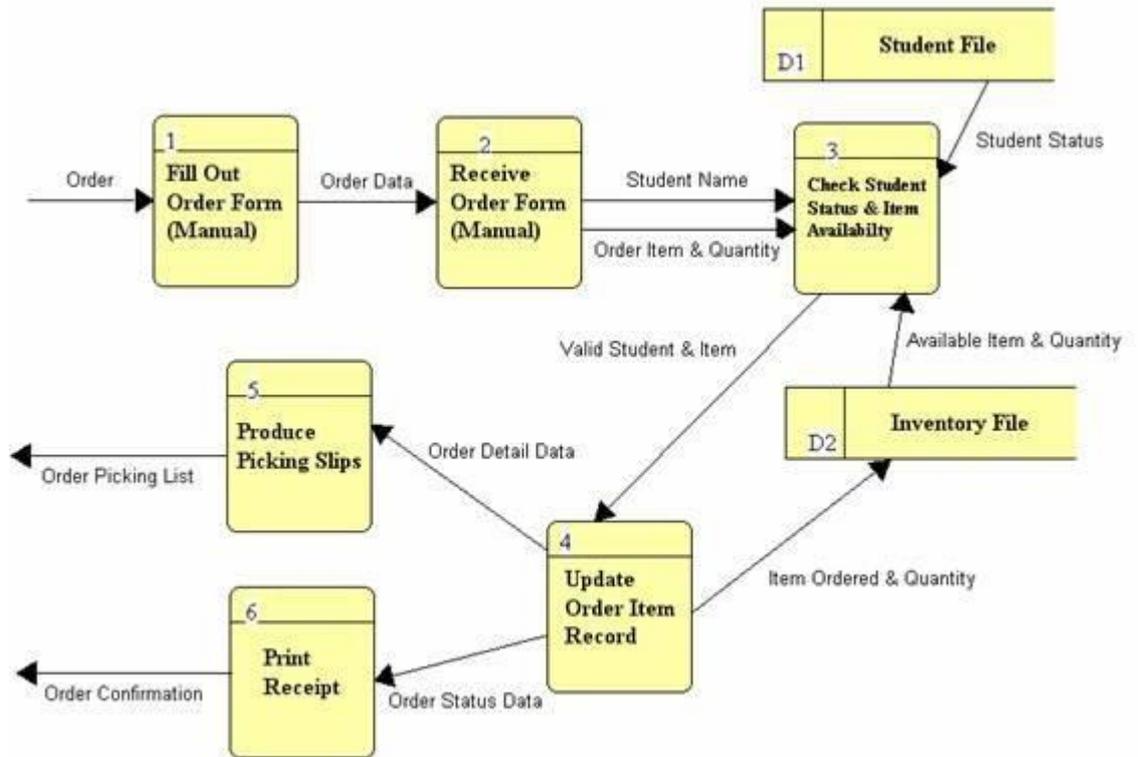
Hierarchical consistency rules

Elements	Rules
DFD	<ul style="list-style-type: none">· A parent diagram must exist unless it is a context diagram
Process	<ul style="list-style-type: none">· Decompose to either another diagram or a primitive process specification· Numbered with respect to its parent
Data flow	<ul style="list-style-type: none">· An input (output) data flow on a parent diagram must appear on a child diagram as input (output)· An input (output) data flow on a child diagram must

	appear on a parent diagram as input (output)
Data store	Decompose to either a file definition or a record definition

Logical vs Physical DFDs

Feature	Logical	Physical
Model	How the business operates	How the system will be implemented
Process	Business activities	Programs, program modules, manual procedures
Data store	Collections of data	Physical files and databases, manual files
Type of data store	Permanent data collections	Master files, transaction files
System controls	Business controls	Controls for data validation, record status, system security



Data dictionary

A documentation and reference of the metadata: data on

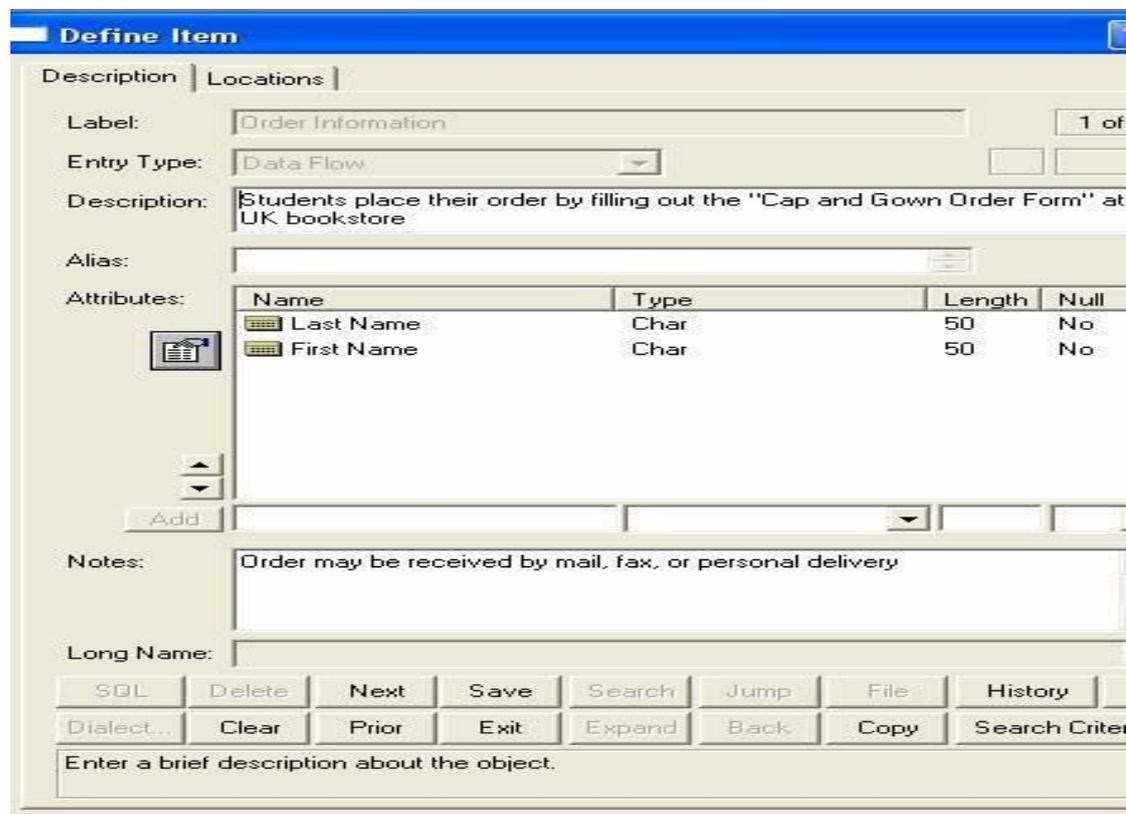
1. Data flow
2. Data structure
3. Data elements
4. Data stores

Promote understanding of the data of the system by collecting, coordinating, and confirming what a specific data term means to different people in the organization.

Data types	Specific description	
Data flow	<ul style="list-style-type: none"> • Source, Destination • Type (File, Screen, Report, Form, Internal) • Data structure, Volume 	
Data structure	<ul style="list-style-type: none"> • = • + • { } • [] • () 	<ul style="list-style-type: none"> • is composed of • and • repetitive elements • either/or • optional

Data element	<ul style="list-style-type: none"> • Alias • Length • Type (alphabetic, alphanumeric, date, numeric) • Input/Output format, Default • Base/Derived • Continuous/Discrete, Validation criteria
Data store	<ul style="list-style-type: none"> • File type, File format, Record size • Number of records, Growth rate, Primary key • Secondary keys

Data flow description example:



Define Item

Description | Locations

Label: Order Information

Entry Type: Data Flow

Description: Students place their order by filling out the "Cap and Gown Order Form" at UK bookstore

Alias:

Attributes:

Name	Type	Length	Null
Last Name	Char	50	No
First Name	Char	50	No

Notes: Order may be received by mail, fax, or personal delivery

Long Name:

SQL Delete Next Save Search Jump File History

Dialect... Clear Prior Exit Expand Back Copy Search Criteria

Enter a brief description about the object.

Logic modeling

To represent the internal structure and functionality of the processes represented on DFDs, i.e., how do data be converted to information?

Structured English

relies on action verbs and noun phrases without adjectives or adverbs to specify 3 typical logic in structured programming: sequence, selection, and repetition

sequence: sequential order of the statements

selection: IF_THEN_ELSE; SELECT_CASE

repetition: DO_UNTIL; DO_WHILE

Cap & gown ordering systems example

Process 3.1 Validate Student Status

MATCH Student_Information with Student_Record using student's Last_Name and First_Name

```
BEGIN IF
  IF Student_Not_Found
  THEN RETURN Student_Not_Found
ELSE
  IF graduation_date is not equal to May, 2001
  THEN RETURN Student_Invalid_Status
END_IF
RETURN Valid_Student
```

Process 3.2 Validate Order Item

MATCH Order_Item_Information with Available_Item_Record based on Item_Description

```
BEGIN IF
  IF the Order_Item_Quantity is grater than the
  Available_Item_Quantity
  THEN RETURN Insufficient_Quantity
END_IF
RETURN Valid_Order
```

Decision tables

all possible choices and conditions the choices depend on are represented in tabular form: condition, actions, and rules

Conditions and Actions	Rules
Conditions	Condition alternatives
Actions	Action Entries

Maximum number of rules in the table = $\prod_{i=1}^n C_i$

n: number of conditions

C_i : number of alternatives for condition i

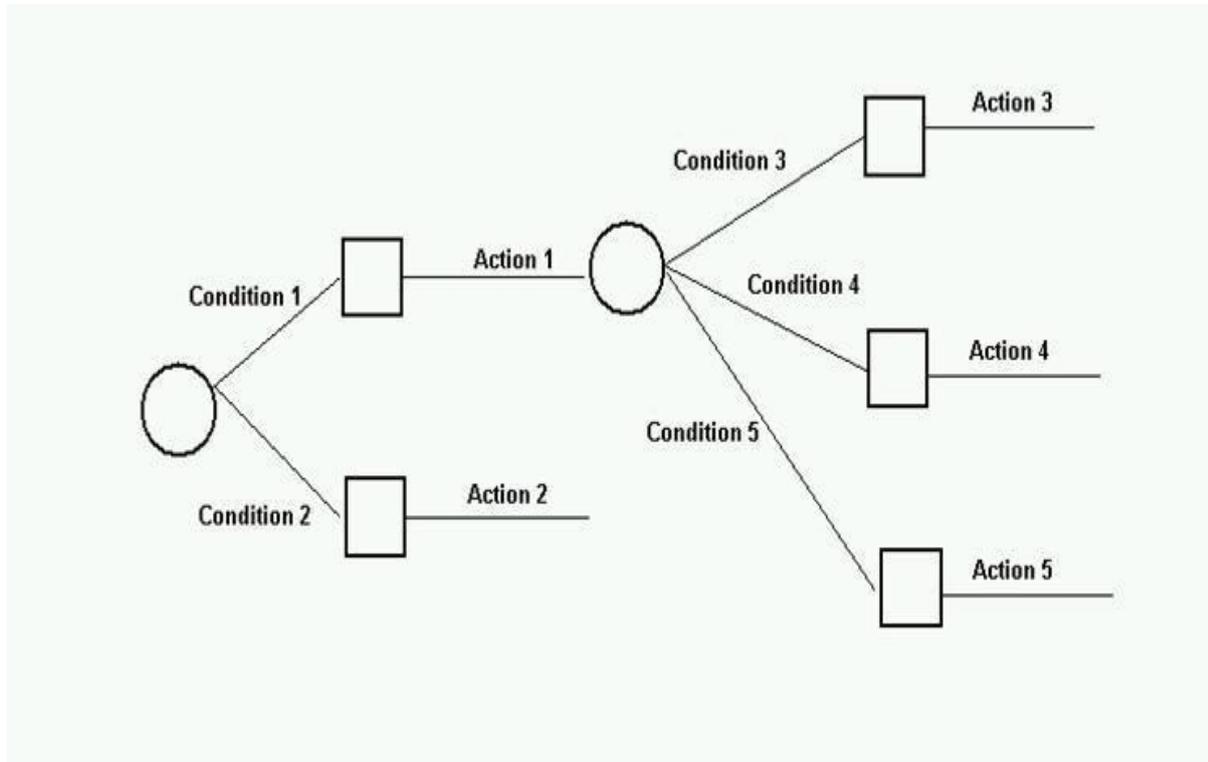
Conditions and Actions	Rules			
Under \$50				
Pays by check with 2 forms of ID				
Uses credit card				
Ring up sales				
Decline sales				
Call supervisor for approval				
Call bank for credit authorization				

Cap & gown ordering system example:

Process 3. Validate Order

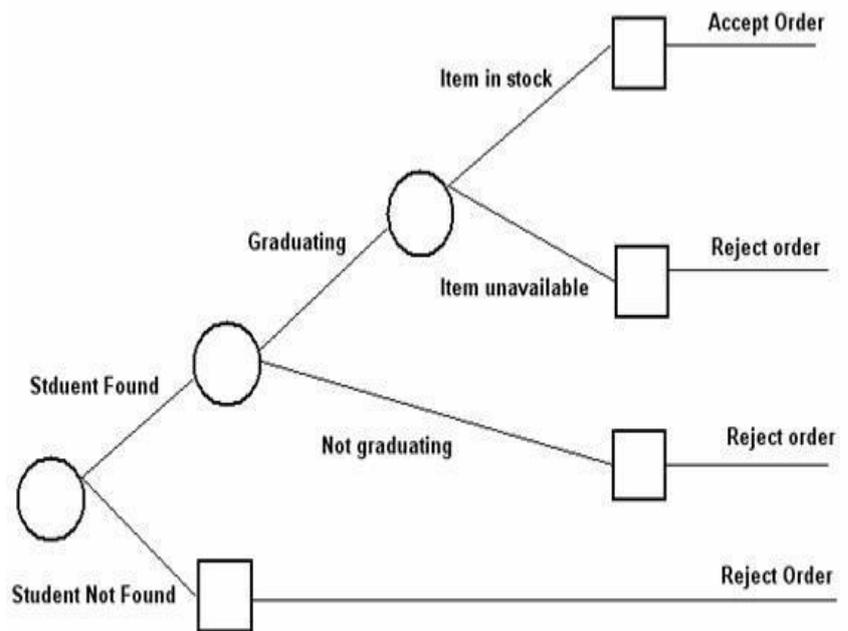
Conditions/Actions	Rules			
Student found	Y	-	N	-
Graduate in May	Y	N	-	-
Item in stock	Y	-	-	N
Accept order	X			
Reject order		X	X	X

Decision trees



A decision or choice situation is depicted as a connected series of nodes (decision points) and branches (decision alternatives)

Cap & gown ordering system example



When to use what?

Condition	Recommendation
Many repetitious actions	Structured English
Communication to end users is important	Structured English
Complex combinations of conditions, actions and rules	Decision tables
Checking for redundancies, contradictions, possibilities	Decision tables
The sequence of conditions and actions is critical	Decision tree
Not every condition is relevant to every action	Decision tree

Evolution of systems analysis techniques

Era	Orientation	Techniques	Evaluation
Pre-computer	Flow-oriented, i.e., no logical details	<ul style="list-style-type: none"> Process flow charts Forms flow charts 	<ul style="list-style-type: none"> Little clarification of system structure Weak on the treatment of procedure
1 st Generation (1950's)	Flow-oriented	<ul style="list-style-type: none"> System flow charts Flowcharts Message specification sheets 	<ul style="list-style-type: none"> Reduce readability to non-technical people Human is considered external to the system

2 nd & 3 rd Generation (1970's)	Package-approach	<ul style="list-style-type: none"> Decision tables Gridcharts Analysis packages, e.g., IBM's SOP (Study Organization Plan) 	<ul style="list-style-type: none"> Multiple system representations require multiple tools
4 th Generation (1980's)	Structured	<ul style="list-style-type: none"> Functional decomposition IBM's HIPO DFD Data dictionary Structured process specification 	<ul style="list-style-type: none"> Improved consideration of system structure issues

Check Your Progress

1. The data ___ stores the names of files that contain relations if they are stored in the files of the operating system..
2. The information about the ___ of the relations is also stored in data dictionary.
3. What is called decision tree?

Glossaries

Keywords	Explanation
Data Dictionary	A data dictionary contains metadata i.e data about the database. The data dictionary is very important as it contains information such as what is in the database, who is allowed to access it, where is the database physically stored etc.
Decision Tree	A decision tree is a graph that always uses a branching method in order to demonstrate all the possible outcomes of any decision.

Illustrations

The Illustrations are given in the concerned topics with appropriate explanation

Suggested Readings

- <https://www.tutorialspoint.com/What-is-Data-Dictionary>
- <https://theintactone.com/2019/04/13/sad-u3-topic-1-data-dictionary-decision-tables/>

Answers to Check Your Progress/Possible Answers

1. Dictionary

2. Indexes

3. **Decision Tree:** A decision tree is a graph that always uses a branching method in order to demonstrate all the possible outcomes of any decision. Decision Trees are graphical and show a better representation of decision outcomes. It consists of three nodes namely Decision Nodes, Chance Nodes, and Terminal Nodes.

યુનિવર્સિટી ગીત

સ્વાધ્યાય: પરમં તપ:

સ્વાધ્યાય: પરમં તપ:

સ્વાધ્યાય: પરમં તપ:

શિક્ષણ, સંસ્કૃતિ, સદ્ભાવ, દિવ્યબોધનું ધામ
ડૉ. બાબાસાહેબ આંબેડકર ઓપન યુનિવર્સિટી નામ;
સૌને સૌની પાંખ મળે, ને સૌને સૌનું આભ,
દશે દિશામાં સ્મિત વહે હો દશે દિશે શુભ-લાભ.

અભણ રહી અજ્ઞાનના શાને, અંધકારને પીવો ?
કહે બુદ્ધ આંબેડકર કહે, તું થા તારો દીવો;
શારદીય અજવાળા પહોંચ્યાં ગુર્જર ગામે ગામ
ધ્રુવ તારકની જેમ ઝળહળે એકલવ્યની શાન.

સરસ્વતીના મયૂર તમારે ફળિયે આવી ગહેકે
અંધકારને હડસેલીને ઉજાસના ફૂલ મહેકે;
બંધન નહીં કો સ્થાન સમયના જવું ન ઘરથી દૂર
ઘર આવી મા હરે શારદા દૈન્ય તિમિરના પૂર.

સંસ્કારોની સુગંધ મહેકે, મન મંદિરને ધામે
સુખની ટપાલ પહોંચે સૌને પોતાને સરનામે;
સમાજ કેરે દરિયે હાંકી શિક્ષણ કેરું વહાણ,
આવો કરીયે આપણ સૌ
ભવ્ય રાષ્ટ્ર નિર્માણ...
દિવ્ય રાષ્ટ્ર નિર્માણ...
ભવ્ય રાષ્ટ્ર નિર્માણ