

Decision Support System

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.

Programmed and Non-programmed 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 manager'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.

Attributes of a 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 modeling and analysis
- Support for data access
- Standalone, integrated, and Web-based

Characteristics of a 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.

Benefits of 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.

Components of a 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.

Classification of DSS

There are several ways to classify DSS. Hoi Apple and Whinstone classifies 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.
- **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.

Types of DSS

Following are some typical DSSs –

- **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.

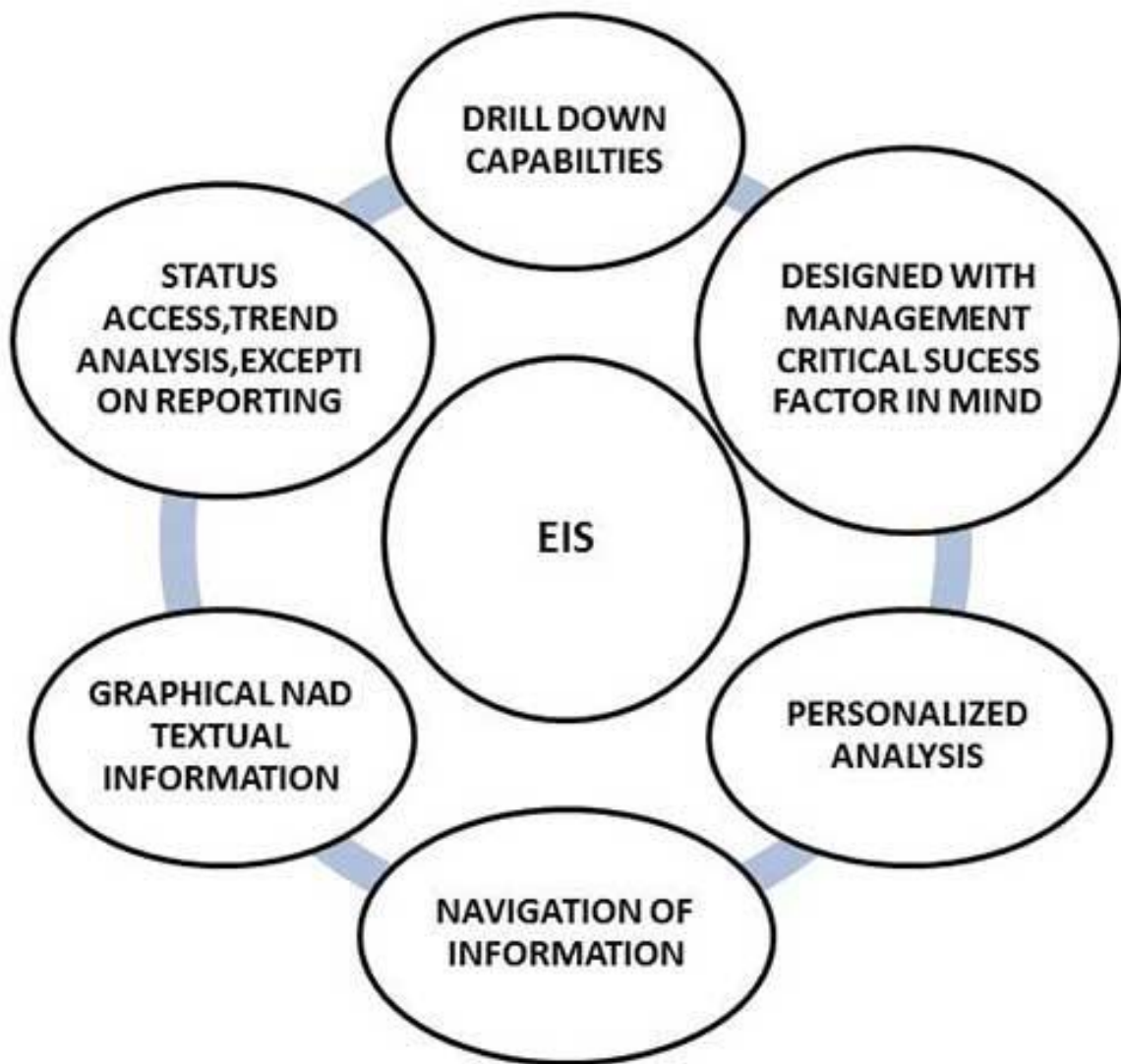
- **Accounting System** – It keeps track of accounting and finance related information, for example, final account, accounts receivables, accounts payables, etc. that keep track of the major aspects of the business.
- **Model Based System** – Simulation models or optimization models used for decision-making are used infrequently and creates general guidelines for operation or management.

Executive Information System

An executive information system (EIS) is a decision support system (DSS) used to assist senior executives in the decision-making process. It does this by providing easy access to important data needed to achieve strategic goals in an organization. An EIS normally features graphical displays on an easy-to-use interface.

Executive information systems can be used in many different types of organizations to monitor enterprise performance as well as to identify opportunities and problems.

Executive support System



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

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

Advantages of 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

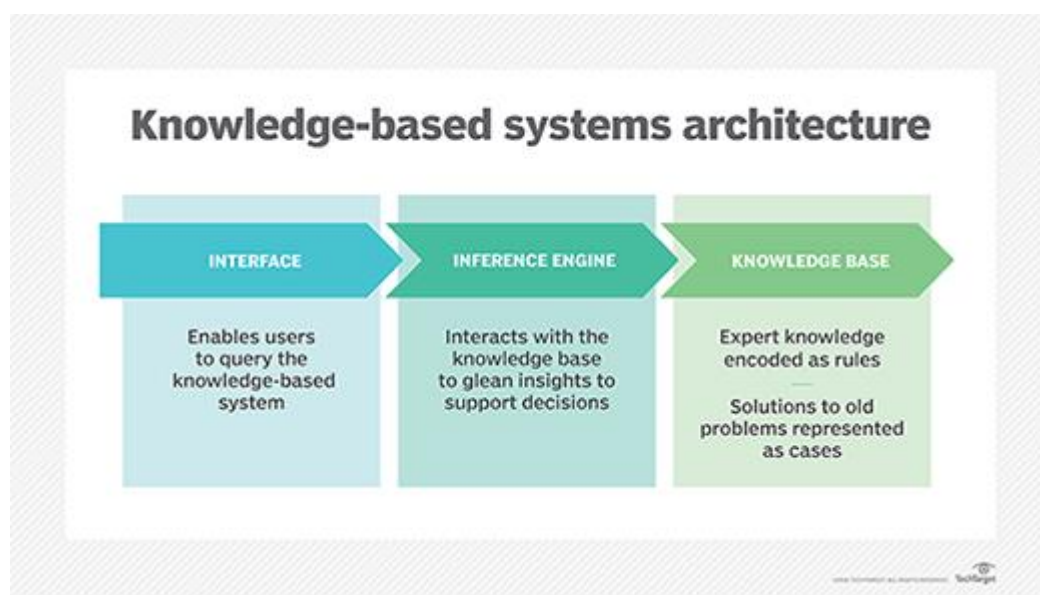
Knowledge Base System

A knowledge-based system (KBS) is a form of artificial intelligence (AI) that aims to capture the knowledge of human experts to support decision-making. Examples of knowledge-based systems include expert systems, which are so called because of their reliance on human expertise.

The typical architecture of a knowledge-based system, which informs its problem-solving method, includes a knowledge base and an inference engine. The knowledge base contains a collection of information in a given field -- medical diagnosis, for example. The inference engine deduces insights

from the information housed in the knowledge base. Knowledge-based systems also include an interface through which users query the system and interact with it.

A knowledge-based system may vary with respect to its problem-solving method or approach. Some systems encode expert knowledge as rules and are therefore referred to as rule-based systems. Another approach, case-based reasoning, substitutes cases for rules. Cases are essentially solutions to existing problems that a case-based system will attempt to apply to a new problem.



Where knowledge-based systems are used

Over the years, knowledge-based systems have been developed for a number of applications. MYCIN, for example, was an early knowledge-based system created to help doctors diagnose diseases. Healthcare has remained an important market for knowledge-based systems, which are now referred to as clinical decision-support systems in the health sciences context.

Knowledge-based systems have also been employed in applications as diverse as avalanche path analysis, industrial equipment fault diagnosis and cash management.

Knowledge-based systems and artificial intelligence

While a subset of artificial intelligence, classical knowledge-based systems differ in approach to some of the newer developments in AI.

Expert System

An **expert system** 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 represent one of the most advanced facts of information technology.

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. **Inference 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 (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.

Trends in Information System

The three major new information system trends are:

Emerging mobile digital platforms

The growth of online software as a service.

The growth of cloud computing.