

# MANAGEMENT INFORMATION SYSTEMS

## Chapter Three: Information Systems in the Enterprise

### Learning Objectives

By the end of this chapter the learner shall be able to;

- i. Evaluate the role played by the major types of systems in a business and their relationship to each other.
- ii. Describe the information systems supporting the major business functions: sales and marketing, manufacturing and production, finance and accounting, and human resources.
- iii. Analyze the relationship between organizations, information systems, and business processes.
- iv. Explain how enterprise applications promote business process integration and improve organizational performance.

### 3.1 Levels of Management

Information systems serve the following three levels of management

#### 1. Top Level of Management

It consists of board of directors, chief executive or managing director. The top management is the ultimate source of authority and it manages goals and policies for an enterprise. It devotes more time on planning and coordinating functions. The role of the top management can be summarized as follows –

- a. Top management lays down the objectives and broad policies of the enterprise.
- a. It issues necessary instructions for preparation of department budgets, procedures schedules etc.
- b. It prepares strategic plans & policies for the enterprise.
- c. It appoints the executive for middle level i.e. departmental managers.
- d. It controls & coordinates the activities of all the departments.
- e. It is also responsible for maintaining a contact with the outside world.
- f. It provides guidance and direction.
- g. The top management is also responsible towards the shareholders for the performance of the enterprise.

#### 2. Middle Level of Management/Managers

The branch managers and departmental managers constitute middle level. They are responsible to the top management for the functioning of their department. They devote more time to organizational and directional functions. In small organization, there is only one layer of middle level of management but in big enterprises, there may be senior and junior middle level management. Their role can be emphasized as –

- a. They execute the plans of the organization in accordance with the policies and directives of the top management.
- b. They make plans for the sub-units of the organization.
- c. They participate in employment & training of lower level management.
- d. They interpret and explain policies from top level management to lower level.
- e. They are responsible for coordinating the activities within the division or department.
- f. It also sends important reports and other important data to top level management.
- g. They evaluate performance of junior managers.
- h. They are also responsible for inspiring lower level managers towards better performance.

#### 3. Lower Level of Management/Operational

Lower level is also known as supervisory / operative level of management. It consists of supervisors, foreman, section officers, superintendent etc. According to R.C. Davis, Supervisory management refers to those executives whose work has to be largely with personal oversight and direction of operative employees.. In other words, they are concerned with direction and controlling function of management. Their activities include –


- a. Assigning of jobs and tasks to various workers.
- b. They guide and instruct workers for day to day activities.
- c. They are responsible for the quality as well as quantity of production.

- d. They are also entrusted with the responsibility of maintaining good relation in the organization.
- e. They communicate workers problems, suggestions, and recommendatory appeals etc to the higher level and higher level goals and objectives to the workers.
- f. They help to solve the grievances of the workers.
- g. They supervise & guide the sub-ordinates.
- h. They are responsible for providing training to the workers.
- i. They arrange necessary materials, machines, tools etc for getting the things done.
- j. They prepare periodical reports about the performance of the workers.
- k. They ensure discipline in the enterprise.
- l. They motivate workers.
- m. They are the image builders of the enterprise because they are in direct contact with the workers.

### 3.2. Levels of Management Information Systems

The MIS is constructed to serve the various levels and aspects of management activities such that each level of the MIS has a different emphasis

#### Nature of Decision making in an organization

Management Hierarchy	Decision Type
Strategic	 Unstructured (Non- Programmed)
Management control & Tactical	
Operational	
	Structured (Programmed)

#### 3.2.1 Desired attributes of MIS and Information for Business Decision Making

Characteristics of Information	Operational	Management Control & Tactical	Strategic
Source	Largely internal		External
Scope	Well-defined narrow		Very wide
Level of Aggregation	Detailed		Aggregate
Time Horizon	Historical		Future
Currency	Highly Current		Quite Old
Required Accuracy	High		Quite Low
Frequency of use	Very frequent		Infrequent

#### 3.2.2. Desired Systems Attributes

- Decision Oriented: the system should produce out puts in an appropriate way to enable informed decision making
- Data processing: should maintain the data input checks, controls, timeliness and efficient resource use.
- Data management: should maintain integrity, independence, and integration of data storage
- Flexibility: MIS should be sufficiently adaptable to users' varied and changing needs and behavior.
- Human Computer Interface (HCI): be user friendly.

### 3.2.3. Categories of MIS

There are four main categories of information systems that serve the different levels of management;

- **Operational-level systems;** Operational-level systems support operational managers by keeping track of the elementary activities and transactions of the organization, such as sales, receipts, cash deposits, payroll, credit decisions, and the flow of materials in a factory. The principal purpose of systems at this level is to answer routine questions and to track the flow of transactions through the organization.
- **Knowledge-level systems;** supports knowledge and data workers in an organization. Its purpose is to help the business discover, organize, and integrate new technology into the business and to help the organization control the flow of paper work. Knowledge-level systems in the form of collaboration tools, workstations and office automation are the fastest growing applications in business today.
- **Management-level systems;** Information systems that supports the monitoring, controlling, decision-making, and administrative activities of middle managers. The principal question addressed by such systems is this: Are things working well? Management-level systems typically provide periodic reports rather than instant information on operations. An example is a relocation control system that reports on the total moving, house-hunting, and home financing costs for employees in all company divisions, noting wherever actual costs exceed budgets.

Some management-level systems support non-routine decision making. They tend to focus on less-structured decisions for which information requirements are not always clear. These systems often answer .what-if. questions: What would be the impact on production schedules if we were to double sales in the month of December? What would happen to our return on investment if a factory schedule were delayed for six months? Answers to these questions frequently require new data from outside the organization, as well as data from inside that cannot be easily drawn from existing operational-level systems.

- **Strategic-level systems;** Strategic-level systems help senior management tackle and address strategic issues and long-term trends, both in the firm and in the external environment. Their principal concern is matching changes in the external environment with existing organizational capability, what will employment levels be in five years? What are the long-term industry cost trends, and where does our firm fit in? What products should we be making in five years?

### 3.4. Types of Business information system

For most businesses, there are a variety of requirements for information. Senior managers need information to help with their business planning. Middle management need more detailed information to help them monitor and control business activities. Employees with operational roles need information to help them carry out their duties. As a result, businesses tend to have several "information systems" operating at the same time. The main kinds of information systems in business are described briefly below:

Information System	Description	Level of Management Served
<b>Executive Support Systems</b>	<ul style="list-style-type: none"><li>• An <b>Executive Support System ("ESS")</b> is designed to help senior management make strategic decisions. It gathers, analyses and summarizes the key internal and external information used in the business.</li><li>• ESS typically involve lots of data analysis and modeling tools such as "what-if" analysis to help strategic decision-making.</li></ul>	Strategic level
<b>Management Information Systems</b>	<ul style="list-style-type: none"><li>• A <b>management information system ("MIS")</b> is mainly concerned with internal sources of information. MIS usually take data from the transaction processing systems (see below) and summarise it into a series of management reports.</li><li>• MIS reports tend to be used by middle management and operational supervisors.</li><li>• Supports structured decisions at the operational and management control levels</li><li>• Generally reporting and control oriented. Designed to report on existing operations and therefore help provide day-to-day control</li><li>• Rely on existing corporate data and data flows</li></ul>	Management-level <ul style="list-style-type: none"><li>• Middle manager</li></ul>

	<ul style="list-style-type: none"> <li>• Has little analytical capability</li> <li>• Generally aids in decision making using past and present data</li> <li>• Relatively inflexible</li> <li>• Have an internal rather than an external orientation</li> </ul>	
<b>Decision-Support Systems</b>	<ul style="list-style-type: none"> <li>• Decision-support systems ("DSS") are specifically designed to help management make decisions in situations where there is uncertainty about the possible outcomes of those decisions.</li> <li>• DSS comprise tools and techniques to help gather relevant information and analyse the options and alternatives.</li> <li>• DSS often involves use of complex spreadsheet and databases to create "what-if" models to support of semistructured and unstructured decisions (structured decisions can be automated).</li> <li>• Used for analytical work, rather than general office support.</li> <li>• They are flexible, adaptable and provide quick response.</li> <li>• The user controls inputs and outputs.</li> <li>• Their inputs are aggregate data, and they produce projections.</li> <li>• Use sophisticated data analysis and modeling tools</li> </ul>	Management-level <ul style="list-style-type: none"> <li>• Middle manager</li> </ul>
<b>Knowledge Management Systems</b>	<ul style="list-style-type: none"> <li>• Knowledge Management Systems ("KMS") exist to help businesses create and share information. These are typically used in a business where employees create new knowledge and expertise - which can then be shared by other people in the organisation to create further commercial opportunities. Good examples include firms of lawyers, accountants and management consultants.</li> <li>• KMS are built around systems which allow efficient categorisation and distribution of knowledge. For example, the knowledge itself might be contained in word processing documents, spreadsheets, PowerPoint presentations, internet pages or whatever. To share the knowledge, a KMS would use group collaboration systems such as an intranet.</li> </ul>	Knowledge-level <ul style="list-style-type: none"> <li>• Knowledge and data workers</li> </ul>
<b>Transaction Processing Systems</b>	<ul style="list-style-type: none"> <li>• Transaction Processing Systems ("TPS") are designed to process routine transactions necessary to conduct business, efficiently and accurately.</li> <li>• is often critical to survival of the organisation;</li> <li>• mostly for predefined, structured tasks;</li> <li>• can have strategic consequences (eg airline reservation system);</li> <li>• usually has high volumes of input and output;</li> <li>• provides data which is summarized</li> <li>• need to be fault-tolerant.</li> <li>• A business will have several (sometimes many) TPS; for example: <ul style="list-style-type: none"> <li>✓ Billing systems to send invoices to customers</li> <li>✓ Systems to calculate the weekly and monthly payroll and tax payments.</li> <li>✓ Production and purchasing systems to calculate raw material requirements.</li> <li>✓ Stock control systems to process all movements into, within and out of the business</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Operational - level</li> </ul>
<b>Office Automation Systems (OAS)</b>	<ul style="list-style-type: none"> <li>• Office Automation Systems are systems that try to improve the productivity of employees who need to process data and information. Perhaps the best example is the wide range of software systems that exist to improve the productivity of employees working in an office (e.g. Microsoft Office XP) or systems that allow employees to work from home or whilst on the move.</li> </ul> <p>Sub Species</p> <ul style="list-style-type: none"> <li>• <b>Communication systems:</b> helps people work together by sharing information in many different forms, Teleconferencing (including audio conferencing, computer conferencing, videoconferencing), Telecronic mail, voice mail, fax</li> <li>• <b>Groupware system:</b> helps teams work together by providing access to team data, structuring communication, and making it easier to schedule meetings. For sharing information, controlling work flows, communication/integration of work</li> </ul>	Knowledge level <ul style="list-style-type: none"> <li>• Knowledge and data workers</li> </ul>

### 3.4.1. Characteristics of Business Information Systems

Type of System	Information Inputs	Processing	Outputs	Users
ESS	Aggregate data; external and internal	Graphics; simulations; interactive	Projections; responses to queries	Strategic Managers Senior managers
DSS	Low-volume data or massive databases optimized for data analysis; analytical models and data analysis tools	Interactive; simulations and analysis	Special reports; decision analysis; response to queries	Management Control and Tactical Managers
MIS	Summary transactions data; high-volume data; simple models	Routine reports; simple models; low-level analysis	Summary and exception reports	Management Control and Tactical Managers
KMS	Designed specifications; knowledge base	Modeling and simulations	Models and graphics	Management Control and Tactical Managers
OAS	Documents; Schedules	Document management; scheduling; communication	Documents and schedules	Operational Workers
TPS	Transactions; events	Sorting; listing; merging; updating	Detailed reports; lists and summaries	Operational Workers

### 3.5. Relationship of the Systems to one another

The various types of systems in an organization have interdependencies. Transaction Processing Systems (TPS) are typically a major source of data for other systems, whereas ESS are primarily a recipient of data from lower-level systems. The other types of systems may exchange data with each other as well. Data may also be exchanged among systems serving different functional areas. For example, an order captured by a sales system may be transmitted to a manufacturing system as a transaction for producing or delivering the product specified in the order or to a MIS for financial reporting.

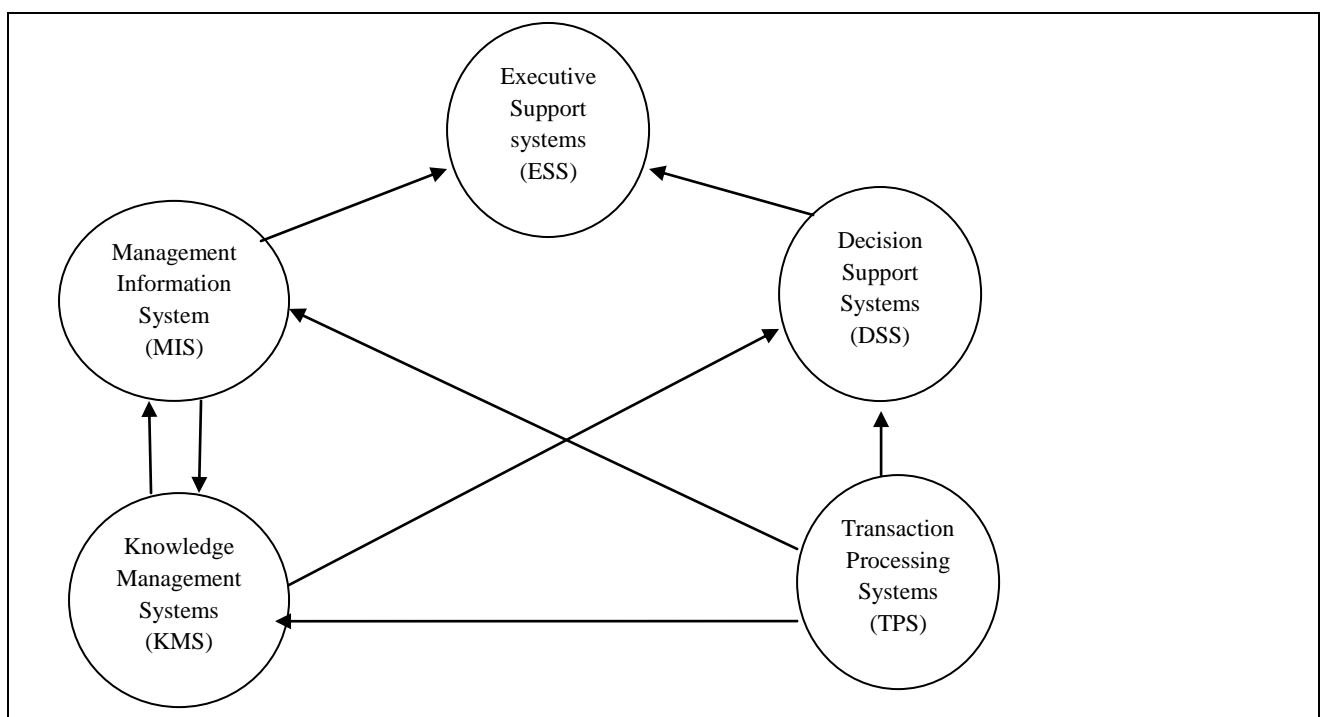


Figure 2.9 Interrelationships among systems.

It is definitely advantageous to integrate these systems so that information can flow easily between different parts of the organization and provide management with an enterprise wide view of how the organization is performing as a whole. But integration costs money, and integrating many different systems is extremely time consuming and complex. This is a major challenge for large organizations, which are typically saddled with hundreds, even thousands of different applications serving different levels and business functions. Each organization must weigh its needs for integrating systems against the difficulties of mounting a large-scale systems integration effort.

### **3.6. Enterprise Information Systems**

#### **Definition**

- Firm-wide information systems that integrate key business processes within the firm or business processes shared by multiple firms.
- Enterprise systems features a set of integrated software modules and a central database that enables data to be shared by many different business processes and functional areas throughout the enterprise
- **Enterprise systems (ES)** are large-scale, integrated application-software packages that use the computational, data storage, and data transmission power of modern information technology to support business processes, information flows, reporting, and data analytics within and between complex organizations.
- Enterprise Information Systems provide a technology platform that enables organizations to integrate and coordinate their business processes. They provide a single system that is central to the organization and ensure that information can be shared across all functional levels and management hierarchies. Enterprise systems are invaluable in eliminating the problem of information fragmentation caused by multiple information systems in an organization, by creating a standard data structure.

A typical Enterprise Information System would be housed in one or more data centers, run enterprise software, and could include applications that typically cross organizational borders such as content management systems.

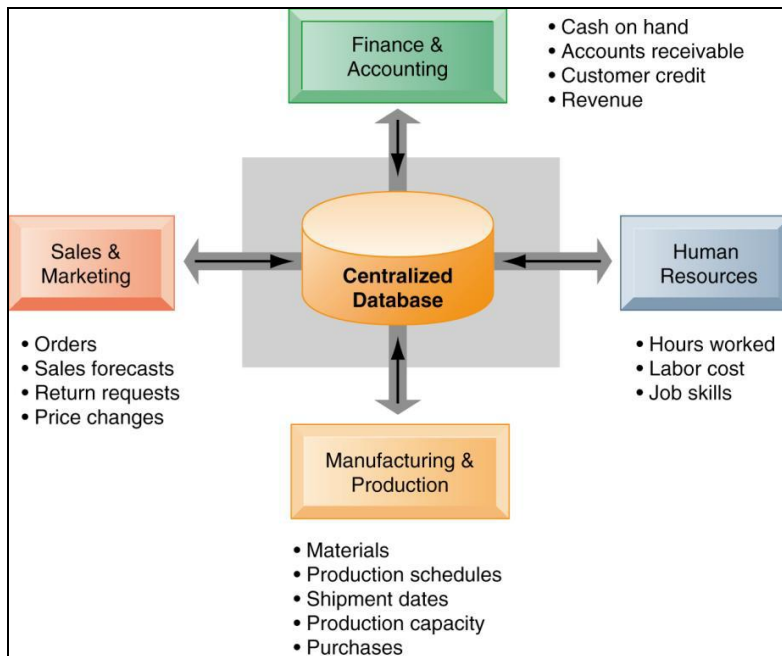
#### **3.6.1. Enterprise Software**

Enterprise software is built around thousands of predefined business processes that reflects best practices. Companies implementing this software must first select the functions of the system they wish to use and then map their business processes to the pre-defined business processes in the software.

#### **3.6.2. Business Support**

Business processes supported by Enterprise systems includes;

- Financial and Accounting processes; including general ledger, accounts payable, accounts receivable, fixed assets, cash management, and forecasting, product-costing accounting, cost-center accounting, asset accounting, tax accounting, credit management and financial reporting.
- Human Resource Processes; including personnel administration, time accounting, payroll, personnel planning and development, benefits accounting, applicant tracking, time management, compensation, workforce planning, performance and travel expense reporting.
- Manufacturing and production processes, including procurement, inventory management, purchasing, shipping, production planning, production scheduling, material requirements planning, quality control, distribution, transportation execution, and plant and equipment maintenance.
- Sales and Marketing processes including order processing, quotations, contracts, product configuration, pricing, billing, credit checking, incentive and commission management and sales planning.



How Enterprise Systems work

### 3.7. Business Drivers of Enterprise Systems: Changing environments

Business Drivers	Impact
Market change	Globalization and increasing information intensity reduce margins in traditional industries
Industry change	Mergers, acquisitions and consolidations in traditional industries increase scale economies and intensify industry competition
Firm-level change	Business process redesign of the 1990s lead to the need to have enterprise systems to support the new processes
Product change	Growth of information, knowledge and high-tech based products shorten product life cycle times; increase in information intensity of traditional products and services shortens cycle times
Management process thinking	From discrete business process focus towards a view of the firm as an integrated set of processes From non-classical competition firm-based view towards industry-based views of cooperation and alliance
Management strategy	Growing belief that information architecture investments could lead to unique knowledge that could not be purchased on input factor markets

### 3.8. Technology Drivers of Enterprise Systems

Technology Drivers	Nature of Change
Relational Database	Relational technology approaches hierarchical database speeds but with greatly enhanced flexibility
Reduction in storage costs	Storage devices double in capacity every 6 months
Expand public network infrastructure	Open Internet networking technologies cause network costs to plunge
Deployment of Client/server	Client/server becomes the dominant mode of computing causing major drops in information storage, processing and distribution costs in the 1990s
Evolution of Desktop computing	Desktop computing becomes the dominant mode of information distribution and 60% of the labour force comes on line at work, greatly increasing the role of information in the firm.
Enterprise software and crossware	Enterprise software emerges with standardized applications in an integrated environment that greatly reduces the costs of enterprise systems



### 3.9. Business Value of Enterprise Systems

- Increases operational efficiency by providing organizational-wide information to help managers make better decisions.
- Facilitates Standardizations and Coordination of important business processes
- Helps firms respond rapidly to customers requests for information or products
- Producing, procuring, shipping right amounts
- Enforcing standard practices and data throughout company
- Providing firm-wide information to help managers make better decisions
- Allowing senior management to easily find out at any moment how a particular organizational unit is performing or to determine which products are most or least profitable

#### Examples of Enterprise systems

##### Supply Chain Management Systems (SCM)

Supply chain: Network of organizations and business processes for:

- Procuring raw materials
- Transforming them into intermediate and finished products
- Distributing finished products to customers

Includes secondary and tertiary suppliers

- Upstream portion: Suppliers
- Downstream portion: Distributors

Two main categories

- Supply chain planning systems
  - Demand planning
  - Order planning
  - Advanced scheduling and manufacturing planning
  - Distribution planning
  - Transportation planning
- Supply chain execution systems: Manage flow of products through distribution centers and warehouses to ensure products delivered to right locations in most efficient manner
  - Order commitments
  - Final production
  - Replenishment
  - Distribution management
  - Reverse distribution

Business value of supply chain management systems

- Matching supply to demand and reducing inventory levels
- Improving delivery service and speeding product time to market
- Using assets more effectively
- Increasing sales by assuring availability of products
- Increased profitability
- Supply chain costs can approach 75% of total operating budgets

##### Customer Relationship Management Systems (CRM)

- Capture, consolidate, analyze customer data and distribute results to various systems and customer **touch points** (contact points) across enterprise
- Provide single enterprise view of customers
- Provide customers single view of enterprise at touch points
- Provide analytical tools for determining value, loyalty, profitability of customers



- Assist in acquiring new customers, providing better service and support to customers, customize offerings to customer preferences, provide ongoing value to retain profitable customers

### **Two main categories of CRM**

#### **Operational CRM**

- Customer-facing applications, e.g. tools for sales force automation, call center and customer service support, marketing automation

#### **Analytical CRM**

- Applications that analyze (OLAP, data mining, etc.) customer data
- Based on data warehouses consolidating data from operational CRM systems and customer touch points
- One important output: Customer lifetime value (CLTV)
  - Value based on revenue produced by a customer, expenses incurred in acquiring and servicing customer, and expected life of relationship between customer and company

### **Business value of CRM systems**

- Increased customer satisfaction
- Reduced direct marketing costs
- More effective marketing
- Lower costs for customer acquisition and retention
- Increased sales revenue
- By identifying profitable customers and segments for focused marketing and cross-selling
- Reduced churn rate (number of customers who stop using or purchasing products or services)

### **3.10. Management Opportunities, Challenges, and Solutions**

None of these enterprise systems are without their opportunities and challenges. Briefly, the opportunities are:

- Higher levels of productivity, earnings, and share prices
- Enhanced decision-making at all levels of the organization
- Information when and where necessary

The challenges are:

- Expensive to purchase and implement
- Total implementation cost may be four to five times of cost of software
- Deep-seated technological change
- Fundamental changes to organization, business processes
- New functions and responsibilities for employees
- SCM systems require business process change for multiple organizations
- Introduce “switching costs”, dependency on enterprise software vendor
- Require understanding firm’s data and cleansing data
- Integrating the system throughout the organization and yet serving specific needs
- Training managers and employees
- Managing the costs of information
- Managing user demands on the system

The solutions are:

- Determine specific information requirements and which of the requirements are being met by current systems
- Pay attention to the training needs of managers and employees — allocate the necessary funds to ensure training needs are adequately met
- Ensure each division is charged for all the information services they use and make the division managers responsible for managing the resource the same as they must manage all their other resources

### Chapter Review Questions ?

1. How can a transaction processing system help an organization's strategic-level planning?
2. Which of the four major types of information systems do you think is the most valuable to an organization? Explain your choice.
3. Discuss the benefits and challenges of enterprise systems and explain why a firm would want to build one.
4. How do enterprise systems help business achieve operational excellence?
5. What are the challenges posed by enterprise applications?

Laudon K, Laudon J, Management Information Systems, Managing the digital firm (Sixth & Eleventh Editions)