Unit-4
Decision Support System(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.

There are two types of decisions - Programmed and Non-programmed Decisions.

Programmed decisions are basically automated processes, general routine work, where −

- These decisions have been taken several times.
- These decisions follow some guidelines or rules.

For example, selecting a reorder level for inventories, is a programmed decision.

Non-programmed decisions occur in unusual and non-addressed situations, so −

- It would be a new decision.
- There will not be any rules to follow.
- These decisions are made based on the available information.
- These decisions are based on the manger's discretion, instinct, perception and judgment.

For example, investing in a new technology is a non-programmed decision.
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.

Components of 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.

Characteristics of DSS:

Following are the characteristics of the Decision Support System –

- 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.

Benefits of DSS:

Following are the benefits of the Decision Support System –

- 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.

Classification of DSS:

There are several ways to classify DSS as follows –

- **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.
- **Database Oriented DSS** − Database plays a major role here; it contains organized and highly structured data.
- **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** − It follows certain procedures adopted as rules.
- **Compound DSS** − It is built by using two or more of the five structures explained above.

Limitations of DSS:

Following are the limitation of DSS –

- **Difficulty in Quantifying All the Data:** A decision support system majorly relies on quantifiable data. Consequently, it's difficult to analyze intangible or indefinable data. In reality, some values cannot be very specific and defined in numbers. Even though a DSS may quantify some of these aspects, the end result must be duly considered by the decision makers. They must use their own judgment when making the final decision.
- **Unaware of Assumptions:** As a decision maker, you may not be fully aware of the assumptions that a decision support system has considered when analyzing data for a specific problem. Making decision without considering uncontrollable factors may prove to be dangerous. A decision maker must realize that a computerized DSS is only a supporting tool. You must consider an unstructured or partially structured situation in-depth and analyze the limitations and assumptions.
- **System Design Failure:** Decision support systems are designed to the specific needs of a decision maker. If you don't know what you want a DSS to do or how it should help you, it will be difficult to design a system that fits your needs. And when you use a vague DSS, the results generated are not what you're looking for. Such situations may arise because of system design failure.
- **Difficulty in Collecting All the Required Data:** As a decision maker, you must realize that it's not possible to capture all of the related data mechanically. While some data is difficult to record, some cannot be recorded at all. Therefore, the value presented by a DSS may not be 100% true.
- **Lack of Technology Knowledge in Users:** Although decision support systems have become much simpler over the years, many decision makers still find it difficult to use. Lack of technological knowledge remains an issue.

DSS Users:

There are different types of DSS users as follows-

- Terminal mode
- Clerk mode
- Subscription mode
- Intermediary mode.

- **Terminal mode:**
  The decision maker is the direct user of the system through on line access.
- **Clerk mode:**
  The decision maker uses the system directly but offline, preparing input on a coding form. The primary difference between this mode and the terminal mode is in the technology employed (batch versus online).

- **Subscription mode:**

  The decision maker receives reports that are generated automatically on a regular basis. This is the typical mode of usage for management reporting systems. Although some data analysis systems or accounting models might be used in this way, it is not typical for decision support systems.

- **Intermediary mode:**

  The decision maker uses the system through intermediaries, who perform the analysis and interpret and report the results. The decision maker does not need to know the intermediary used the system to arrive at the requested information. The role of an intermediary is common in the use of decision support systems and merits separate attention. It has typically been argued that decision support systems will be resisted because managers will refuse to use terminals. The job of chief executives is highly fragmented with frequent interruptions.

There are two types of intermediaries that reflect different types of support for the manager.

(a) Expert tool user

(b) Staff assistant or staff analyst.

(a) Expert tool user:

This person is skilled in the application of one or more types of specialised problem solving tools. The expert tool user performs tasks which the problem solver does not have the skills or training to perform.

(b) Staff assistant or staff analyst:

This person has specialized knowledge about problems and some experience with the decision support technology. The staff assistant essentially extends the manager's capabilities by taking over many of the tasks of problem solving such as setting up the problem, obtaining data and building the initial model.
The manager can concentrate on the more unstructured portions of the problem solving task. The staff assistant performs work the manager could do if time were available.

Although more intermediaries are staff assistants, there is also frequent need for the expert tool user. The use of intermediaries permits the systems to be more sophisticated and powerful. On line, interactive systems are still desirable with intermediaries because they allow them to work more quickly and efficiently.

Management Information System(MIS)

To the managers, Management Information System is an implementation of the organizational systems and procedures. To a programmer it is nothing but file structures and file processing. However, it involves much more complexity.

The three components of MIS provide a more complete and focused definition, where **System** suggests integration and holistic view, **Information** stands for processed data, and **Management** is the ultimate user, the decision makers.

Management information system can thus be analyzed as follows −

Management

Management covers the planning, control, and administration of the operations of a concern. The top management handles planning; the middle management concentrates on controlling; and the lower management is concerned with actual administration.

Information

Information, in MIS, means the processed data that helps the management in planning, controlling and operations. Data means all the facts arising out of the operations of the concern. Data is processed i.e. recorded, summarized, compared and finally presented to the management in the form of MIS report.

System

Data is processed into information with the help of a system. A system is made up of inputs, processing, output and feedback or control.

Thus MIS means a system for processing data in order to give proper information to the management for performing its functions.

Definition:

Management Information System or 'MIS' is a planned system of collecting, storing, and disseminating data in the form of information needed to carry out the functions of management.

Objectives of MIS:

The goals of an MIS are to implement the organizational structure and dynamics of the enterprise for the purpose of managing the organization in a better way and capturing the potential of the information system for competitive advantage.

Following are the basic objectives of an MIS −

- **Capturing Data** − Capturing contextual data, or operational information that will contribute in decision making from various internal and external sources of organization.
- **Processing Data** − The captured data is processed into information needed for planning, organizing, coordinating, directing and controlling functionalities at strategic, tactical and operational level. Processing data means −
    - making calculations with the data
    - sorting data
    - classifying data and
    - summarizing data
- **Information Storage** − Information or processed data need to be stored for future use.
- **Information Retrieval** − The system should be able to retrieve this information from the storage as and when required by various users.
- **Information Propagation** − Information or the finished product of the MIS should be circulated to its users periodically using the organizational network.

Characteristics of MIS:

Following are the characteristics of an MIS −

- **System approach:**
  MIS follows the system approach, which implies a step by step approach to the study of system and its performance in the light of the objective for which it has been constituted. It means taking an inclusive view at sub-systems to operate within an organization.
- **Management-oriented:**
  The management-oriented characteristic of MIS implies that top-down approach needs to be followed for designing MIS. A top-down method says the initiation of system development determines management requirements as well as business goals. MIS implies the management dynamically to the system development towards the completion of management decision.
- **As per requirements:**
  The design and development of MIS should be as per the information required by the managers. The required design and development information is at different levels, viz., strategic planning, management control and operational control. It means MIS should cater to the specific needs of managers in the hierarchy of an organization.
- **Future-oriented:**
  The design and development of MIS should also be future purpose so that the system is not restricted to provide only the past information.
- **Integrated:**
  A complete MIS is a combination of its multiple sub-components to provide the relevant information to take out a useful decision. An integrated system, which blends information from several operational areas, is a necessary characteristic of MIS.
- **Common data flows:**
  This concept supports numerous basic views of system analysis such as avoiding duplication, combining similar functions and simplifying operations. The expansion of common data flow is a cost-effectively and logical concept.
- **Long-term planning:**
  MIS should always develop as a long term planning because it involves logical planning to get success of an organization. While developing MIS, the analyst should keep future oriented analysis and needs of the company in mind.
- **Relevant connection of sub-system planning:**
  The MIS development should be decomposing into its related sub-systems. These sub-systems must be meaningful with proper planning.
- **Central database:**
  it contains data in tabular form. The data base is responsible to operations like insertion, deletion, updation of records. This database covers information related to inventory, personnel, vendors, customers, etc. the data stored in the database.

Expert System

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.
It is a computer based information system in which knowledge is represented in data, in which the processing of the knowledge is directed primarily by computer programs.
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 Subsystem**:
   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.

Advantages of Expert System:

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

Disadvantages Expert System:

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