**VISION INSTITUTE OF MANAGEMENT**

**MANAGEMENT INFORMATION SYSTEM**

**BBA 3rd YEAR/6th SEM**

**Unit 5**

# Decision Support System

# **A decision support system (DSS)** is a computerized information system used to support decision-making in an organization or a business. **A DSS** lets users sift through and analyze massive reams of data and compile information that can be used to solve problems and make better decisions.

The benefits of decision support systems include more informed decision-making, timely problem-solving and improved efficiency for dealing with problems with rapidly changing variables.

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For example, **a DSS** could be used to project a company’s revenue over the upcoming six months based on new assumptions about product sales. Due to the large amount of variables that surround the projected revenue figures, this is not a straightforward calculation that can be done manually. **A DSS** can integrate multiple variables and generate an outcome and alternate outcomes, all based on the company’s past product sales data and current variables.

The primary purpose of using **a DSS** is to present information to the customer in a way that is easy to understand. A DSS system is beneficial because it can be programed to generate many types of reports, all based on user specifications. A DSS can generate information and output it graphically, such as a bar chart that represents projected revenue, or as a written report.

### **Where Can a DSS Be Used?**

As technology continues to advance, data analysis is no longer limited to large bulky mainframe computers. Since a DSS is essentially an application, it can be loaded on most computer systems, including laptops. Certain DSS applications are also available through mobile devices. The flexibility of the DSS is extremely beneficial for users who travel frequently. This gives them the opportunity to be well-informed at all times, which in turn provides them with the ability to make the best decisions for their company and customers at any time.

# DSS: Deterministic Systems

There are a number of situation, where the management has to make a decision based on the analysis of business statistics. Since the organization would have the database information; these decision situations draw data from the database(s). Most of these decision situations are fairly structured and, therefore, can be put in the form of the business models. A far assumption is made that the model has business and decision-making validity.

If the management can design such models duly tested, they can be used by the need arrives. All such tools and models act as the support system for decision-making. The tools and the models are generally standard but have to have a custom need in a specific situation. The DSS based on such tools or models have found extensive use, as a number of computer-based software tools and packages are hardware independent and have proven the application areas. The ranges of packages are available from PC to mainframe computer systems. The packages are also available for a popular network system as well.

The origin of these tools and models lie in business management, management science, and operations research. Some are universally known and proven tools and have application in business management. While designing the models, a flexible approach is taken to solve varied decision-making problems. They undergo a change over a period of time. The most significant advantage of the DSS is its implications on the result or business performance. The second advantage of DSS is that it provides higher management ability to delegate decision-making to the lower level once the tools and the models are tested.

**DSS MODELS**

The DSS can be based on three different approaches. They are shown in the figure below:



**Behavioral model:** these models are useful in understanding the behavior amongst the business variables. The decision maker can then make decisions giving due regard to such behavioral relationships.

**Management science models:** these models are developed on the principles of business management, accounting, and economies. In many areas of management, the proven methods of management control are available which can be used for the management decisions. There are also several management systems, which can be converted into DSS models.

**Operation research models:** the operation research models are mathematical models. These models represent a real-life problem situation in terms of the variables, constants, and parameters expressed in algorithm equation. Since the models are mathematical; there are solutions to these problems. In arriving the solution methodology calculus, matrix algebra, probability, and set theory are used. These models have the clarity to the extent that each of them has a set of assumptions which must be true in real life. Further, if the assumptions are valid, the solutions offered are realistic and practical. The model represents the real-life problem solutions.

# Artificial intelligence (AI) System

**Artificial intelligence**, defined as intelligence exhibited by machines, has many applications in today’s society. More specifically, it is Weak AI, the form of AI where programs are developed to perform specific tasks, that is being utilized for a wide range of activities including medical diagnosis, electronic trading platforms, robot control, and remote sensing. AI has been used to develop and advance numerous fields and industries, including finance, healthcare, education, transportation, and more.

AI for Good is an ITU initiative supporting institutions employing AI to tackle some of the world’s greatest economic and social challenges. For example, the University of Southern California launched the Center for Artificial Intelligence in Society, with the goal of using AI to address socially relevant problems such as homelessness. At Stanford, researchers are using AI to analyze satellite images to identify which areas have the highest poverty levels.

**Agriculture**

In agriculture new AI advancements show improvements in gaining yield and to increase the research and development of growing crops. New artificial intelligence now predicts the time it takes for a crop like a tomato to be ripe and ready for picking thus increasing efficiency of farming. These advances go on including Crop and Soil Monitoring, Agricultural Robots, and Predictive Analytics. Crop and soil monitoring uses new algorithms and data collected on the field to manage and track the health of crops making it easier and more sustainable for the farmers.

More specializations of AI in agriculture is one such as greenhouse automation, simulation, modeling, and optimization techniques.

Due to the increase in population and the growth of demand for food in the future there will need to be at least a 70% increase in yield from agriculture to sustain this new demand. More and more of the public perceives that the adaption of these new techniques and the use of Artificial intelligence will help reach that goal.

**Market analysis and data mining**

Several large financial institutions have invested in AI engines to assist with their investment practices. BlackRock’s AI engine, Aladdin, is used both within the company and to clients to help with investment decisions. Its wide range of functionalities includes the use of natural language processing to read text such as news, broker reports, and social media feeds. It then gauges the sentiment on the companies mentioned and assigns a score. Banks such as UBS and Deutsche Bank use an AI engine called Sqreem (Sequential Quantum Reduction and Extraction Model) which can mine data to develop consumer profiles and match them with the wealth management products they’d most likely want. Goldman Sachs uses Kensho, a market analytics platform that combines statistical computing with big data and natural language processing. Its machine learning systems mine through hoards of data on the web and assess correlations between world events and their impact on asset prices. Information Extraction, part of artificial intelligence, is used to extract information from live news feed and to assist with investment decisions.

**Personal finance**

Several products are emerging that utilize AI to assist people with their personal finances. For example, Digit is an app powered by artificial intelligence that automatically helps consumers optimize their spending and savings based on their own personal habits and goals. The app can analyze factors such as monthly income, current balance, and spending habits, then make its own decisions and transfer money to the savings account. Wallet.AI, an upcoming startup in San Francisco, builds agents that analyze data that a consumer would leave behind, from Smartphone check-ins to tweets, to inform the consumer about their spending behavior.

**Portfolio Management**

Robo-advisors are becoming more widely used in the investment management industry. Robo-advisors provide financial advice and portfolio management with minimal human intervention. This class of financial advisers work based on algorithms built to automatically develop a financial portfolio according to the investment goals and risk tolerance of the clients. It can adjust to real-time changes in the market and accordingly calibrate the portfolio.

**Human resources and Recruiting**

Another application of AI is in the human resources and recruiting space. There are three ways AI is being used by human resources and recruiting professionals: to screen resumes and rank candidates according to their level of qualification, to predict candidate success in given roles through job matching platforms, and rolling out recruiting chat bots that can automate repetitive communication tasks. Typically, resume screening involves a recruiter or other HR professional scanning through a database of resumes.

**Media and e-commerce**

Some AI applications are geared towards the analysis of audio-visual media content such as movies, TV programs, advertisement videos or user-generated content. The solutions often involve computer vision, which is a major application area of AI.

Typical use case scenarios include the analysis of images using object recognition or face recognition techniques, or the analysis of video for recognizing relevant scenes, objects or faces. The motivation for using AI-based media analysis can be among other things the facilitation of media search, the creation of a set of descriptive keywords for a media item, media content policy monitoring (such as verifying the suitability of content for a particular TV viewing time), speech to text for archival or other purposes, and the detection of logos, products or celebrity faces for the placement of relevant advertisements.

# Decision Support Systems

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**What Can a DSS Analyze?**

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**How Can a DSS Present the Information?**

The primary purpose of using a DSS is to present information to the customer in a way that is easy to understand. A DSS system is beneficial because it can be programed to generate many types of reports, all based on user specifications. A DSS can generate information and output it graphically, such as a bar chart that represents projected revenue, or as a written report.

**Where Can a DSS Be Used?**

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**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**

* **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. Export system is the example.
* **Compound DSS:**It is built by using two or more of the five structures explained above.

### **Types of DSS**

* **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.

# Transaction Processing System

**Transaction Processing System** is a type of information processing system, software and hardware combination, which supports Transaction processing. Transaction processing is a type of computer processing in which each individual indivisible task, called a transaction, is worked upon and executed as and when it comes. The response to requests is immediate. In contrast to this is batch processing in which a batch of requests are stored and then executed all at once. A transaction Processing System is also used to collect, store, retrieve and modify transactions executed by an organization.

In transaction processing, user or customer interaction is required, unlike batch processing. It allows only certain predefined, typically short duration, tasks and transactions to be performed by the user and provides a predictable request execution time, which is pre- programmed. This gives it the following characteristics:

* **Predictability**
* **Reliability**
* **Consistency**

Transaction processing systems are helpful in three areas:

* **System runtime functions:** An execution environment with high response time, reliability of execution and security of data
* **System administration functions:**Administrative support required for managing transactions
* **Application development functions:** Customization support to design and manage the user interface.

Example: **ATM (Automatic Teller Machine)**

# Enterprise Management System (EMS)

Computers, electronics, communication, and audio-video technologies have converged closely to produce a new style of operating business. The dynamic business environment of today is full of challenges and opportunities. The dependence on the information and driving energy source is increasing. Every business has an additional dimension which is, speed and time. The business needs of today are beyond transaction processing. It requires an instant real-time response in every case, wherever it occurs.

The word enterprise is chosen to convey that it compasses the larger business community covering all the players and their participation in the business. The system is extended beyond the corporate boundaries. In such a situation, the system which we are designing is an enterprise-wide. It must catch an event interpret it and trigger the action, and communicate it across to the enterprise. Since business is information hungry, it must have an ability to sense the situation and act accordingly. When the business requires online information to make informed knowledge-based decisions and has them executed in the business operations in a coordinated manner, it has to take the support of many other systems.

Take a simple example of employee management where the arrival of the persons or their absence raises a number of triggers in the organization. The well-known attendance recording system monitors the employee movement from all angles- availability, assigning, security, permission and salary and wages.

In the business today, the demand is a paperless operation, wireless communication of a result of fully transparent and automated operations at all centers in an integrated and coordinated manner taking care of the business, actions and decision needs. To support such demands of the business, systems of information processing and communication are needed. These systems may be automated or mechanized interfaced with the other systems for data communication and processing. There could also be audio, video and imaging systems to bring realism in information and remote sensing system for security and communication.

Though the tools, the technologies, and the well-designed solution and systems are available to support all such needs of the business, what is needed is an integrated solution out of these technologies and the systems offering enterprise-wide management support such integrated solutions is called as the **Enterprise Management System (EMS).**Following are the systems, which, when implemented in an integrated manner for the coordinated and cooperative function of the business, give rise to the Enterprise Management System:

* ERP: Enterprise Resource Planning Systems.
* EDI: Electronic Data Interchange System for commerce, communication, and action.
* CAD/CAM/CAE: Computer Aided Design/Manufacturing/Engineering System for production management.
* AMS: Attendance Management System; that is, employee attendance and presence management for the role management or data capture systems on floors, in stores, at gates, etc.
* DMS: Document Management System, which is, imaging, copying and text management and dispatching document, DBMS.
* CMS: Communication Management Systems, such as paying, cordless, mobile, telephone systems, and audio-video system.
* SMS: Security Management Systems such as the closed-circuit television, alarm or warning systems, movement tracking system, etc.

In the EMS, the ERP system plays the role of a front running system. The major decision making and execution takes place through the ERP. It is a system of managing all functions of the business with information support coming through the ERP. It handles the operational system to run the business and provides the required inputs to planning and control systems handled by the middle management. With the internal sources of information and the use of information from the external sources, it provides decision support information for strategic planning and control to the top management.

The ERP is supported by various other support systems which manage, independently, the specific requirement and simultaneously provide inputs to the ERP. The ELECTRONIC DATA INTERCHANGE (EDI) system assists the ERP in correcting two systems electronically for example, documents transfer, data transfer, etc. it is designed to handle to commercial functions of the business popularly known as the electronic commerce. It also acts as a gateway to interact with the vendor, the customer, and the other associated institutions of the organizations.

The CAD/CAM/CAE, i.e. the Computer Aided Design/Manufacturing/Engineering systems is the systems which handle design, manufacturing and engineering functions. It will provide the drawings and design engineering information to the ERP in its execution of manufacturing, purchase and inspection functions. They have also equipped with the database management functions and their database acts backup support to the ERP.

The AMS, i.e. Attendance Management System, keeps track of the employee related information for personnel planning, availability, and scheduling. It provides static information about an employee through the human resources management system and the current dynamic information such as his or her presence, shifts rotation, the kind of job handled the cost and so on.

The DMS, i.e., Document Management Systems designed to keep important documents in the database for viewing, sending messages and for documenting support in the transactions handled. The system provides text edit facility for document manipulation for the purpose of transaction handling. In the ERP it is used for cross-checking the key information and also to confirm the validity of the transaction. It handles the document access, editing, copying, and mixing the information and sending the information to the various destinations for execution. It uses scanning, imaging, workflow automation, and document database management system.

The CMS on the Communication Management Systems are used for tracking the important resource for action. These resources are located, altered and advised to act from the location where they are. Their attention is drawn to the event and advised to act to handle the situation. The ERP uses the CMS as a tool, for all the communication needs of recording an event.

The SMS, i.e. the Security Management System handle the security, entry access requirement of the business operations. It may be a person, a vehicle or material, its movement, availability, and access is tracked, monitored and guarded for security and safety. It provides support of the ERP by clearing the situation to act further. A truck will not be allowed to enter unless it is an authorized one, and then it will be weighted and its weight will be transferred to the ERP for processing further information. An employee’s movement can be restricted or prohibited to select areas before his time is recorded and sent to the ERP for further processing.

These six systems together act as the support system to the ERP, all these systems are extensively used for the main purpose for which they are installed. Each one of them has a specific technology to handle the function and are equipped to capture, store, process and transfer the data to the ERP. Each of these systems operates on their native system and is integrated to the ERP through the gateway by using specific software. These systems are a part and parcel of the ERP system network.

The EMS, therefore, can be defined as a network system comprising the ERP, the EDI, the CAD/CAM/CAE, the CMS, the SMS, and the DMS.

# Enterprise Resource Planning (ERP)

**Enterprise resource planning (ERP)** is a process used by companies to manage and integrate the important parts of their businesses. Many ERP software applications exist to help companies implement resource planning by integrating all of the processes it needs to run a company with a single system. An ERP software system can integrate planning, purchasing inventory, sales, marketing, finance, human resources, and more.

You can think of an enterprise resource planning system as the glue that binds together the different computer systems for a large organization. Without an ERP application, each department would have its own system optimized for that division’s particular tasks. With ERP software, each department still has its own system, but all of the systems can be accessed through one application with one interface.

ERP applications also allows the different departments to communicate and share information more easily with the rest of the company. It collects information about the activity and state of different divisions, making this information available to other parts, where it can be used productively.

ERP applications can help a corporation become more self-aware by linking information about production, finance, distribution, and human resources together. Because it connects different technologies used by each individual part of a business, an ERP application can eliminate costly duplicate and incompatible technology. The process often integrates accounts payable, stock-control systems, order-monitoring systems, and customer databases into one system.

ERP offerings have evolved over the years from traditional software models that make use of physical client servers to cloud-based software that offers remote, web-based access.

### **Special Considerations**

An ERP system doesn’t always eliminate inefficiencies within the business. The company needs to rethink the way it’s organized, or else it will end up with incompatible technology.

ERP systems usually fail to achieve the objectives that influenced their installation because of a company’s reluctance to abandon old working processes that are incompatible with the software. Some companies are also reluctant to let go of old software that worked well in the past. The key is to prevent ERP projects from being split into many smaller projects, which can result in cost overruns.

### **ERP Solutions Providers**

Some familiar names are leaders in ERP software. Oracle Corp. (ORCL) originally supplied a relational database that integrated with ERP software developed by SAP (SAP) before entering the broader enterprise market in a big way in the early 2000’s. Microsoft (MSFT) has long been an industry leader, with many customers using multiple software applications from the company.

As cloud-based solutions have grown in popularity in recent years, the traditional ERP industry leaders have seen challenges from upstarts such as Bizowie and WorkWise.

* ERP software can integrate all of the processes needed to run a company.
* ERP solutions have evolved over the years, and many are now typically web-based applications that users can access remotely.
* An ERP system can be ineffective if a company doesn’t implement it carefully.