Chapter 2

Kinds of Systems in Organizations

2.0 Introduction

Organizations utilize different types of information systems to take their business decisions for their operations. The hierarchy levels of the organizations in general are operational, knowledge, management, and strategic. Accordingly, the need of information required at different levels varies. Major type's information systems in organizations include transaction processing systems, office systems, knowledge work systems, decision-support systems, management information systems, and executive support systems. Transaction processing systems function at the operational level of the organization. Knowledge work systems help create and integrate new knowledge within the organization. Management information systems provide managers with reports based primarily on data pulled from transaction processing systems, have an internal orientation, and have limited flexibility. Decision-support systems function at the management level and provide analytical models and data analysis tools to provide support for semi structured and unstructured decision-making activities. Executive support systems function at the strategic level, support unstructured decision making, and use advanced graphics and communications. In this chapter the different types of information systems that are used by the business organizations are detailed.

2.1 Kinds of Systems in Organizations

Organizations utilize different types of information systems to take their business decisions for their operations. The hierarchy levels of the organizations in general are operational, knowledge, management, and strategic. Accordingly, three main categories of information systems serve at different organizational levels on hierarchy are:

I. Operational-level systems

II. Management-level systems

III. Strategic-level systems
1. **Operational-level systems:** Information systems that monitors and support operational managers, keeping track of the elementary activities and business transactions of the organization.
   E.g. Sales, receipts, cash deposits, payroll, credit decisions and flow of materials in a factory.

2. **Management-level systems:** Information systems that serves the monitoring, controlling, decision-making, and administrative activities of middle managers of the business organization.

3. **Strategic-level systems:** Information systems that support the long-range planning activities of senior management and help senior management tackle and address strategic issues to keep the strategic growth of the business firm.

### 2.2 Categorisation on decisions

Categorisation on decisions on the basis of the characteristics in an organization may be classified as:

1. **Structured Decisions:** Decisions that are repetitive, routine, and have a definite procedure for handling them.
2. **Semi-structured Decisions:** Decision where only part of the problem has a clear-cut answer provided by an accepted procedure.
3. **Unstructured Decisions:** Non-routine decisions in which the decision maker must provide judgment, evaluation and insights into the problem definition; there is no agreed upon procedure for making such decisions.

**Major Types of Systems in Organizations**

Major type’s information systems in organizations include:

1. Transaction Processing Systems (TPS)
2. Management Information Systems (MIS)
3. Decision-Support Systems (DSS)
4. Executive Support Systems (ESS)
Transaction processing systems function at the operational level of the organization. Knowledge work systems help create and integrate new knowledge within the organization. Management information systems provide managers with reports based primarily on data pulled from transaction processing systems, have an internal orientation, and have limited flexibility. Decision-support systems function at the management level and provide analytical models and data analysis tools to provide support for semi-structured and unstructured decision-making activities. Executive support systems function at the strategic level, support unstructured decision making, and use advanced graphics and communications. Major type's information system in a typical organization is shown in figure 2.1 along with strategic levels and functional areas.

![Figure 2.1 Major type's information system in a typical organization](image)

2.30 Transaction Processing System (TPS)

Transaction processing was one of the first business processes to be computerized and without information systems, recording and processing business transactions would consume huge amounts of an organization's resources. Transactions are events that occur as part of doing business, such as sales, purchases, deposits, withdrawals, refunds, and payments. TPS serve the operational level.
The transaction processing systems (TPS) is a computerized system that performs and records the daily routine transactions necessary to the conduct of the business. TPS also involve employees in business processes. Transaction Processing Systems are information systems that process data resulting from the occurrence of business transaction.

Every organization has manual and automated transacting processing systems (TPSs), which process the detailed data necessary to update records about the fundamental business operations of the organization. These systems include order entry, inventory control, payrolls, accounts payable, accounts’ receivable, and general ledgers to name a few. The input to these systems includes basic business transactions such as customer orders, purchase orders, receipts, time records, invoices and customer payments. The result of processing business transactions is that the organizations records are updated to reflect the status of the operation at the time of the last process transaction. Automated TPSs consist of all the components of Computer Based Information, including databases, telecommunications, people, procedure, software and hardware devices used to process transactions. The processing activities include data collection, data edit, data correction, data manipulation, data storage and document production.

For most organizations TPSs support the routine, day to day activities that occur in the normal course of business that help a company add value to its product and services depending on the customer, value may mean lower price, better service, higher quality or uniqueness of the product. By adding a significant amount of value to their products and services, companies ensure further organization success. Because the TPSs often perform activities related to customer contacts like order processing and invoicing – these information systems play a critical value to the customer.

2.31 Transaction processing methods and objectives
When computerized transaction processing system first evolved, only one method of processing was available. All transactions were collected in group called batches and processed together. In batch processing system, business transactions are accumulated over a period of time and then processed. The time period during which transactions are accumulated is length of time that is needed to meet the needs of the users of the system.

Today, computer technology allows another processing method called online, real time or online transaction processing (OLTP), with this form of data processing, each transaction is processed immediately, without the delay of accumulating transactions in to batch.
**Real-time Processing** Transaction data are processed immediately after they are generated and can provide immediate output to end-users.

As soon as the input is available, a computer programme performs the necessary processing and updates the records affected by the single transaction. Consequently at any time the data in an online system always reflect the current status. Many companies have found that OLTP helps them provide faster, more efficient service— one way to add value to their activities in the eyes of the customer increasingly, companies are using the internet to perform man OLTP functions.

A third type of transaction processing called **online entry with delayed processing** is a compromise between batch and online processing. With this type of system, the transactions are entered into the computer system when they occur, but they are not processing immediately.
Advantages and Limitations of Real-time Processing

Advantages

1. Immediate updating of files and immediate responses to user queries
2. Needed for applications where a high frequency of changes must be made to a database during a short time
3. Good security control
4. Several databases can be processed or updated concurrently

Limitations

1. Only the specific records affected by transactions or inquiries need to be processed.
2. High frequency updating incurs higher cost.

Advantages and Limitations of Batch processing

Advantages

1. Economical when large volumes of transaction data must be processed.
2. Ideally suited for applications where it is not necessary to update databases as transaction occur and where documents and reports are required only at the specified scheduled intervals.

Limitations

1. Master files are frequently out of date between scheduled processing
2. Immediate updated responses to inquiries cannot be made.
Applications of TPS

a. Order processing systems - includes order entry, sales configuration, shipment planning, shipment execution, inventory control, invoicing, customer relation management etc.
   1. Order entry system captures the basic data needed to process a customer order
   2. Sales configuration system ensures that the product and services ordered are sufficient to accomplish the customers objectives and will work well together
   3. Shipment planning system determine which open orders will be filled and forms which location they will be shipped
   4. Shipment execution system coordinates the outflow of all products and goods from the organization
   5. Inventory control system that updates the computerized inventory records to reflect the exact quantity on hand of each stock keeping unit
   6. An output of the invoicing system, a customer invoice reflects the value of the current invoice, as well as which products customer purchased.
   7. Customer relationship management systems – a collection of people, processes, software and internet capabilities that helps an organization manage customer relationships efficiently and systematically

b. Purchasing systems includes inventory control, purchase order processing, receiving and accounting

c. Accounting systems includes budget, accounts receivable, payroll, asset management and general ledger.

2.4 Transaction Processing System (TPS)

TPS is the basic business systems that serve the operational level of the organization. Any transaction processing system goes through a five stages cycle:

1. Data entry activities
2. Transaction processing activities
3. File and data processing
4. Document and report generation
5. Inquiry processing activities
Stage 1: Data entry activities

The input activity in TPS involves a data entry process. In this process, data is captured or collected by recording, coding and editing activities. Then data may be converted to a form that may be entered into a computer system. Traditional Data Entry, Source Data Automation like OCR, MICR and EDI etc.

Stage 2: Transaction processing activities

IS will capture data on source documents such as purchase orders, payroll, time sheets and sales order forms. Reduces or eliminates many of the activities, people, and data media required by traditional data entry methods.

Transaction data are processed immediately after they are generated and can provide immediate output to end-users adopting Real-time Processing or in Batch processing system, business transactions are accumulated over a period of time and then processed.

Stage 3: TPS File and Database Processing

One of the major functions of TPS is to make changes to an organisation’s corporate databases and to provide the data resources that can be processed and used by MIS, DSS and EIS.

Stage 4 of TPS Document and Report Generation

Following documents will be generated by TPS as desired by the end-user. Document and Reports produced by TPS are called Transaction documents.

1. Action Documents: Documents that initiate actions or transactions on the part of their recipient. Eg. Purchase Order, Pay Cheque.

2. Information Documents: These documents relate, confirm, or prove to their recipients that transactions have occurred (Control document). They document the fact that a transaction has occurred. Eg. Sales Receipts, Sales Order confirmation.
3. **Turnaround Documents**: They are designed to be returned to the sender. A turnaround document combines the functions of an action document and an information document.

4. **Control Listings**: Reports that describe each transaction occurring during a period (transaction logs) E.g., A pay roll register.

**Stage 5: Editing / Inquiry processing activities**

Editing and providing the reports as per the end user requirement and processes the corrections that describe errors detected during processing (invalid account numbers).

**Example: TPS of a payroll system**
2.5 Management Information Systems (MIS)

BASIC CONCEPTS:


Information is considered as sixth resources

Management information system (MIS) is an organized collection of people, procedures, software, databases and devices used to provide routine information to the managers and decision makers. The focus of an MIS is primarily an operational efficiency, marketing, production, finance and other functional areas are supported by MIS and linked through a common database.

The scope and purpose of MIS is better understood when each term is explained.

Management is a process consisting of planning, organizing, to achieve organizational objectives.
Various functions of management are briefly defined as follows:

1. **Planning** – process of deciding in advance the cause of action
2. **Organizing** – forming formal group of people and activities to facilitate achieving its objectives
3. **Controlling** – checking the progress of plans and correcting any deviations
4. **Directing** – processing of activating the plans, structure and group efforts in the desired direction.

According to schedule ‘MIS is a system of people, equipment procedures, documents and communication that collects validates, operates on transformers, stores and present data for use in planning, budgeting, accounting and controlling and other management process’. Frederick B Cornish defines MIS as ‘Structure to provide the information needed and where needed’. Further, the system represents the internal communication network of the business providing the necessary intelligence to plan, execute and control. Information Systems at the management level of an organization that serve the functions of planning, controlling, and decision making by providing routine summary and exception reports.

MIS supports the management level by providing routine summary reports and exception reports for various purposes of management control process, including planning, controlling, and decision making.

Examples are sales and profit per customer and per region, relocation summary and analysis, inventory control, capital investment analysis, and even a report on students who were here in the autumn but did not return in the spring.

MIS differs from TPS in that MIS deals with summarized and compressed data from the TPS and sometimes analysis of that summarized data.

MIS is “vital” in any organization for two reasons:

1. It emphasizes the management orientation of IT in business (not merely the processing of data).
2. It emphasizes that a systems framework should be used for information systems applications.
2.51 Objectives of MIS

1. To provide managerial end users with information to make decisions
2. To provide a variety of reports and displays to management
3. To provide information required by managers
4. To retrieve information about internal operation from databases
5. To obtain data about business environment from external sources.

2.52 Characteristics of MIS

Various characteristics of MIS may be consolidated as following points.

1. MIS support structured and semi-structured decisions at the operational and management control levels. They are also useful for planning purposes of senior management staff.
2. MIS are generally reporting and control oriented. They are designed to report on existing operations and therefore to help provide day-to-day control of operations.
3. MIS rely on existing corporate data and data flows.
4. MIS have little analytical capability.
5. MIS generally aid in decision making using past and present data.
6. MIS are relatively inflexible.
7. MIS have an internal rather than an external orientation.
8. Information requirements are known and stable.
9. MIS require a lengthy analysis and design process (in the order of one to two years)
10. Demand, key indicator and drill down reports have all helped managers and executives make better, timely decisions.
11. Provide reports with fixed and standard formats – for example – scheduled reports for inventory control may contain the same type of information placed in the same locations on the reports.
12. MIS reports use primarily internal source of data that are contained in the computerized databases. The internet and extranets are frequently used sources for external data.
2.53 MIS versus Data Processing

MIS and Data processing goes hand in hand and their relationship is mentioned below.

1. A data processing system processes transactions and produces reports. It represents the automation of fundamental, routine processing to support operations.

2. Every MIS will also include transaction processing as one of its functions.

3. MIS has the capability to provide analysis, planning and decision making support.

4. Users have the methods for querying the database on an ad hoc basis.

5. Information resources are utilized to improve decision making and achieve improved organizational effectiveness.

2.54 Reports of MIS

Reports of MIS are classified under four different kinds. They are mentioned below.

1. Scheduled reports

Uses a prescribed format designed to provide managers with information on a regular basis. Eg. Daily or weekly sales analysis reports and monthly financial statements

2. Exception Reports

Reports are produced only when exceptional conditions occur or Reports are produced periodically but contain information only about exceptional conditions. Eg. Credit reports on customers who exceed their credit limits.

3. Demand Reports and Responses

Information is available whenever a manager demands (using web browsers, DBMS query languages and report generations)

4. Push Reporting

Information is pushed to manager’s networked workstation. Eg. Companies use web casting software to selectively broadcast reports and other information to the networked PCs of managers and specialists over their corporate intranets.
A Sample MIS Report is presented in Figure 2.2 showing summarized annual sales data produced by the MIS.

Table 2.2: Management Information Systems from the system’s perspective

<table>
<thead>
<tr>
<th>PRODUCT CODE</th>
<th>PRODUCT DESCRIPTION</th>
<th>SALES REGION</th>
<th>ACTUAL SALES</th>
<th>PLANNED</th>
<th>ACTUAL versus PLANNED</th>
</tr>
</thead>
<tbody>
<tr>
<td>4469</td>
<td>Carpet Cleaner</td>
<td>Northeast</td>
<td>4,066,700</td>
<td>4,800,000</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South</td>
<td>3,778,112</td>
<td>3,750,000</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midwest</td>
<td>4,887,001</td>
<td>4,600,000</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>West</td>
<td>4,003,440</td>
<td>4,400,000</td>
<td>0.91</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>16,715,253</td>
<td>17,550,000</td>
<td>0.95</td>
</tr>
<tr>
<td>5674</td>
<td>Room Freshener</td>
<td>Northeast</td>
<td>3,676,700</td>
<td>3,900,000</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td></td>
<td>South</td>
<td>5,608,112</td>
<td>4,700,000</td>
<td>1.19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Midwest</td>
<td>4,711,001</td>
<td>4,200,000</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>West</td>
<td>4,583,440</td>
<td>4,900,000</td>
<td>0.93</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>18,559,253</td>
<td>17,700,000</td>
<td>1.05</td>
</tr>
</tbody>
</table>

View of Management Information Systems from the system’s perspective is shown in below Table 2.2 and Figure 2.3 presents the relationship between TPS and MIS. MIS uses TPS as a functional supportive element to process and to provide required information at different levels of the organization.

Example: Annual budgeting.
2.6 Decision Support System

Decision-support systems provide material for analysis for the solution of semi-structured problems, which often are unique or rapidly changing. Typically, they provide the ability to do “what if” analysis. DSS will often use data from external sources, as well as data from TPS and MIS. DSS supports “right now” analysis rather than the long-term structured analysis of MIS. DSS are designed for analytical purposes and are flexible in nature. DSS provide sophisticated analytical models and data analysis tools to support semi-structured and unstructured decision-making activities. DSS use data from TPS, MIS, and external sources, provide more analytical power than other systems and interactive.

The impact is on decisions in which there is sufficient structure for computer and analytic aids to be of value but where manager’s judgment is essential.

A DSS is an organized collection of people, procedures, software databases and devices, used to support problem/specific decision making and lead to problem solving. The focus of a DSS is on decision making effectiveness when faced with unstructured or semi structured business problems.
The motion of decision support as a formal concept was coined by G. Anthony Gorry and Michael S. Scott Morton. They felt a need for a framework to channel computer applications towards management decision making and developed a grid known as the Gorry and Scott Morton grid.

![Gorry and Scott Morton grid](image)

**Figure 2.2 Gorry and Scott Morton grid.**

### 2.61 Characteristics of decision support system

The main characteristics of DSS are

1. DSS help managers make decisions that are semi-structured, unique, or rapidly changing, and not easily specified in advance.

2. DSS are responsive enough to run several times a day in order to correspond to changing conditions.
3. DSS make use of both internal information (from TPS and MIS) and also from external sources, such as current stock prices or product prices of competitors.

4. DSS offer users flexibility, adaptability, and a quick response.

5. DSS allow users to initiate and control the input and output.

6. DSS operate with little or no assistance from professional programmers.

7. DSS provide support for decisions and problems whose solutions cannot be specified in advance.

8. DSS use sophisticated analysis and modelling tools.

9. DSS shall support the manager but not replace his/her judgment. It should therefore neither try to provide the answers nor impose a predetermined or predefined sequence of analysis.

10. DSS requires the decision maker’s insight and judgment to control the process and solution.

2.62 Four Core Capabilities of a DSS

1. Representations: Conceptualisations of information used in making decisions, such as graphs, charts, lists, reports and symbols to control operations.

2. Operations: Logical and mathematical manipulations of data, such as gathering information, generating lists, preparing reports, assigning risks and values, generating statistics and simulating alternatives.

3. Memory Aids: Databases, views of data, work spaces, libraries, link among work spaces and libraries, and other capabilities to refresh and update memory.

4. Control Aids: Capabilities that allow the user to control the activities and functions of the DSS.
2.63 Examples of DSS Systems

<table>
<thead>
<tr>
<th>Industry</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airlines</td>
<td>Price and route selection, flight scheduling</td>
</tr>
<tr>
<td>Investment Companies</td>
<td>Investment evaluation</td>
</tr>
<tr>
<td>Railways</td>
<td>Train Dispatching and Routing</td>
</tr>
<tr>
<td>Frito-Lay, Inc.</td>
<td>Price, ad and promotional section</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>Production optimisation</td>
</tr>
<tr>
<td>Oil Companies</td>
<td>Evaluation of potential drilling sites</td>
</tr>
</tbody>
</table>

2.64 Differences between DSS and MIS

A DSS differs from an MIS in numerous ways, including the types of problems solved; the support given to users; the decision emphasis and approach; and the type, speed, output and development of the system used.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic</td>
<td>Strategic level managers involved with long term decisions</td>
</tr>
<tr>
<td>Tactical</td>
<td>Operational level = managers involved with daily decisions</td>
</tr>
<tr>
<td>Operational</td>
<td></td>
</tr>
</tbody>
</table>

Decision frequency

MIS supports the management level by providing routine summary reports and exception reports for various purposes, including planning, controlling, and decision making while DSS provide material for analysis for the solution of semi-structured problems, which often are unique or rapidly changing.

DSS will often use data from external sources, as well as data from TPS and MIS. DSS are designed for analytical purposes and are flexible and supports “right now” analysis rather than the long-term structured analysis of MIS.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>DSS</th>
<th>MIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design Information Format</td>
<td>Iterative process, Ad hoc, flexible and adaptable format</td>
<td>Deliver system based on frozen requirements Pre-specified, fixed format</td>
</tr>
<tr>
<td>Information processing methodology</td>
<td>Information produced by analytical modelling of business data</td>
<td>Information produced by extraction and manipulation of data.</td>
</tr>
</tbody>
</table>

### 2.65 Decision-Support Systems (DSS)

Management level

- Inputs: Transaction level data
- Processing: Interactive
- Outputs: Decision analysis
- Users: Professionals, staff

Example: Contract cost analysis

### 2.66 Functions of a DSS

There are five functions of a DSS facilitating managerial decision making. They are:

1. **Model building** – allows decision makers to identify the most appropriate model for solving the problem at hand.
2. **What is analysis** – is the process of assessing the impact of changes to model variables, the value of the variable or the interrelationships among variables.
3. **Goal seeking** – is the process of determining the input values required to achieve a certain goal.
4. **Risk analysis** – is a function of DSS that allows managers to assess the risks associated with various alternatives.
5. **Graphical analysis** – helps managers to quickly digest large volume of data and visualize the impacts of various courses of action.
2.67 Decision Support System

2.68 Components of DSS

1. **DSS Database**: A collection of current or historical data from a number of applications or groups.

2. **Model Base**: A collection of mathematical and analytical models that can easily be made accessible to the DSS server.

3. **Model**: An abstract representation that illustrates the components or relationships of a phenomenon.

4. **DSS Software System**: DSS component that permits easy interaction between the users of the system and the DSS database and model base.
Voyage-Estimating DSS.

This DSS operates on a powerful PC used daily by managers to develop bids on shipping contracts.

2.7 Executive support systems (ESS)/ Executive Information System (EIS)

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

Executive support systems function at the strategic level, support unstructured decision making, and use advanced graphics and communications. Examples of executive support systems include sales trend forecasting, budget forecasting, and personnel planning.

ESS is designed to incorporate data about external events such as new tax laws or competitors, but they also draw summarized information from internal MIS and DSS. They filter, compress and track critical data, emphasizing the reduction of time and effort required to obtain information useful to executives. ESS employ most advanced graphics S/W and can deliver graphs and data from many sources immediately to a senior executive office.
ESS combines many features of MIS and DSS and provides top executives with immediate and easy access to information. ESS helps to identify factors that are critical to accomplishing strategic objectives (critical success factors) and hence provide a generalized computing and communications environment that help senior managers address strategic issues and identify long-term trends in the firm and its environment.

ESS addresses non-routine decisions requiring judgment, evaluation, and insight because there is no agreed-on procedure for arriving at a solution.

ESS presents graphs and data from many internal and external sources through an interface that is easy for senior managers to use. Information presented in forms tailored to the preferences of the executives using the system. ESS provides output as desired by the end-user in the forms like Customizable graphical user interfaces, Exception reports, Trend analysis etc.,

### 2.71 Model of ESS

![Figure 2.4 Model of ESS](image)
EXECUTIVE SUPPORT SYSTEMS (ESS) as a system

ESS may be viewed from a system’s perspective as indicated below.

- **Inputs**: Aggregate data
- **Processing**: Interactive
- **Outputs**: Projections

Users: Senior managers

1. Top Level Management
2. Designed to the individual senior manager
3. Ties CEO to all levels
4. Very expensive to keep up
5. Extensive support staff
2.74 Features of ESS

- Contemporary ESS bring together data from all parts of the firm and enable managers to select, access, and tailor them as needed using easy-to-use desktop analytical tools and online data displays.

- Through their ESS, many managers have access to public data, such as news services, financial market databases, and economic information.

- ESS has the ability to **drill down**, moving from a piece of summary data to lower and lower levels of detail.

- Contemporary ESS includes tools for modeling and analysis.

- Whereas DSS use such tools primarily for modeling and analysis in a fairly narrow range of decision situations, ESS use them primarily to provide status information about organizational performance.

- Well-designed ESS also have some facility for environmental scanning.

- A key information requirement of managers at the strategic level is the ability to detect signals of problems in the organizational environment that indicate strategic threats and opportunities.

- Ability to analyze, compares, and highlight trends.

- The easy use of graphics enables the user to look at more data in less time with greater clarity and insight than paper-based systems provide.

- The timeliness and availability of the data result in needed actions being identified and carried out earlier than previously could have been done.

- Problems are handled before they become too damaging; opportunities are also identified earlier.

- Immediate access to so much data also enables executives to better monitor activities of lower units reporting to them.

- That very monitoring ability enables decision making to be decentralized and to take place at lower operating levels.
2.75 Benefits of EIS

- Helps in competitive intelligence gathering.
- Help managers identify changing market conditions, formulate responses, track implementation efforts, and learn from feedback.
- ESS is configured to summarize and report on key performance indicators for senior management in the form of a digital dashboard or "executive dashboard."
- The dashboard displays on a single screen all of the critical measurements for piloting a company, similar to the cockpit of an airplane or an automobile dashboard.
- Many firms are now implementing a balanced scorecard model that supplements traditional financial measures with measurements from additional perspectives, such as customers, internal business processes, and learning and growth.
- Managers use balanced scorecard systems to see how well the firm is meeting its strategic goals.

2.76 Interrelationships among systems

In contemporary digital firms, the different types of systems are closely linked to one another. This is the ideal. In traditional firms these systems tend to be isolated from one another, and information does not flow seamlessly from one end of the organization to the other. Efficiency and business value tend to suffer greatly in these traditional firms. The interrelationship between major kinds of system in an organization is depicted in figure 2.6.

The various types of systems in the organization exchange data with one another. TPS are a major source of data for other systems, especially MIS and DSS. TPS are operational-level systems that collect transaction data. Examples of these are payroll or order processing that track the flow of the daily routine transactions that are necessary to conduct business. TPS provide data that are required by office systems, KWS, MIS and DSS, although these systems may also use other data. KWS and office systems not only use data from TPS but also from MIS. DSS not only use data from TPS but also from KWS, office systems, and MIS. MIS rely heavily on data from TPS but also use data from KWS and office systems. ESS obtains most of their internal data from MIS and DSS.
2.8 Office automation:
Refers to the use of mechanical, electrical and electronic devices to enhance communication in the workplace and increase the efficiency. Typical activities of office automation include following.

a. Word processing
b. Electronic mail
c. Voice mail
d. Electronic calendaring
e. Audio conferencing
f. Video conferencing
g. Computer conferencing
h. Tele conferencing
i. Facsimile transmission (FAX)
j. Desktop publishing
k. Videotext
l. Imaging
m. Multimedia systems
2.9 Enterprise Systems

Enterprise systems, also known as enterprise resource planning (ERP) systems, provide a single information system for organization-wide, coordinates and integrate the key business processes.

Information that was previously fragmented in different systems can seamlessly flow throughout the firm so that it can be shared by business processes in manufacturing, accounting, human resources, and other areas.

Introduction to Enterprise Applications

INTEGRATING FUNCTIONS AND BUSINESS PROCESSES: Introduction to Enterprise Applications

The Order Fulfillment Process
2.91 Systems for Enterprise-Wide Process Integration

Enterprise applications are usually designed to support organization-wide process coordination and integration of major business processes and systems of a typical organization. Integration elemental functions typically include Enterprise systems, Supply chain management systems, Customer relationship management systems and Knowledge management systems. Figure 2.7 presents enterprise applications depicting the major functional area and business process of a typical organization.

![Figure 2.7 presents enterprise applications](image)

2.92 Enterprise Application Architecture

Figure 2.8 Shows Enterprise Application Architecture. The picture shows the major functions each having its uses of information systems and the functional relationship with outside the organization’s boundaries:
2.93 Benefits of Enterprise Systems

a. Help to unify the firm’s structure and organization: One organization

b. Management: Firm wide knowledge-based management processes

c. Technology: Unified platform

d. Business: More efficient operations & customer-driven business processes

2.94 Challenges of Enterprise Systems

a. Difficult to build: Require fundamental changes in the way the business operates

b. Technology: Require complex pieces of software and large investments of time, money, and expertise

c. Centralized organizational coordination and decision making: Not the best way for the firms to operate
2.95 Expert Systems (ES)

An expert system is a knowledge-intensive programme that solves a problem by capturing the expertise of a human in limited domains of knowledge and experience. An expert system can assist decision making by asking relevant questions and explaining the reasons for adopting certain actions. Figure 2.8 shows the ES with various components and functional elements of a typical ES.

2.95.1 Common characteristics of ES

a. They perform some of the problem-solving work of humans
b. They represent knowledge in forms such as rules or frames
c. They interact with humans
d. They can handle multiple hypotheses simultaneously.

2.95.2 Components of an Expert System
2.95.3 Components of an ES

The major components of an ES include the following major four components:

1. Knowledge domain or base
2. Development team
3. AI shell and
4. User

1. Knowledge Base: A model of human knowledge that is used by ES. Conceptually, knowledge base can be divided into two categories: Domain and Heuristics.

- Facts about a specific subject area (called a domain). Facts could include definitions, relationships, measurements, probabilities, observations etc.

- Rule of thumb (called heuristics) describing the reasoning procedures by which an expert uses facts to arrive at conclusions.

Three ways have been advised to represent human knowledge and expertise.

a. Rule Base
b. Semantic nets.
c. Frames

Rule Base: The collection of knowledge in an AI system that is represented in the form of IF-THEN rules.

Semantic nets: Expert systems that use the property of inheritance to organize and classify knowledge when the knowledge base is composed of easily identifiable chunk or objects of interrelated characteristics (inheritance).

Frames

Method of organizing expert system knowledge into chunks, but the relationships is based on shared characteristics determined by the user.

2. The Development Team:

An AI development team is composed of one or several “experts” who have a thorough command over the knowledge base and one or more knowledge engineers. They are the specialists who elicit information and expertise from other professionals and translate into a set of rules, frames, or semantic nets for an expert system.
3. **AI Shell:** The programming environment of an expert system. AI shells can quickly generate user interface screen, capture the knowledge base, and manage the strategies for searching the rule base.

4. **Inference Engine:** The strategy used to search through the rule base.

Inference Engine: The strategy used to search through the rule base. The two strategies commonly used are:

1. Forward chaining
2. Backward chaining

The two strategies commonly used are:

**Forward chaining:**
Strategy for searching the rule base in an expert system that begins with the information entered by the user and searches the rule base to arrive at a conclusion.

**Backward chaining:**
Strategy for searching the rule base in an ES that acts like a problem solver by beginning with a hypothesis and seeking out more information until the hypothesis is proved or disproved.

5. **The User**

The role of the user is both to pose questions of the system and to enter relevant data to guide the system along. The user may employ the ES as a source of advice or to perform tedious and routine analysis tasks.

2.95.4 **Benefits of ES**

a. Captures the expertise of an expert or group of experts in a computer based information system.

b. Outperforms a single human expert in many problem situations
c. ES is faster and more consistent, does not get tired or distracted by over work or stress.

d. Help preserve and reproduces the knowledge of experts

e. Improves the efficiency of its business processes, or produce new knowledge-based products and services.

Limitations of ES

a. Do well with specific types of operational or analytical tasks, but falter at subjective managerial decision-making.

b. Difficult and costly to develop and maintain properly.

c. Cannot learn from experience. But must be taught new knowledge and modified as new expertise is needed to match developments in their subject areas.

2.95. 5 Differences between ES and DSS

The differences between DSS and ES are summarized in the table presented below.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>DSS</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
<td>Assist human decision maker</td>
<td>Replicate a human advisor and replace him/her</td>
</tr>
<tr>
<td>Who makes the recommendations</td>
<td>The human and / or the system</td>
<td>The system</td>
</tr>
<tr>
<td>(decisions)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Orientation</td>
<td>Decision Making</td>
<td>Transfer of expertise (human-machine-human) and rendering of advice.</td>
</tr>
<tr>
<td>Attribute</td>
<td>DSS</td>
<td>ES</td>
</tr>
<tr>
<td>Major query, direction</td>
<td>Human queries the machine</td>
<td>Machine queries the human</td>
</tr>
<tr>
<td>Nature of support</td>
<td>Personal, groups, and institutional</td>
<td>Personal and groups</td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Data manipulation method</td>
<td>Numerical</td>
<td>Symbolic</td>
</tr>
<tr>
<td>Characteristics of problem area</td>
<td>Complex, broad</td>
<td>Narrow domain</td>
</tr>
<tr>
<td>Type of problems treated</td>
<td>Ad hoc, unique</td>
<td>Repetitive</td>
</tr>
<tr>
<td>Context of database</td>
<td>Factual knowledge</td>
<td>Procedural and factual knowledge</td>
</tr>
<tr>
<td>Reasoning capability</td>
<td>No</td>
<td>Yes, limited</td>
</tr>
<tr>
<td>Explanation capability</td>
<td>Limited</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### 2.9 Group Decision-Support Systems (GDSS)

GDSS is an interactive, computer-based system that facilitates solution of unstructured problems by a set of decision-makers working together as a group. It aids groups, especially groups of managers, in analyzing problem situations and in performing group decision making tasks.

A Group Decision Support System (GDSS) is an interactive computer-based system used to facilitate the solution of unstructured problems by a set of decision makers working together as a group. GDSS make meetings more productive by providing tools to facilitate planning, generating, organizing, and evaluating ideas; establishing priorities; and documenting meeting proceedings for others in the firm.

The sequence of activities and collaborative support tools used in an electronic meeting system facilitate communication among attendees and generate a full record of the meeting.
2.91 Components of GDSS

Hardware: Including conference facilities and electronic hardware.

Software tools: Including electronic questionnaires, brainstorming tools, idea organizers, questionnaire tools, voting tools; stakeholder identification and analysis tools; policy formation tools, and group dictionaries.

People: Refers not only to the participants but also to a trained facilitator and often to a staff that supports the hardware and software.

2.92 Group Decision-Support Systems

Function of a typical GDSS

In a GDSS electronic meeting, each attendee has a workstation. The workstations are networked and are connected to the facilitator's console, which serves as the facilitator's workstation and control panel, and to the meeting's file server. Using GDSS software the number of attendees at a meeting can increase while productivity also increases. One reason for this is that attendees contribute simultaneously rather than one at a time.

A GDSS contributes to a more collaborative atmosphere by guaranteeing contributors’ anonymity so that attendees focus on evaluating the ideas themselves. GDSS meetings increase the number of ideas generated and the quality of decisions. GDSS produce the desired results in fewer meetings in both face-to-face and distributed meeting environments. The typical GDSS involves following process. The general process of a GDSS is depicted in figure 2.9.

a. Group leader selects the necessary software, and develop the required agenda.

b. Participants meet (in decision room/Internet) and are given a task.

c. Participants generate ideas – brainstorm anonymously

d. Facilitator organize ideas into categories (different for user-driven software)

e. Discussion and prioritization – may involve ranking by some criteria and/or rating to the facilitators scale

f. Repeat Steps 3, 4, 5 as necessary

g. Reach decision and suggest / recommend providing feedback on decision and results to all involved
2.93 Factors affecting GDSS Effectiveness

a. Electronic meeting technology.

b. The outcome of group meetings depends on
   i. the composition of the group,
   ii. the manner in which the problem is presented to the group,
   iii. the facilitator’s effectiveness
   iv. the organization’s culture and environment,
   v. the quality of the planning,
   vi. the cooperation of the attendees,
   vii. the appropriateness of tools selected for different types of meetings and decision problems.
   viii. the organization’s culture and environment,
ix. the quality of the planning,
x. the cooperation of the attendees,
xi. and the appropriateness of tools selected for different types of meetings and decision problems.

2.94 Advantages of GDSS

Advantages of GDSS in summarized below.

a. Anonymity – drive out fear leading to better decisions from a diverse hierarchy of decision makers.

b. Parallel Communication – eliminate monopolizing providing increased participation, better decisions.

c. Automated record keeping – no need to take notes, they’re automatically recorded.

d. Ability for virtual meetings – only need hardware, software and people connected.

e. Portability - Can be set up to be portable.

f. Global Potential - People can be connected across the world

g. No need for a computer guru – although some basic experience is a must