CHAPTER ONE

INTRODUCTION TO MIS

Chapter objectives

After completing this chapter, students will be able to:

- Explain the importance of MIS
- Describe the evolution and characteristics of information age
- Define IT and the career side of information technology

1. Introduction

All individuals, companies and, in general, all organizations are continuously capturing data, many of which are of no significance to them at all. However, other data are available that would afford them a better understanding of their own environment and of themselves. These data what we know as *information* – enable them to make more accurate decisions? For this reason, the right amount of information at the right time is a key factor for every organization.

Management information systems can be described as tools that help managers organize and make decisions from their data. More simply, effective MIS aids communication. Unsurprisingly, it's still true that people generally accomplish more together than they do apart, and the old concept of collaboration and communication is still at the core of business. Management information systems strive to efficiently collect, format, and communicate information to a wide variety of people. A number of software packages and applications designed to help you collaborate more and communicate. First, it is important to have a solid understanding of computing hardware, since these are the tools of processing and communication used in management information systems.

Activity 1

1. What is the impact of management information system on business?
2. Define and Discuses about the difference between the following key terms
   - **a.** Data
   - **b.** System
   - **c.** Information
   - **d.** Information system
   - **e.** Management information system

1.1. Basic Definitions

Before going into any details, it is desirable to define some key terms so we can communicate effectively.

Data: Data is raw facts. Data is like raw material. Data does not interrelate and also it does not help in decision making. Data is defined as groups of non-random symbols in the form of text, images, voice representing quantities, action and objects.

Information: Information is the product of data processing. Information is interrelated data. Information is equivalent to finished goods produced after processing the raw material. The information has a value in decision making. Information brings clarity and creates an intelligent human response in the mind.

"Information is a data that has been processed into a form that is meaningful to recipient and is of real or perceived value in the current or the prospective action or decision of recipient."Although the terms *data* and *information* are sometimes used indiscriminately, they do have different meanings. Data are non-random symbols that represent the **values of attributes or events**.

Hence, data are facts, events and transactions stored according to an agreed code. Data are facts obtained through reading, observation, calculation, measurement, etc. The amounts and other details on an organization's invoices, cheques or pay slips, etc, are referred to as *data*,

For example, Information is a set of data transformed in such a way that it helps to reduce future uncertainty and, therefore, contributes to the decision-making process. Information is data transformed in a way that makes sense to the person who receives it; in other words, it has a real or perceived value for that person when he or she acts or takes decisions. Information, moreover, is data that have been **finished product** interpreted and understood by the recipient of the message. The relationship between data and information is similar to that of raw materials and the finished product. Information will be meaningful insofar as it provides useful raw material for taking a specific decision.

A system is a set of interrelated components with a clearly defined boundary working together to achieve a common set of objectives by accepting inputs and producing outputs in an organized transformation process. It refers to a combination of components working together. For example, a **computer system** includes both hardware and software. A **Windows system** is a personal computer running the Windows operating system. A **desktop publishing system** is a computer running desktop publishing software.

Components of a system

- **Input** The activity of gathering and capturing data Whatever goes into the computer
- **Processing** Converting or transforming data into useful outputs
- **Output** Useful information, usually in the form of documents and/or reports Anything that comes out of a computer

System A system is defined as a set of elements which are joined together to achieve a common objective. The elements are interrelated and interdependent Systems range from very simple to very complex. There are numerous types of systems. For example, there are biological systems (the heart, etc.), mechanical systems (thermostat, etc.), human/mechanical systems (riding a bicycle, etc.), ecological systems (predator/prey, etc.), and social systems (groups, supply and demand, friendship, etc.).

Informtion system An information system is a set of people, procedures, and resources that collects, transforms, and disseminates information in an organization.

An information system is a set of interrelated components that collect (retrieve), process, store, and distribute information to support decision making and control in an organization
Today's organizations rely on many types of information systems. They include:

- Simple manual (Paper- and- pencil) information systems
- Informal information systems (Word- of- mouth)
- Formal (written procedures) information systems
- Computer - based information systems that use hardware, software, and people resources to transform data resources into information products for end users.

An **information system** is a type of fabricated system that is used by one or more persons to help accomplish a task or assignment. Information systems come in all shapes and sizes and are limited only by human imagination

An information system contains information about an organization and its surrounding environment. Three basic activities input, processing, and output produce the information organizations need. Feedback is output returned to appropriate people or activities in the organization to evaluate and refine the input. Environmental factors such as customers, suppliers, competitors, stockholders, and regulatory agencies interact with the organization and its information systems.

1.1. Definition of Management Information System

MIS is prevalently demystified as the Information System, the Information and Decision System, the Computer-based Information System.

The MIS has more than one definition, some of which are given below:

- MIS is the system, which makes available the right information to the right person, at the right place, at the right time, in the right form and at the right cost.
- The MIS is defined as the system that provides information support for decision making in the organization.
- The MIS is defined as an integrated system of man and machine for providing the information to support the operations, the management and the decision making function in the organization.
- The MIS is defining as the system based on the data base of the organization evolved for the purpose of providing information to the people in the organization.
- The MIS is defining as a Computer-based Information System.

MIS is an Information Management and Systems, is a discipline covering the application of people, technologies, and procedures collectively called information systems, to solving business problems.

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

The MIS is defined as a system which provides information support for decision making in the organization.

The MIS is defined as an integrated system of man and machine for providing the information to support the operations, the management and the decision making function in the organization.

The MIS is defined as a system based on the database of the organization evolved for the purpose of providing information to the people in the organization.

The MIS is defined as a Computer - based Information System.

In order to get a better grip on the activity of information processing, it is necessary to have a formal system which should take care of the following points:

- Handling of a voluminous data.
- Confirmation of the validity of data and transaction.
- Complex processing of data and multidimensional analysis.
- Quick search and retrieval.
- Mass storage.
- Communication of the information system to the user on time.
- Fulfilling the changing needs of the information.

The management information system uses computers and communication technology to deal with these points of supreme importance.

1.2. Role of management information system

Activity

- **Dear learner !** please indicate and discuses about the significance of management information system
- How the role of heart in human body related with management information system?

The role of the MIS in an organization can be compared to the role of heart in the body. The information is the blood and MIS is the heart. In the body the heart plays the role of supplying pure blood to all the elements of the body including the brain.

The heart works faster and supplies more blood when needed. It regulates and controls the incoming impure blood, processes it and sends it to the destination in the quantity needed. It fulfills the needs of blood supply to human body in normal course and also in crisis.

The MIS plays exactly the same role in the organization. The system ensures that an appropriate data is collected from the various sources, processed, and sent further to all the needy destinations. The system is expected to fulfill the information needs of an individual, a group of individuals, the management functionaries: the managers and the top management.

The MIS satisfies the diverse needs through a variety of systems such as Query Systems, Analysis Systems, Modeling Systems and Decision Support Systems the MIS helps in Strategic Planning, Management Control, Operational Control and Transaction Processing.

The MIS helps the clerical personnel in the transaction processing and answers their queries on the data pertaining to the transaction, the status of a particular record and references on a variety of documents. The MIS helps the junior management personnel by providing the operational data for planning, scheduling and control, and helps them further in decision making at the operations level to correct an out of control situation. The MIS helps the middle management in short them planning, target setting and controlling the business functions. It is supported by the use of the management tools of planning and control. The MIS helps the top management in goal setting, strategic planning and evolving the business plans and their implementation.

The MIS plays the role of information generation, communication, problem identification and helps in the process of decision making. The MIS, therefore, plays a vita role in the management, administration and operations of an organization.

1.3. Subsystems of MIS

The two approaches to define subsystems;

1. **Organizational function subsystems:**

a) **Marketing information system**- sales forecasting, sales planning, and sales analysis. The computer based information systems support the marketing function in the following areas:

- **Sales management:-** plan and monitor sales performance of products and sales people and produces sales analysis, reports which analyze sales by product, product line, customer, sales person, and sales territory.

- **Product management:-** plan and control the performance of specific products**.** Computers can help provide price, revenue, cost, and growth information for existing products and new product development.

- **Advertising and promotion:-** information helps managers achieve sales objectives at the lowest possible costs for advertising and promotion.

- **Sales forecasting:-** marketing managers use market research data**,** historical data**,** promotion plans, and statistical forecasting models to generate short-range and long-range sales forecasts.

2. **Market research:-** Computers and statistical analysis software help the market research activity collect, analyze, and maintain information on a wide variety of market variables subject to continual change.

b) **Manufacturing information system-** production planning and scheduling cost control analysis.

3. **Computer Integrated Manufacturing (CIM):-** is an overall concept which stresses that the goals of computer use in factory automation must be to **Simplify** Production processes, product design, factory organization, **Automate** production processes, and business functions that support them with computers and robots, **Integrate** all production, and support processes using computers and Tele networks

Examples

- Engineers design better products using both
    - CAE
    - CAD
- better production processes with
    - CAPP - computer- aided processing planning
- Computers are also used to help
    1) plan the types of material needed in the production process - called MRP
    2) to integrate MRP with production scheduling and shop floor control known as MRP II. (Manufacturing resource planning)
- computer - aided manufacturing (CAM)
    - ✓ used to help manufacture products
    - ✓ this can be accomplished by
        - Monitoring and controlling the production process in a factory - **Shop Floor control**
        - Directly controlling a physical process - **Process control**
        - Directly controlling a machine tool - **Machine control**
        - Directly controlling a machine with some human like capabilities- **Robotics**.

c) **Personnel information system-** salary administration, planning HR recruitment, performance analysis.

- Some of the major applications of information systems that support HRM are:

Staffing

- **Personnel record-keeping system:-** keeps track of additions, deletions, and other changes to the records in a personnel database, Changes in job assignments and compensation, or hiring and terminations are examples.

- **Employee skills inventory system:-** uses the employee skills data from a personnel database to locate employees within a company who have the skills required for specific assignments and projects.

- **Personnel requirements forecasting:-** to assure a business an adequate supply of high-quality human resources.

- **Training and Development:-** computer-based training programs and appraisals of employee job performance are available to help this area of HRM.
- **Compensation analysis:-** Information systems can help analyze the range and distribution of employee compensation; wages and salaries**,** incentive payments **and** fringe benefits with in a company, and make comparison with compensation paid by similar firms.

d) **Accounting information system-** financial analysis, cost analysis, capital planning, etc.
   - **Operational accounting systems**:- computer-based information systems record and report the flow of funds through an organization on a historical basis and produce important financial statements such as balance sheets, income statements.
   - **Management accounting systems**: - such systems also produce forecasts of future conditions such as projected financial statements, and financial budgets. It emphasized on cost accounting reports, the development of financial budgets and projected financial statements and analytical reports comparing actual to forecasted performance.

e) **Logistics information system-** planning and control of purchasing, inventories, distribution.

f) ***Financial Information systems:-*** computer based financial information systems support managers in decisions concerning the financing of a business, and the allocation and control of financial resources within a business. Major financial information categories include: collect information on all cash receipts and disbursements on a real time or periodic basis also produce daily, weekly or monthly forecasts of cash receipts or disbursements, which are used to spot future cash deficits or surpluses. Such information allows businesses to deposit or invest excess funds more quickly, and thus increase income generated by deposited or invested funds.
   - **Capital Budgeting:-** involves evaluating the profitability and financial impact of proposed capital expenditures**;** long-term expenditure proposals for plant and equipment can be analyzed using a variety of techniques: present value analysis of expected cash flows**,** probability analysis of risk

- **Financial Forecasting:-** A variety of statistical forecasting packages provide techniques that result in financial forecasts of national and local economic conditions, wage levels**,** price levels, and interest rates
- **Financial Planning:-** Financial planning systems use planning models to evaluate the present and projected financial performance of a business. It also helps determine the financing needs of business and analyze alternative methods of financing.

g) **Top management system-** strategic planning, resource allocation.

2. Activities subsystems:

a) **Transaction processing system**- processing of orders, shipments, and receipts. Transaction processing systems are information systems that process data resulting from the occurrence of business transactions. A transaction is a record of an event, which the business must respond. For example, data about an order that has just been recorded constitute a transaction. The company responds to this transaction by:

- filling the order
- adjusting its inventory to account for the items used to fill the order
- generating a packing slip
- packaging and shipping the order
- billing the customer

The transaction thus triggers a whole series of events that eventually update the firm's business records and produce appropriate documents.

Thus, transaction processing activities are needed to capture and process such data or the operations of a business would grind to a halt.

b) **Operational control system**- scheduling of activities and performance reports.

c) **Management control system**- formulation of budgets and resource allocation.

d) **Strategic planning system**- formulation of objectives and strategic plans.

1.5. Contemporary Approaches to Information Systems

Multiple perspectives on information systems show that the study of information systems is a multidisciplinary field. No single theory or perspective dominates. Figure 1.1 illustrates the major disciplines that contribute problems, issues, and solutions in the study of information systems. In general, the field can be divided into technical and behavioral approaches.

Information systems are socio-technical systems. Though they are composed of machines, devices, and "hard" physical technology, they require substantial social, organizational, and intellectual investments to make them work properly.

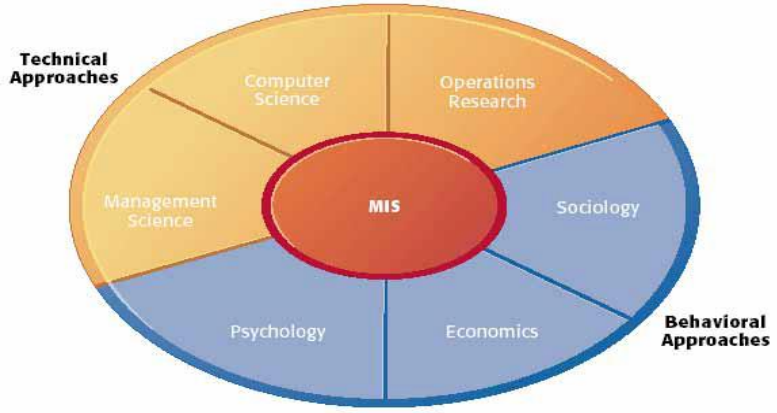


Figure 1.1: Contemporary approaches to information systems

The study of information systems deals with issues and insights contributed from technical and behavioral disciplines.

a) Technical Approach

The technical approach to information systems emphasizes mathematically based models to study information systems, as well as the physical technology and formal capabilities of these systems. The disciplines that contribute to the technical approach are computer science, management science, and operations research.

Computer science is concerned with establishing theories of computability, methods of computation, and methods of efficient data storage and access. Management science emphasizes the development of models for decision-making and management practices.

Operations research focuses on mathematical techniques for optimizing selected parameters of organizations, such as transportation, inventory control, and transaction costs.

b) Behavioral Approach

An important part of the information systems field is concerned with behavioral issues that arise in the development and long-term maintenance of information systems. Issues such as strategic business integration, design, implementation, utilization, and management cannot be explored

usefully with the models used in the technical approach. Other behavioral disciplines contribute important concepts and methods.

For instance, sociologists study information systems with an eye toward how groups and organizations shape the development of systems and also how systems affect individuals, groups, and organizations. Psychologists study information systems with an interest in how human decision makers perceive and use formal information. Economists study information systems with an interest in what impact systems have on control and cost structures within the firm and within markets.

The behavioral approach does not ignore technology. Indeed, information systems technology is often the stimulus for a behavioral problem or issue. But the focus of this approach is generally not on technical solutions. Instead, it concentrates on changes in attitudes, management and organizational policy, and behavior.

Management Information Systems

- Use of computer-based information systems in business firms
- Combines work of CS, management, and operating research toward developing system solutions to real word problems
- Concerned with behavioral issues of development, use and impact of IS

Main actors: Suppliers of hardware and software, Business firms, Managers and employees, Firm's environment (legal, social, cultural context).

After contrasting the technical and behavioral approaches, you should stress to your students that the socio-technical approach does not ignore the technical, but considers it as a part of the organization. This is also a good place to reinforce the differences between information systems literacy and computer literacy.

(1) A Business Perspective on Information Systems

Major Business Functions:

- Sales and marketing
- Manufacturing
- Finance

- Accounting
- Human resources

(2) Management Levels

Senior managers: make long-range strategic decisions about products and services

Middle managers: carry out the programs and plans of senior management

Operational managers: monitor the firm's daily activities

Figure 1.2: Management Hierarchies

The first level strategic planning processes determines what markets or businesses the company should be in at present or plant to be in the near future. The next level, management control includes processes or functions that facilitate the management of those processes delegated to the operational control level. The bottom level, operational control indicates processes performed to control the basic product or services produced by the company. It is concerned with individual tasks or transactions, such as procurement or raw material as per prescribed quantity and quality, selling of products to specific customers.

(3) Contemporary approaches to information systems

a) Technical Approach
b) Behavioral Approach

(4) Socio-technical Systems

Management Information Systems (MIS)

System performance optimized when technology and organization adjust to each other for a satisfactory fit.

1.6. The Evolution and characteristics of the Information Age

1.6.1. The Evolution of the Information Age

Agricultural Age: The period up to the 1800s, when the majority of workers were farmers whose lives revolved around agriculture.

Industrial Age: The period from the 1800s to 1957, when work processes were simplified through mechanization and automation.

Information Age: The period that began in 1957, in which the majority of workers are involved in the creation, distribution, and application of information.

– Knowledge Workers: Workers involved in the creation, distribution, and application of information.

Table 1.1 The Evolution of the Information Age

	AGRICULTURAL AGE	INDUSTRIAL AGE	INFORMATION AGE
Time Period	Pre-1800s	1800s to 1957	1957 to present
Majority of Workers	Farmers	Factory workers	Knowledge workers
Partnership	People and land	People and machines	People and people
Principal Tool	Hand tools	Machines	Information technology

1.6.2. The Characteristics of the Information Age

- An information-based society has arisen.
  - Information Society: A society in which more people work at handling information than at agriculture and manufacturing combined.
- Businesses depend on information technology to get their work done.
- Work processes are being transformed to increase productivity.

– Work Processes: The combination of activities that workers perform, the way they perform those activities, and the tools they use.

– Productivity: The relationship between the results of an activity (output) and the resources used to create those results (inputs).

  - Effectiveness: The extent to which desirable results are achieved.

- Information technology provides the means to rethink/recreate/reengineer conventional business processes.

  - Reengineering: The reshaping of business processes to remove barriers that prohibit an organization from providing better products and services and to help the organization capitalize on its strengths.

  - Business Processes: Collections of activities, often spanning several departments that take one or more kinds of input and create a result that is of value to a company's customers.

- Success in business is largely determined by the effectiveness with which information technology is used.

- Information technology is embedded in many products and services.

- Reengineering efforts to attain greater productivity:
  - ✓ Industrial Age - Division of Labor: Separation of work process into component task, with different workers specializing in each of the tasks.
  - ✓ Information Age – Teamwork, Interconnection, and Shared Information.

1.7. What is Information Technology?

Definition:

- Information technology (IT) is a technology which uses computers to gather, process, store, protect, and transfer information. Today, it is common to use the term Information and communications technology (ICT) because it is unimaginable to work on a computer which is not connected to the network.
- Information technology is a systemic study of artifacts that can be used to give form to facts in order to provide meaning for decision making, and artifacts that can be used for organization, processing, communication and application of information.

- A term used to refer to a wide variety of items and abilities used in the creation, storage, and dispersal of data and information. Its three main components are computers, communications networks, and know-how.
- **Data**: Raw facts, figures, and details.
- **Information**: An organized, meaningful, and useful interpretation of data.
- **Knowledge**: An awareness and understanding of a set of information and how that information can be put to the best use.

Characteristics of Information Technology

Information Technology has the following Characteristics:

- Acquisition, Storage, manipulation, management, transmission or reception of data or information.
- Real time access to information.
- Easy availability of updated data
- Connecting Geographically dispersed regions
- Wider range of communication media.

Summary

The management information system uses computers and communication technology to deal with; handling of a voluminous data, confirmation of the validity of data and transaction, complex processing of data and multidimensional analysis, quick search and retrieval, mass storage, communication of the information system to the user on time, fulfilling the changing needs of the information.

Management information systems strive to efficiently collect, format, and communicate information to a wide variety of people. A number of software packages and applications designed to help you collaborate more and communicate.

The study of information systems deals with issues and insights contributed from technical and behavioral disciplines. The technical approach to information systems emphasizes mathematically based models to study information systems, as well as the physical technology and formal capabilities of these systems and behavioral issues that arise in the development and

long-term maintenance of information systems. Issues such as strategic business integration, design, implementation, utilization, and management cannot be explored usefully with the models used in the technical approach.

Management information systems; use of computer-based information systems in business firms, combines work of CS, management, and operating research toward developing system solutions to real word problems and Concerned with behavioral issues of development, use and impact of IS.

Self Test Questions

Multiple Choices

1. *A computer based financial information systems support managers in decisions concerning the financing of a business, and the allocation and control of financial resources within a business.*

- **A.** *Management information system*
- **B.** *Marketing information system*
- **C.** *Financial information system*
- **D.** *Logistic information system*

2. *An integrated computer based user-machine system that provides information for supporting operations and decision making functions.*

- ***A.*** *Management information system*
- ***B.*** *Decision support system*
- ***C.*** *Expert system*
- ***D.*** *None*

3. *Which is not a typical business function?*

- ***A.*** *Sales*
- ***B.*** *Service*
- ***C.*** *Manufacturing*
- ***D.*** *Benefits and compensation*

4. _____ *is an awareness and understanding of a set of information and how that information can be put to the best use.*

- *A. Data*
- *B. Knowledge*
- *C. Information*

D. All of the above

5. *Collections of activities, often spanning several departments that take one or more kinds of input and create a result that is of value to a company's customers.*

A. Business Processes

B. Reengineering

C. Information

D. Knowledge

Say True/False

1. *Management information systems strive to efficiently collect, format, and communicate information to a wide variety of people.*

2. *Work Processes are the relationship between the results of an activity (output) and the resources used to create those results (inputs).*

3. *IT refers to a wide variety of items and abilities used in the creation, storage, and dispersal of data and information.*

4. *Knowledge refers to an organized, meaningful, and useful interpretation of data.*

5. *Productivity is the combination of activities that workers perform, the way they perform those activities, and the tools they use.*

CHAPTER TWO:

FOUNDATIONAL CONCEPTS IN MIS

Objectives of the chapter

After completing this chapter, students will be able to:

- Define the concept of data, information, knowledge and wisdom.
- Describe the information need and sources of manpower
- Understand framework for information systems
- Explain the business system

2. Introduction

Translating the real concept of the MIS into reality is technically, an infeasible proposition unless computers are used. The MIS relies heavily on the hardware and software capacity of the computer and its ability to process, retrieve communicate with no serious limitations.

The variety of the hardware having distinct capabilities makes it possible to design the MIS for a specific situation. For example, if the organization needs a large database and very little processing, a computer system is available for such a requirement. Suppose the organization has multiple business location at long distances and if the need is to bring the data at one place, process, and then send the information to various location, it is possible to have a computer system with a distributed data processing capability. If the distance is too long, then the computer system can be hooked through a satellite communication system. The ability of the hardware to store data and process it at a very fast rate helps to deal with the data volumes, its storage and access effectively. The ability of the computer to sort and merge helps to organize the data in a particular manner and process it for complex lengthy computations. Since the computer is capable of digital, graphic, word image, voice and text processing, it is exploited to generate information and present it in the form which is easy to understand for the information user.

The software is available to transfer the data from one computer system to another. Hence, you can compute the results at one place and transfer them to a computer located at another place for some other use. The computer system being able to configure to the specific needs helps to design a flexible MIS.

The advancement in computers and the communication technology has the distance, speed, volume and complex computing an easy task. Hence, designing the

MIS for a specific need and simultaneously designing a flexible and open system becomes possible, thereby saving a lot of drudgery of development and maintenance and maintenance of the system. The concept of user friendly systems and the end user computing is possible, making information processing a personalized function.

However, the application of the management principles and practices in today's complex business world is possible only when the MIS is based on computer system support.

2.1. Business and Management Functions

2.1.1. Business functions

A. Facilities and Security

Activities

1. **If Your Company span several continents what types of processes performed by facilities and security management with regard to your business operations.**
2. **If a business disruption were to occur, what processes and procedures would be needed in order to get your business back up and running?**

For example, if the building is damaged or destroyed, physical security of the building will be disrupted. Employees won't be able to just swipe their badge at the front door. Is this a critical business function or not? It depends. If the building is destroyed, it doesn't matter that they can't get into the building. You don't just need an alternate process, you need an alternate location. Once an alternate location is established, you need facilities support.

the critical business function, in this example, is having a place of business ("facilities"). Security and access are secondary. Notice how it helped to think of a specific scenario -- it focused our thinking so we could see the key areas. Is having a place of business a critical business function? Not in the formal definition of a business *process*, but it's certainly important. Security usually involves a process -- adding employees to access lists, providing employees with badges, IDs, or other identification, and granting them appropriate access to company

resources. This might be highly important during normal business functioning, but does it impact the company's mission-critical operations? It depends on your business. If you work in a secure research environment, facilities and security may be mission-critical. If you work in a software development firm where employees could check code out of an online library and work from home, facilities and security may not be mission-critical at all. Facilities and security, though, may have some critical business functions beyond these macro-level functions just mentioned. For example, is facilities involved with the receiving or shipping of products, inventory, or other tangible goods? If so, these may be critical business functions to be included.

B. Finance

By definition, the financial workings of the company are critical business functions, but not all financial functions are mission-critical functions. For example, tracking receivables and payables are critical business functions because without the ability to keep track of what others owe you and what you owe others, you have no idea about the financial status of the company.

Employee payroll is another critical business function (which is a financial transaction that might fall under the purview of the Human Resources department). If employees are not paid, if appropriate withholding and other taxes and deductions are not taken, your company faces serious problems, with employees and with state and federal authorities.

If your company has legal obligations to pay back a loan from a bank or make payments or reports to investors, these also might be critical business functions to be included in your analysis. In some cases, you may have some leeway with regard to repayment if you experience a natural disaster, but don't count on it. Your financiers don't care, they just want payments on time and in full. Therefore, keeping track of these kinds of financial and legal obligations may be considered critical business functions, depending on the nature of your company and its financing structure.

Accounting, finance, and reporting functions within finance should be reviewed and analyzed. There are many interdependencies in financial functions that cross over into HR, marketing, sales, IT, and operations. If key IT systems were to go down, which business processes would be

impacted? Which processes and functions would have to get back up and running first in order to keeps the business going?

C. Human Resources

If your firm experiences some sort of natural disaster, your Human Resources staff will be busy trying to fulfill a number of roles. Employees will usually contact HR for information on the status of the building, the status of the company, whether they should report to work, where they should report to work, and so on. Employees may also use HR as a clearing house for information about the well-being of other employees or information on the broader community.

Finally, employees will be looking to HR for information on how, when, and where they'll get paid. In fact, this will likely be the first question many employees ask, especially if the business disruption happens just prior to or on payday. The staff in HR will be in the best position to provide guidance on the kinds of issues for which employees come to them. From there, you can compile a list of critical business functions.

Activities

Dear learner! Remember, create a list of all business functions, and then prioritize them later.

1. If IT systems were to go down, which HR functions and processes are mission-critical?
2. How would they be accomplished in the absence of IT systems?
3. How would this impact other areas of the company?

D. IT

Critical business functions for IT? It seems like almost all of them are critical most of the time, especially if you judge by the phone calls, hallways pleas, and e-mails begging for assistance when one of the applications, servers, or hardware goes down. However, ultimately, the

hardware and software should support the critical business functions, so the IT functions, in large part, will be driven by all the other departments. HR might say "we have to have our payroll application"; marketing might say "without our CRM system, we can't sell any products"; manufacturing might say "without our automated inventory management system, we can't even begin to make anything."

Therefore, the IT department's critical business functions are driven externally, to a large degree. However, there are also business functions that occur within the IT department critical to the company's ability to recover and continue doing business after a disaster. For example, the IT department needs to create backups of all data that changes after a disaster. If a disaster happens on a Tuesday and you're able to get some systems back up and running by the following Monday, backups need to start on Monday, as soon as data begins being generated, saved, or changed. Therefore, backup processes can be viewed as critical business functions from the IT view.

E. Legal/Compliance

There are numerous mission-critical business functions related to legal and compliance areas of your company. If your firm is subject to legal or regulatory statutes and requirements, you're already well aware of these constraints. You need to view these constraints and requirements in light of a potential business outage to determine which of these are mission-critical, which are vital or important, and which are minor in nature.

For example, if your firm deals with private or confidential personal data, it must be protected at all times, even if you move to a manual system for the duration of a system outage. Which systems, then, should be recovered first? Which business processes are mission-critical? Those related to remaining in compliance, both in terms of business process and business data, should be ranked very high on your list. The legal and financial consequences, as discussed in the case study earlier in this book (see Case Study 1, "Legal Obligations Regarding Data Security") can be enormous.

F. Manufacturing (Assembly)

If your company is involved with the manufacturing, assembly, or production of tangible products, you obviously need to scour this area for mission-critical functions since your ability to

produce your products is the engine that drives your company. There may be some systems that can come online later, but there are likely to be certain systems that must be up and running in order for any manufacturing, assembly, or production to occur.

Identify these business processes and systems by understanding what would happen if the production equipment were to be damaged or destroyed. Next, understand what would happen if the production equipment was left in tact but upstream or downstream events impacted your customers or vendors.

The impact analysis needs to include both internal and external elements. What business processes should you put in place to deal with the potential loss of a key supplier? We'll look at risk mitigation strategies in detail in Chapter 5. For now, you should be identifying the potential impact of various business disruptions to your manufacturing operations, keeping both internal and external (upstream/downstream) disruptions in mind.

Activities

It's also important to understand the interaction between any manufacturing/assembly automation equipment and IT systems.

1. If IT systems go down, how is automation systems impacted?
2. If automation systems go down, how is IT systems impacted?
3. What manual processes can be implemented in the absence of either automation systems or associated IT systems?

G. Marketing and Sales

Marketing activities help create demand for the company's products and services by establishing or expanding knowledge of the company and its products/services. Sales activities are those actions that actually create a sales transaction and bring revenue into the company.

Some companies may determine that marketing activities in the aftermath of a business disruption can be put on hold while sales activities should be a top priority. Other companies may see marketing activities as mission-critical in the aftermath of a business disruption because they are businesses that need to stay in touch with customers, keep their products/services in front of customers, and cannot afford to let rumors and erroneous information about the company's status float around, especially in today's world of instant, on-demand news.

H. Operations

If your company doesn't manufacture, assemble, or produce tangible products, it probably develops and sells intangible products such as service, software development, research, analysis, and others. Whatever it is your company does, it sells something in order to generate revenue. Therefore, your operations are what end up generating those goods and services that are sold to customers.

As with manufacturing and assembly, operations are what generate sales and therefore are almost always part of the most urgent mission-critical business functions. Although "operations" is a rather broad and vague term, each company knows exactly what its operations are and how these operations contribute to revenue generation. It is within that scope of knowledge that these activities should be assessed for criticality.

I. Research and Development

Some companies or organizations are funded through investors, through grants, or operate as nonprofits. They may be dedicated solely to research and development and may not generate revenue in the traditional sense of the word. However, every organization needs funding and that funding almost always comes with some sort of expectations and requirements about what is to be achieved with that funding.

Case study

For example, if your organization does biochemical research and you're funded by federal or state programs, you still have business functions related to deliverables to consider. Is the next round of funding predicated upon the successful delivery of the results of current development or testing? If so, you have several mission-critical systems to consider along with assessing the impact of a business disruption to your research. Do you have live cultures growing in a lab that need to be tested and assessed? If so, what would happen if the research building was destroyed by fire or by an earthquake or tornado? How would your research be impacted and how would you recover? Though these are a bit different from traditional business functions and are not related directly to IT systems, these are questions that should be asked and answered if you're in this business.

J. Warehouse (Inventory, Order Fulfillment, Shipping, Receiving)

If your company deals in tangible goods of any kind, you have processes for handling inventory, order fulfillment, returns, shipping, and receiving. In some companies, these functions are handled by outside firms. For example, you may manufacture or assemble a product that is sent out daily on trucks to some other company that handles the remaining inventory processes.

Nonetheless, your company has to keep track of what it makes and what it ships out at minimum. So, there are two elements here, the actual manufacturing or assembly (covered earlier) and the tracking, storing, and moving of these products. These two functional areas are closely tied together and the interdependencies in these areas should be given special attention. If IT systems go down, how are these activities impacted? If the building is ravaged by fire or flood, how are these activities impacted?

2.1.2. Management Functions

It should be noted that the value of any information is derived from the actions that management takes as a result of using that information. It follows that information specialists need to know what type of tasks and functions management have to perform so that they are able to produce relevant and usable information.

The functions of management can be grouped into five areas: planning; decision making; organization and co-coordinating; leadership and motivation and control. Obviously, the emphasis given to each area varies from manager to manager and is especially dependent on the level of the manager in the organization.

There are clear differences in information requirements between a manager at the operational or transactional level, such as transport supervisor, and a manager at the tactical level, such as accounts or sales manager, or at the strategic level, such as managing director/board of directors. At the highest (strategic) level, structured, formal MIS may actually be counter-productive, for at these levels informal MIS and external influences become increasingly important.

Another factor which affects the tasks a manager has to perform, and hence his or her information requirements, is the extent of functional authority within an organization. Functional authority is that which is exercised by specialists, managers and staff throughout the various

departments and units of the organization. Possibly, the most common example of this is the personnel department which has functional responsibilities for many personnel and industrial relations activities throughout the whole organization. While each of the five functional areas which constitute the task of management needs relevant information, three particular areas – planning, decision making and control – make heavy demands on the organization's MIS.

Planning and decision making have rightly been called the primary management tasks and these tasks occur at every level of management, although naturally the type of planning and decision making will vary between the levels. Planning is the process of deciding in advance what is to be done and how it is to be done. The planning process results in plans which are predetermined courses of action that reflect organizational objectives and these plans are implemented by decisions and actions. Thus, effective planning and decision making are inextricably linked, for without decisions and actions, the planning process is a sterile exercise.

In order to provide appropriate information, MIS designers must be aware of the types of decisions at the various levels of the organization. A useful classification is that given by H.A. Simon who classified decision making into programmed and non-programmed. Programmed decisions are those that are routine and repetitive and where decision rules are known. Conversely, non-programmed decisions are novel and unstructured and the nature of the problem and decision rules are complex and little understood. It follows from these brief descriptions that radically different information and procedures are required for the different decision types, which have obvious implication for MIS design.

2.2. Data, Information, Knowledge and Wisdom

Activities

Dear student please distinguish the difference between each of the following key terms

a. Data
b. Information
c. Knowledge
d. Wisdom

Data has commonly been seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it.

There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge.

Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge.

Data

1: factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation <the data is plentiful and easily available.>

2: information output by a sensing device or organ that includes both useful and irrelevant or redundant information and must be processed to be meaningful.

It is raw. It simply exists and has no significance beyond its existence (in and of itself). It can exist in any form, usable or not. It does not have meaning of itself. In computer parlance, a spreadsheet generally starts out by holding data.

Information

(1): knowledge obtained from investigation, study, or instruction (2): intelligence, news

(3): facts, data.

It is data that has been given meaning by way of relational connection.

This "meaning" can be useful, but does not have to be. In computer parlance, a relational database makes information from the data stored within it.

Knowledge

: The range of one's information.

It is the appropriate collection of information, such that it's intent is to be useful. Knowledge is a deterministic process. When someone "memorizes" information (as less-aspiring test-bound students often do), then they have amassed knowledge. This knowledge has useful meaning to them, but it does not provide for, in and of itself, an integration such as would infer further knowledge. For example, elementary school children memorize, or amass knowledge of, the "times table". They can tell you that "2 x 2 = 4" because they have amassed that knowledge (it being included in the times table). But when asked what is "1267 x 300", they can not respond

correctly because that entry is not in their times table. To correctly answer such a question requires a true cognitive and analytical ability that is only encompassed in the next level... understanding. In computer parlance, most of the applications we use (modeling, simulation, etc.) exercise some type of stored knowledge.

Understanding

It is an interpolative and probabilistic process. It is cognitive and analytical. It is the process by which I can take knowledge and synthesize new knowledge from the previously held knowledge. The difference between understanding and knowledge is the difference between "learning" and "memorizing". People who have understanding can undertake useful actions because they can synthesize new knowledge, or in some cases, at least new information, from what is previously known (and understood). That is, understanding can build upon currently held information, knowledge and understanding itself. In computer parlance, AI systems possess understanding in the sense that they are able to synthesize new knowledge from previously stored information and knowledge.

Wisdom

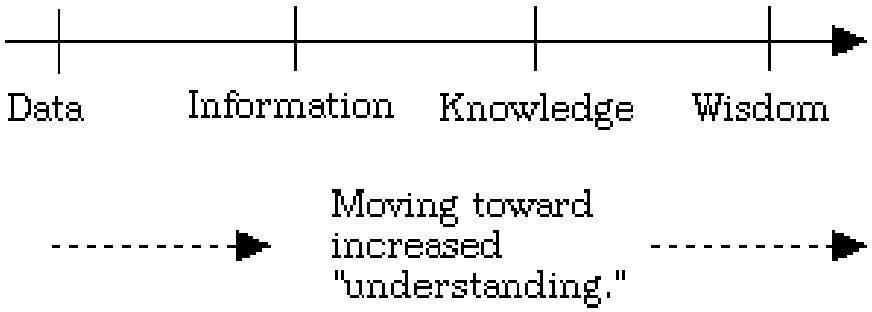
1 accumulated philosophic or scientific learning: Knowledge.

2. Wise attitude or course of action.

It is an extrapolative and nondeterministic, non-probabilistic process. It calls upon all the previous levels of consciousness, and specifically upon special types of human programming (moral, ethical codes, etc.). It beckons to give us understanding about which there has previously been no understanding, and in doing so, goes far beyond understanding itself. It is the essence of philosophical probing. Unlike the previous four levels, it asks questions to which there is no (easily achievable) answer, and in some cases, to which there can be no humanly-known answers period.

Wisdom is therefore, the process by which we also discern, or judge, between right and wrong, good and bad. I personally believe that computers do not have, and will never have the ability to posses' wisdom. Wisdom is a uniquely human state, or as I see it, wisdom requires one to have a soul, for it resides as much in the heart as in the mind. And a soul is something machines will never possess (or perhaps I should reword that to say, a soul is something that, in general, will never possess a machine).

It has been contended that the sequence is a bit less involved than described by Ackoff. The following figure represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next. Understanding is not a separate level of its own.



2.3. The Information Needs and Sources of Managers

In any organization, managers and staff working at different levels and performing different roles have a variety of information needs, and they use the information in various ways. We live in a world of information. Every day potential readers are presented with a multitude of books, journals and newspapers. However, human capacity is limited and we can absorb only a tiny amount of all this information. There are no clear procedures to help us to identify all information of interest quickly.

Information needs refer to the information required to take decisions correctly and to carry out the tasks deriving from them. Three large sets of information needs are associated with the three stages in the strategic management process:

A strategic diagnosis should be undertaken when a strategy is drawn up; in other words, an internal analysis and an environmental analysis – both general and specific – must be carried out. Information is an essential element in this strategic diagnosis stage.

Information is needed on the main strategic environmental factors: cultural, financial, political, competition, technological. This information should attend to the evolution of these factors, as well as their present state.

An internal analysis requires information generated by the company itself as a result of its activity. This information can be classified according to the *company's functions, namely*, *marketing, production, finance, human resources, R&D and management*.

Each member of the company involved in implementing the strategy must be aware of his or her particular responsibility, and must receive information on the tasks he or she has to perform – and how to perform them – in order for the strategy and its component plans to be effectuated. In other words, those responsible for accomplishing these actions need information about what they have to do and how to do it. This information is usually passed down from higher to lower levels.

Strategy control; efficient control requires knowledge on the outcomes of the actions undertaken to effectuate the plans, and how the different environmental components are evolving, in order to verify whether the strategy is developing appropriately and whether any changes are influencing its viability.

Some of the information used to draw up the strategy will also be required in the control stage in order to compare the strategy targets with the results being obtained. Information on the results of implementing the plans will also be needed at this stage. This information must be delivered at the right time so that when any deviations are detected in the control, opportune measures can be taken to correct them and achieve the target sets.

We can therefore consider three sets of information needs in the management process, each one of which will require different information and will be obtained in different ways.

It is extremely important to restrict the information to what is actually needed, as there is a risk of information excess, and everything that goes beyond the strictly necessity impoverishes rather than enriches the system, since it affects the cost of obtaining information. Information economics aims to determine the optimum amount of information for a specific problem, based on comparing the marginal cost of the information and the value of the sample or additional information. We know what type of information we want to obtain; we now examine the sources of information that can be used to obtain it.

Information systems can be grouped into two distinct types: operations support systems and management support systems. Operations support systems handle the routine day-to-day

information processing needs of the organization, while management support systems assist managers in decision making.

Managers use information systems to help them make decisions to run the organization. Much of the information is captured by operational systems or transaction processing systems (TPS), but the information is not in a form most useful to management.

Management information and support systems are designed to assist management in the decision-making process, and thus contribute to the goals of the organization and the value-added processes that support those goals.

Before you study the types and levels of management support systems, you need to understand the decision making and problem-solving process.

Decision Making As a Component of Problem Solving

Problem-solving abilities often separate the most valuable managers and executives from the mediocre or poor managers in terms of their contribution to the organization. The problem-solving model comprises five stages:

1. **Intelligence stage:** A problem or opportunity is identified and information gathered to refine the scope, resources, and constraints.
2. **Design stage:** Possible solutions are developed and the feasibility of each evaluated.
3. **Choice stage:** The most appropriate solution is selected. The decision is made.
4. **Implementation stage:** The problem is not solved until the selected solution has been implemented.
5. **Monitoring stage:** In this final stage, the decision makers assess how well the solution fits the problem and what modifications may be necessary to improve it.

Notice how the systems development life cycle (SDLC) follows the stages of the problem-solving approach. This is because information systems are developed to meet the goals and objectives of the organization, to solve problems, and to take advantage of opportunities, and these objectives are identical to the purpose of management problem solving.

Levels of Decision Making

Another way to look at management is in terms of the levels at which decisions are made.

- **Operational decisions**

Lower-level managers oversee the day-to-day operations, making routine **operational decisions.** For example, extending credit to customers and restocking inventory items from an alternative supplier. Many traditional transaction processing systems (TPS) are designed for this level of management. Most accounting systems, inventory control systems, and payroll systems perform this function. For instance, when you run Accpac Sage ERP to keep track of transactions and generate financial statements, the program serves as an operations support system to handle the routine operations of the business.

- **Tactical decisions**

Middle-level managers, concerned with meeting short-term objectives, make **tactical decisions**. Most of the information and decision frameworks at this level of management are reasonably well structured. Examples of such management activities include reviewing back orders for inventory items, examining detailed expense schedules to track expenditures, or comparing actual sales to budget.

MIS extends beyond the routine handling of operational information; it also provides a variety of reports to assist managers in making tactical decisions.

- **Strategic decisions**

Top-level managers or executives are particularly concerned with **strategic decisions**. Reports from MIS form only part of the total information requirements of senior management. Many of the issues dealt with at this level are semi-structured or unstructured and cannot be automated. Nevertheless, DSS and ESS are computer based tools that top-level management can use in their strategic planning and decision making.

2.4. Information Systems Framework

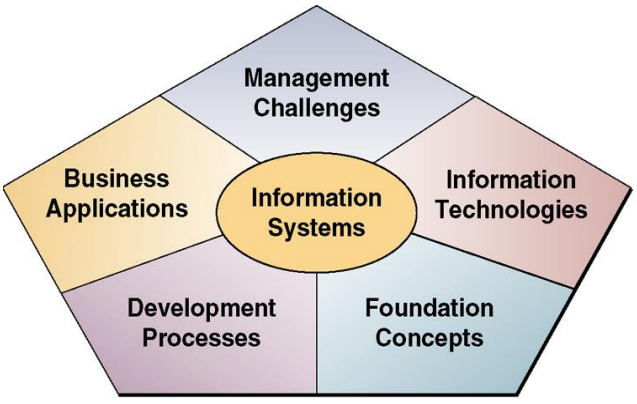


Figure 2.1: Information Systems Framework

Foundation concepts: The managerial end user needs to have knowledge of the generic components and properties of information systems, which requires an understanding of some basic concepts in general systems theory and information processing.

Development processes: How should managerial end users or information specialists develop information systems solutions to business problems? To answer this question, you should learn some basic problem solving and developmental concepts. One should understand how methodologies such as the systems approach, the systems development life cycle, and prototyping could be used to construct information systems applications that successfully meet end user and organizational needs.

Information Technology: In this area, they should have an understanding of major concepts, developments, and management issues in information technology, i.e. Hardware, Software, Telecommunications and Database management

Business Applications: They should gain a basic understanding of information systems concepts and applications in areas such as end user computing, office automation, transaction processing, information reporting, decision support, executive support and artificial intelligence.

Management challenges: This area requires understanding the major challenges and methods involved in managing the resources, technologies, and activities of information systems. More specifically, we should understand concepts such as information resource management and information systems planning, implementation, and control.

2.5. Business Systems

A business firm is an open, adaptive organizational system operating in a business environment. A business consists of the following interrelated system components:

- **Input:** Economic resources such as people, money, material, machines, land, facilities, energy, and information are acquired by a business from its environment and used in its system activities.
- **Processing:** Organizational Processes such as marketing, manufacturing, and finance transform input into output.

- **Output:** goods and services, payments to employees and suppliers, dividends, taxes, and information are all outputs produced by a business and exchanged with or transferred to its environment.
- **Feedback:** A primary role of information systems is serving as the feedback component of an organizational system. They provide information to management concerning the performance of the organization.
- **Control:** management is the control component of an organizational system.
  - ✓ Managers control the operations of a business so that its performance meets organizational goals such as profitability, market share, and social responsibility.
  - ✓ Feedback about organizational performance is compared to standards of performance established by management. Management then makes decisions to adjust performance to meet organizational goals.

2.5.1. The Fundamental Roles of IS in Business

Although there are a seemingly endless number of software applications, there are three fundamental reasons for all business applications of information technology. They are found in the three vital roles that information systems can perform for a business enterprise:

- Support of business processes and operations.
- Support of decision making by employees and managers.
- Support of strategies for competitive advantage.

IS illustrates how the fundamental roles interact in a typical organization. At any moment, information systems designed to support business processes and operations may also be providing data to, or accepting data from, systems focused on business decision making or achieving competitive advantage. The same is true for the other two fundamental roles of IS. Today's organizations are constantly striving to achieve integration of their systems to allow information to flow freely through them, which adds even greater flexibility and business support than any of the individual system roles could provide.

Let's look at a typical retail store as a **good example** of how these roles of IS in business can be implemented.

Support of Business Processes and Operations: - As a consumer, you regularly encounter information systems that support the business processes and operations at the many retail stores where you shop. For example, most retail stores now use computer-based information systems to help their employees record customer purchases, keep track of inventory, pay employees, buy new merchandise, and evaluate sales trends. Store operations would grind to a halt without the support of such information systems.

Support of Business Decision Making: - Information systems also help store managers and other business professionals make better decisions. For example, decisions about what lines of merchandise need to be added or discontinued and what kind of investments they require are typically made after an analysis provided by computer-based information systems. This function not only supports the decision making of store managers, buyers, and others, but also helps them look for ways to gain an advantage over other retailers in the competition for customers.

Support of Strategies for Competitive Advantage: - Gaining a strategic advantage over competitors requires the innovative application of information technologies. For example, store management might make a decision to install touch-screen kiosks in all stores, with links to the e-commerce Web site for online shopping. This offering might attract new customers and build customer loyalty because of the ease of shopping and buying merchandise provided by such information systems. Thus, strategic information systems can help provide products and services that give a business a comparative advantage over its competitors.

Business has three dimensions of a meaning

- ✓ Business as a commerce is the process that people produce, exchange and trade goods and services.
- ✓ Business as an occupation is the acquired set of specialized skills and abilities that allows people to create valuable goods and services.
- ✓ Business as an organization is the system of task and authority relationship that coordinates and controls the interactions between people so that they work toward a common goal.

2.5.2. E-business

Electronic business (e-business): All electronically mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes.

The Role of e-Business in Business

The Internet and related technologies and applications have changed the ways businesses operate and people work, as well as how information systems support business processes, decision making, and competitive advantage. Thus, many businesses today are using Internet technologies to Web-enable their business processes and create innovative e-business applications.

We define e-business as the use of Internet technologies to work and empower business processes, e-commerce, and enterprise collaboration within a company and with its customers, suppliers, and other business stakeholders. In essence, e-business can be more generally considered an *online exchange of value*. Any online exchange of information, money, resources, services, or any combination thereof falls under the e-business umbrella. The Internet and Internet-like networks those inside the enterprise (intranet) and between an enterprise and its trading partners (extranet) have become the primary information technology infrastructure that supports the e-business applications of many companies. These companies rely on e-business applications to

(1) Reengineer internal business processes,

(2) Implement e-commerce systems with their customers and suppliers, and

(3) Promote enterprise collaboration among business teams and workgroups.

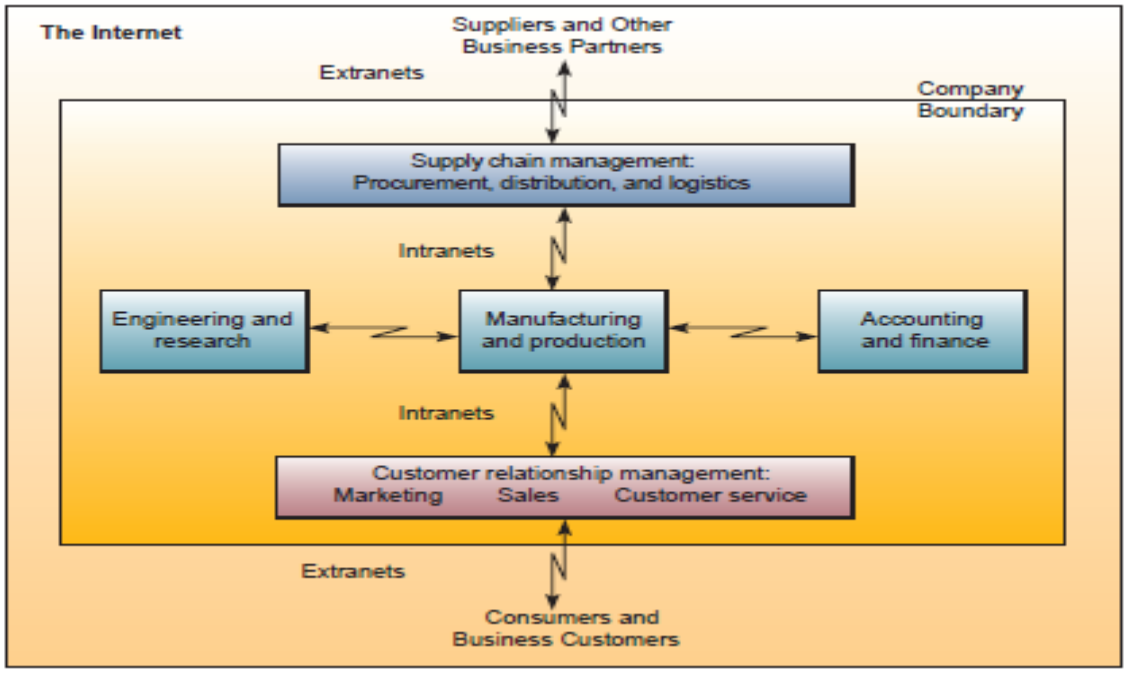


Figure 2.2: Businesses today depend on the Internet, intranets

Enterprise resource planning applications (ERP) software: Provides functions for managing business areas such as production, distribution, sales, finance and human resources management.

- ERP is the technological backbone of e-business, an enterprise wide transaction framework with links into sales order processing, inventory management and control, production and distribution planning, and finance.
- Enterprise resource planning is a cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company. For example, ERP software for a manufacturing company will typically process the data from and track the status of sales, inventory, shipping, and invoicing, as well as forecast raw material and human resource requirements. Figure 8.8 presents the major application components of an ERP system. Figure 8.9 illustrates some of the key cross-functional business processes and supplier and customer information flows supported by ERP systems.
- ERP gives a company an integrated real-time view of its core business processes, such as production, order processing, and inventory management, tied together by the ERP application software and a common database maintained by a database management system.
- ERP systems track business resources (such as cash, raw materials, and production capacity), and the status of commitments made by the business (such as customer orders, purchase orders, and employee payroll), no matter which department (manufacturing, purchasing, sales, accounting, and so on) has entered the data into the system.
- ERP software suites typically consist of integrated modules of manufacturing, distribution, sales, accounting, and human resource applications. Examples of manufacturing processes supported are material requirements planning, production planning, and capacity planning. Some of the sales and marketing processes supported by ERP are sales analysis, sales planning, and pricing analysis, while typical distribution applications include order management, purchasing, and logistics planning. ERP systems support many vital human resource processes, from personnel requirements planning to salary and benefits administration, and accomplish most required financial recordkeeping and managerial accounting applications. Figure 2.3 illustrates the processes supported by the ERP system that the Colgate-Palmolive Company installed. Let’s take a closer look at Colgate’s experience with ERP.

Figure 2.3: The major application components of enterprise resource planning.

Example modules:

–Sales & Distribution (SD)

–Financials (FI)

–Controlling (CO)

–Materials Management (MM)

–Project System (PS)

–Time Sheet (CATS)

–Payroll

–Human Resources (HR)

–Asset Accounting (AA).

Benefits and Challenges of ERP

Quality and efficiency: - ERP creates a framework for integrating and improving a company's internal business processes those results in significant improvements in the quality and efficiency of customer service, production, and distribution.

Decreased costs: - Many companies report significant reductions in transaction processing costs and hardware, software, and IT support staff compared to the nonintegrated legacy systems that were replaced by their new ERP systems.

Decision support: - ERP provides vital cross-functional information on business performance to managers quickly to significantly improve their ability to make better decisions in a timely manner across the entire business enterprise.

Enterprise agility: - Implementing ERP systems breaks down many former departmental and functional walls or "silos" of business processes, information systems, and information

resources. This results in more flexible organizational structures, managerial responsibilities, and work roles, and therefore a more agile and adaptive organization and workforce that can more easily capitalize on new business opportunities.

The Costs of ERP

An ERP implementation is like the corporate equivalent of a brain transplant. We pulled the plug on every company application and moved to PeopleSoft software. The risk was certainly disruption of business because if you do not do ERP properly, you can kill your company, guaranteed.

Summary

The MIS relies heavily on the hardware and software capacity of the computer and its ability to process, retrieve communicate with no serious limitations. The ability of the hardware to store data and process it at a very fast rate helps to deal with the data volumes, its storage and access effectively and the software, an integral part of a computer system, further enhances the hardware capability. It is available to handle the procedural and nonprocedural data processing.

The ability of the computer to sort and merge helps to organize the data in a particular manner and process it for complex lengthy computations. Since the computer is capable of digital, graphic, word image, voice and text processing, it is exploited to generate information and present it in the form which is easy to understand for the information user.

The ability of a computer system to provide security of data brings a confidence in the management in the storage of data on a magnetic media in an impersonal mode. It provides an access to the selected information through a password and layered access facilities. Therefore, the application of the management principles and practices in today's complex business world is possible only when the MIS is based on computer system support.

The main business functions are; facilities and security, finance, human resources, it, legal/compliance, manufacturing (assembly), marketing and sales, operations, research and development, warehouse (inventory, order fulfillment, shipping, receiving)and on the other hand the five major areas of management functions are planning, decision making, organization and coordinating, leadership and motivation and control.

Information needs refer to the information required to take decisions correctly and to carry out the tasks deriving from them. Three large sets of information needs are associated with the three stages in the strategic management process: strategic diagnosis, implementing the strategy and Strategy control. The two main types of information systems are operations support systems and management support systems.

Information systems framework includes; foundation concepts, development processes, information technology, business applications and management challenges.

The main Roles of IS in Business includes; Support of business processes and operations, Support of decision making by employees and managers and Support of strategies for competitive advantage.

The major Benefits of ERP includes;

- Quality and efficiency
- Decreased costs
- Decision support
- Enterprise agility and also ERP has its own cost, the cost is disruption of business because if you do not do ERP properly, you can kill your company, guaranteed. ,

Self Test Questions

Multiple Choices

1. *A cross-functional enterprise system driven by an integrated suite of software modules that supports the basic internal business processes of a company.*

- ***A.*** *Enterprise resource planning*
- ***B.*** *Marketing information system*
- ***C.*** *Human resource planning*
- ***D.*** *Accounting information system*

2. *One of the following is not true about the roles of IS in business.*

- ***A.*** *Support of business processes and operations.*
- ***B.*** *Support of decision making by employees and managers.*
- ***C.*** *Support of strategies for competitive advantage.*
- ***D.*** *None of the above.*

3. *All electronically mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes is;*

- ***A.*** *Electronic commerce*
- ***B.*** *Project system*
- ***C.*** *Electronic business*
- ***D.*** *All of the above*

4. *_____is a component of business system which deals with economic resources such as people, money, material, machines, etc.*

A. *Feedback*
C. *Processing*
B. *Input*
D. *Output*

5. *It is an extrapolative and nondeterministic, non-probabilistic process.*

A. Wisdom
B. Understanding
C. Knowledge
D. Information

Say True/False

1. *Information needs refer to the information required to take decisions correctly and to carry out the tasks deriving from them.*

2. *The ability of the computer is to sort and merge helps to organize the data in a particular manner and process it for complex lengthy computations.*

3. *Data is the process by which you can take knowledge and synthesize new knowledge from the previously held knowledge.*

4. *ERP gives a company an integrated real-time view of its core business processes, such as production, order processing, and inventory management.*

5. *Intelligence stage is the problem-solving model stage in which a problem or opportunity is identified and information gathered to refine the scope, resources, and constraints.*

CHAPTER THREE:

INFORMATION TECHNOLOGY

Chapter Objectives

At the end of this chapter, students will be able to:

- Understand the concept of IT
- Explain the main concepts (hardware programs)
- Describe the communication technologies
- Explain the database management concepts

3.1. INTRODUCTION

Information Technology (IT) in its broadest sense encompasses all aspects of computing technology. IT, as an academic discipline, is concerned with issues related to **advocating for users** and meeting their needs within an organizational and societal context through the **selection, creation, application, integration and administration** of computing technologies.

"Information technology is a label that has two meanings. In the broadest sense, the term information technology is often used to refer to all of computing. In academia, it refers to undergraduate degree programs that prepare students to meet the computer technology needs of business, government, healthcare, schools, and other kinds of organizations.

. IT is a new and rapidly growing field that started as a grassroots response to the practical, everyday needs of business and other organizations. Today, organizations of every kind are dependent on information technology. They need to have appropriate systems in place. These systems must work properly, be secure, and be upgraded, maintained, and replaced as appropriate.

3.2. The Computer System

3.2.1. Computer Hardware

Activities

Dear learner please indicate then discuses about the components of computer hardware with their application

The hardware of a computer system consists of primary storage, central processing unit, Input devices, secondary storage devices, output devices, buses, and communication devices. The **central processing unit** manipulates raw data into a more useful form and controls the other parts of the computer system.

Primary storage temporarily stores data and program instructions during processing, while **secondary storage** devices (magnetic and optical disks, magnetic tape) store data and programs when they are not being used in processing. **Input devices**, such as keyboards or the computer "mouse", convert data and instructions into electronic form for input into the computer. **Output devices**, such as printer, video display terminals, convert electronic data produced by the computer system and display it in a form that people can understand. **Communication devices** provide connections between the computer and communication networks. **Buses** are path for transmitting data and signals between the various parts of the computer system.

3.2.1. Primary Storage

Primary storage has three functions. It stores all or part of the program that is being executed. Primary storage also stores the operation systems programs that manage the operation of the computer. Finally, the primary storage area holds data that are being used by the program. Data and program are placed in primary storage before processing, between processing steps, and after processing has ended, prior to being returned to secondary storage or released as output. Internal primary storage is often called RAM, or Random Access Memory. It is called RAM because it can directly access any randomly chosen location in the same amount of time.

Most of the information used by a computer application is stored on secondary storage devices such as disks, and tapes, located outside the primary storage area. In order for the computer to do work on information, information must be transferred into primary memory for processing. Therefore, data are continually being read into and written out of the primary storage area during the execution of program .Primary storage is actually composed of semi conductors. A semi conductor is an integrated circuit made by printing thousands and even millions of tiny transactions on a small silicon chip. There are several different kinds of semi conductor memory used in primary storage,

Activities

Discuses about the difference between the following key terms

- Primary Storage and Secondary Storage
- RAM and ROM
- Output devices and Input devices
- Buses and Communication devices

RAM, or random access memory, is used for short term storage of data or program instructions. RAM is volatile: its contents will be lost when the computer's electric supply is disrupted by a power outage or when the computer is turned off.

ROM, or Read Only Memory, can be only be read from. It cannot be written to. ROM chips come from the manufacturer with programs already "burned in" or stored. ROM is used in general-purpose computers to store important or frequently used programs (such as computing routines for calculating the square root of numbers).

3.2.2. Central Processing Unit (CPU)

The central processing unit (CPU) is the part of the computer system where the manipulation of symbols, numbers, and letter occurs, and it controls the other parts of the computer system.
The CPU consists of central unit and an arithmetic logical unit. Located near the CPU is primary storage (sometimes called primary memory or main memory) where data and program instructions are stored temporarily during processing. Three kinds of buses link the CPU, primary storage, and the other devices in the computer system. The data bus moves data to and from primary storage. The control bus transmits signals specifying whether to "read" or "write" data to or from a given primary storage address, input device, or output device.

Activity

Compare How is a computer’s central processing unit (CPU) similar to the human brain?

1. Arithmetic and Logical Unit

The arithmetic logical unit (ALU) performs the principal logical and arithmetic operations of the computer. It adds, subtracts, multiplies, and divides, determining whether a number is positive, negative, or zero. In addition to performing arithmetic function and ALU must be able to determine when are quantity is greater than or less than another and when two quantities are equal. The ALU can perform logical operations on the binary codes for letters as well as numbers.

2. Control Unit

The control unit coordinates and control the other parts of the computer system. It reads a stored program, one instruction at a time, and directs other components of the computer system to perform the tasks required by the program. The services of operations required to process a single machine instruction is called the machine cycle.

The machine cycle has two parts: an instruction cycle and an execution cycle. During the instruction cycle, the control unit retrieves are program instruction from primary storage and decodes it. It places the part of the instruction telling the ALU what to do next in a special instruction register and places the part specifying the address of the data to be used in the operation into an address register.

During the execution cycle, the control unit locates the required data in primary storage, places it in a storage register, instructs the ALU to perform the desired operation, temporary stores the result of the operation in the accumulator, and finally places the result into primary memory. As the execution of each instruction is completed, the control unit advances to and reads the next instruction of the program.

3.2.3. Input Devices

1. Keyboard

Keyboard is the most common input device. Depending on the number of function keys, keyboard can be categorized as a standard or enhanced. Standard keyboards have 10 function keys while the enhanced keyboards have 12 function keys.

2. The computer mouse

The "point and click" actions of the computer mouse have made it an increasingly popular alternative to keyboard and text-based commands. A mouse is a hand held device that is usually connected to computer by a cable. The computer user moves the mouse around on a desktop to control the position of the curser on a video display screen. Once the cursor is in the desired position, the user can push a button on the mouse to select a command. The mouse can also be used to "draw" images on the screen.

3. Touch Screens

Touch screens are easy to use and are appealing to people who cannot use traditional keyboards. Users can enter limited amounts of data by touching the surface of a sensitized video display monitor with a finger or a pointer. With colorful graphics, sound, and simple menus, touch screen allow the user to make selections by touching specified parts of the screen.

4. Source data automation

Source data automation captures data in computer readable form at the time and place they are created. Point of sale systems, optical bar code scanners used in supermarkets, and other optical character recognition device are examples of source data automation. One of the advantages of source data automation is that the many errors that occur when people use keyboards to enter data are almost eliminated. The principal source data automation technologies are magnetic ink character recognition, optical character recognition, pen based input, digital scanner, voice input, and sensors.

- ***Magnetic ink character recognition (MICR)***

This technology is used primarily in cheque processing for the banking industry. The bottom portion of a typical cheque contains characters that are pre printed using a special ink.

A MICR reader translates the characters on cherubs that have been cashed and sent to the bank for processing into digital form for the computer. The amount of the cheque, which is written in ordinary ink, must be keyed in by hand.

- ***Optical character recognition (OCR)***

This device translates specially designed marks, characters, and codes into digital form. The most widely used optical code is the bar code, which is used as a point of sale systems in supermarkets and retail stores.

- **Pen based inputs**

Handwriting recognition devices such as pen-based "tablets" and "notebooks" are promising new input technologies, especially for people working in the sales or service areas or for those who have traditionally shunned computer key boards. These pen based input devices usually consist of a flat screen display tablet and a pen like stylus. With pen-based input, users print directly on to the tablet sized screen. The screen is fitted with a transparent grid of five wires that detects the presence of the special stylus, which emits a faint signal from its tip. The screen can also interpret tapping and flicking gestures made with the stylus. Pen based input devices transform the letters and numbers written by users on the tablet into digital form, where they can be stored, or processed and analyzed.

- **Digital scanners**

Digital scanners translate images such as pictures or documents into digital form, and are an essential component of image processing system.

- **Voice input devices**

Voice input devices converts' spoken word into digital form. Voice recognition software compares the electrical patterns produced by the speaker's voice to a set of pre recorded patterns. If the patterns match, the input is accepted. Most voice system still has limited "vocabularies" of several hundred to several thousand words and can accept only very simple commands.

- **Sensors**

Sensors are devices that collect data directly from the environment for input into a computer system. The sensors continuously measure emission and are linked to micro computers which send the data collected by the sensors to the central computer for analysis.

3.2.4. Output devices

The major data output devices are cathode ray tube (CRT) terminals (sometimes called video display terminals, or VDTs, and printers.

1. CRT

The CRT is probably the most popular form of information output in modern computer system. It works much like a television picture tube, with an electronic "gun" shouting a beam of electrons to illuminate the pixels on the screen. The more pixels for screen, the higher the resolution. CRT

monitor can be classified as monochrome or color and by their display capabilities. Some display only text, whereas others display both text and graphics. Typical CRT display 80 column and 24 lines of text data. Display devices for graphics often utilize bit mapping. Bit mapping allows each pixel on the screen to be addressed and manipulated by the computer. This requires more computer memory but permits finer detail and the ability to produce any kind of image on the display screen.

2. **Printers**

Printers produce a printed hard copy of information output. They include impact printers (a standard typewriter or a dot matrix) and non-impact printers (laser, inkjet, and thermal transfer printers). Most printers print one character at a time, but some commercial printers print an entire line or page at a time. Impact printers are slower than non-impact printers. Laser printers for micro computers can print 4 to 8 pages per minute. Laser printers in large computers center can print over 100 pages per minute.

3. Other devices

Microfilm and micro fiche have been used to compactly store output as microscopic filmed images, and they are mainly used by insurance companies or other firms that need to output and store large number of documents.

4. Plotters

Plotters are output device using multicolored pens to draw high quality graphic documents. Plotters are much slower than printers, but are useful for outputting large size charts, maps or drawings.

5. Voice output device

A voice output device converts digital output data back into intelligible speech, sounds are prerecorded, coded, and stored on disk, to be translated back as spoken words. For instance, when you call for information on the telephone, you may hear a computer "voice" respond with the telephone number you requested.

3.2.5. Secondary storage

Magnetic tape

Magnetic tape is an older device that is still important for secondary storage of large volume of information. It is used primarily in manufacture batch application and for archiving data.

1. **Magnetic Disk**

The most widely used secondary storage medium today is magnetic disk. There are two types of magnetic disks: floppy disks and hard disks. Hard disks are thin steel plates with an iron oxide coating. In large systems, multiple hard disks are mounted together on a vertical shaft. Here the read write head (disk and drive) are sealed together. That is why these devices sometimes are called hard drives. A hard disk is found in the system unit. It is not removable.

2. ***Floppy disks***

Floppy disks are a removable magnetic disks primarily used with microcomputers. The two most common standard sizes are 3.5 inch and 5.25 inch disks that are made up of polyester film with magnetic coating.

4. ***Optical Disks***

Optical disks, also called compact disks or laser optical disks, stores data at densities many times greater than those of magnetic disks and are available for both micro computers and large computers. Data are recorded on optical disks when a laser device burns microscopic pits in the reflective layer of a spiral track. Binary information is encoded by the length of these pits and the space between them.

Optical disks can thus store massive quantities of data, including not only text but also pictures, sound, and full motion video, in a highly compact form. The optical disk is read by having a low power laser beam from an optical head scan the disk.

3.2.5. Other Devices

In addition to the main hardware components, we have a number of parts of a computer that are not mentioned. To state some of them:

1. ***Motherboard***

It is the main board containing the CPU, RAM, ROM and additionally different expansion slots.

2. ***Power Supply***

Electrical power is needed almost for every components of the PC. And the components will get their need from the power supply which is found inside the system unit.

3. ***Bus***

A bus is simply an electronic pathway between the CPU and other devices. It can transmit electronic information (in fact composed of bits) between devices.

4. ***Port***

A port is a socket at the back of the system unit which can be used to plug a cable from peripheral devices like monitors, keyboards etc.

3.3. COMPUTER SOFTWARE

Activities

1. What are the difference between computer are hardware and computer software?
2. List and discuses about the component of the two main computer system which are hardware and software computer system
3. Where the compute, each hardware and software are applied

Software is a detailed instruction that control the operations of a computer system. Without software, computer hardware could not perform the task we associate with computers. A software program is a series of statements or instructions to the computer. The process of writing or coding programs is termed programming and individuals who specialize in this task are called programmers. The stored program concept means that a program must be stored in the computer's primary storage along with the required data in order to execute, or have its instructions performed by the computer. Once the program has finished executing, the computer hardware can be used for another task when a new program is loaded into memory.

3.3.1. Types of software

There are two types of software: systems software and application software.

1. **Operating System Software:** System software is a set of generalized programs that manage the resources of the computer, such as the central processor, communications links, and peripheral devices. Programmers who write system software are called system programmers.

2. **Application software:** describes the programs that are written for or by users to apply the computer to a specific task. Application software is primarily concerned with accomplishing the tasks of end users. Many different programming languages can be used to develop application software. Software for processing an order or generating a mailing list is application software. Programmers who write Application software are called application programmers. The types of software are interrelated and can be thought of as a set of nested boxes, each of which must interact closely with the other boxes surrounding it. The system software surrounds and controls access to the hardware. Application software must work through the system software in order to operate. End users work primarily with application software.

Each type of software must be specially designed to a specific machine in order to ensure its compatibility. System software coordinates the various parts of the computer system and mediates between application software and computer hardware.

Types of system software

The system software that manages and controls the activities of the compute is called **operating system**. Other system software consists of **computer language translation programs** that convert programming languages into machine language and **utility program** that perform common processing tasks. Operating system is the system software that manages and controls the activities of the computer.

One way to look at the operating system is as the system's chief manager. Operating system software decides which computer resources will be used, which programs will be run, and the order in which activities will take place. An operating system performs three functions. It

allocates and assigns system resources. It schedules the use of computer resources and computer jobs; and it monitors computer system activities.

3.4. DATABASE MANAGEMENT SYSTEM (DBMS)

A group of related files make up a **database**. A **database management system** (DBMS) is simply the software that permits an organization, to centralize data, manage them efficiently, and provide access to the stored data by application programs.

The DBMs acts as an interface between application programs and the physical data files. When the application program calls for data item such as gross pay, the DBMs finds this item in the database and presents it to the application program. Using traditional data files, the programmer would have to define the data and then tell the computer when they are.

A collection of programs (SWs) that enables you to enter, organize, select data, and Retrieve information from database easily. A *Database Management System (DBMS)* is **a software package** designed to store and **manages databases.**

A database management system has three components:

1. A data definition language
2. A data manipulation language
3. A data directory

1. ***Data definition language:*** the data definition language is the formal language used by programmers to structure of the database. The data definition language defines each data element as it appears in the database before that data element is translated into the forms required by the application programs.

2. ***Data manipulation language:*** most DBMs have a specialized language called a data manipulation language that is used in conjunction with some conventional third or fourth generation programming languages to manipulate the data in the database. This language contains commands that permit end users and programming specialists to extracts data from the database to satisfy information requests and develop applications. The most prominent data manipulation language today is SQL, or structured Query language.

3. ***Data dictionary:*** the third element of DBMs is a data dictionary. This is an automated or manual file that stores definitions of data elements and data characteristics such as usage, physical representation, ownership (who in the organization is responsible for maintaining the data), authorization, and security. Many data dictionaries can produce lists and reports of data utilization, groupings, program locations, and so on.

Advantages of Database Management System

The advantages of a DBMS are as follows:

- Complexity of the organization's information system environment can be reduced by central management of data, access, utilization, and security
- Data redundancy and inconsistency can be reduced by eliminating all of the isolated files in which the same data elements are repeated
- Data confusion can be eliminated by providing central control of data creation and definitions
- Program data dependence can be reduced by separating the logical view of data from its physical arrangement
- Program development and maintenance costs can be radically reduced
- Flexibility of information systems can be greatly enhanced/by permitting rapid and inexpensive ad hoc queries of very large pools of information
- Access and availability of information can be increased

Activities

1. Discuses about Problems with the traditional file processing (files maintained separately by different departments)
2. What happened in the department if there is no proper data base management ?

3.5. Telecommunication and network

When computers are networked, two industries—computing and communications— converge, and the result is vastly more than the sum of the parts. Suddenly, computing applications become available for business-to-business coordination and commerce, and for small as well as large organizations. The global Internet creates a public place without geographic boundaries—

cyberspaces—where Ordinary citizens can interact, publish their ideas, and engage in the purchase of goods and services. In short, the impact of both computing And communications on our society and organizational structures is greatly magnified.

Telecommunications and network technologies are internetworking and revolutionizing business and society. Businesses have become networked enterprises. The Internet, the Web, and intranets and extranets are networking business processes and employees together and connecting them to their customers, suppliers, and other business stakeholders. Companies and workgroups can thus collaborate more creatively, manage their business operations and resources more effectively, and compete successfully in today's fast-changing global economy.

By definition, the term **network** means an interconnected or interrelated chain, group, or system. Using this definition, we can begin to identify all kinds of networks: a chain of hotels, the road system, and the names in a person's address book or PDA, the railroad system, the members of a church, club, or organization. The examples of networks in our world are virtually endless, and computer networks, though both valuable And powerful, are just one example of the concept.

Telecommunications is the exchange of information in any form (voice, data, text, images, audio, and video) over networks. Early telecommunications networks did not use computers to route traffic and, as such, were much slower than today's computer based networks. Major trends occurring in the field of telecommunications have a significant impact on management decisions in this area. You should thus be aware of major trends in telecommunications industries, technologies, and applications that significantly increase the decision alternatives confronting business managers and professionals.

The Business Value of Telecommunications Networks

What business value is created when a company capitalizes on the trends in telecommunications we have just identified? Use of the Internet, intranets, extranets, and other telecommunications networks can dramatically cut costs, shorten business lead times and response times, support e-commerce, improve the collaboration of workgroups, develop online operational processes, share resources, lock in customers and suppliers, and develop new products and services. These benefits make applications of telecommunications more strategic and vital for businesses that must increasingly find new ways to compete in both domestic and global market

Strategic Capabilities	e-Business Examples	Business Value
Overcome geographic barriers: Capture information about business transactions from remote locations.	Use the Internet and extranets to transmit customer orders from traveling salespeople to a corporate data center for order processing and inventory control.	Provides better customer service by reducing delay in filling orders and improves cash flow by speeding up the billing of customers.
Overcome time barriers: Provide information to remote locations immediately after it is requested.	Credit authorization at the point of sale using online POS networks.	Credit inquiries can be made and answered in seconds.
Overcome cost barriers: Reduce the cost of more traditional means of communication.	Desktop videoconferencing between a company and its business partners using the Internet, intranets, and extranets.	Reduces expensive business trips; allows customers, suppliers, and employees to collaborate, thus improving the quality of decisions reached.
Overcome structural barriers: Support linkages for competitive advantage.	Business-to-business electronic commerce Web sites for transactions with suppliers and customers using the Internet and extranets.	Fast, convenient services lock in customers and suppliers.

Table 3.1: The business value of business applications of telecommunications networks

The explosive growth of the Internet is a revolutionary phenomenon in computing and telecommunications. The Internet has become the largest and most important network of networks today and has evolved into a global information superhighway. We can think of the Internet as a network made up of millions of smaller private networks, each with the ability to operate independent of, or in harmony with, all the other millions of networks connected to the Internet. When this network of networks began to grow in December 1991, it had about 10 servers. In January 2004, the Internet was estimated to have more than 46 million connected servers with a sustained growth rate in excess of 1 million servers per month. In January 2007, the Internet was estimated to have more than 1 billion users with Web sites in 34 languages from English to Icelandic.

The Internet is constantly expanding as more and more businesses and other organizations and their users, computers, and networks join its global Web. Thousands of business, educational, and research networks now connect millions of computer systems and users in more than 200

countries. Internet users projected for 2010 are expected to top the 2 billion user mark, which still only represents approximately one third of the worldwide population. Apply these numbers to Metcalfe's law, and you can see that the number of possible connections is extraordinary.

The Net doesn't have a central computer system or telecommunications center. There are, however, 13 servers called root servers that are used to handle the bulk of the routing of traffic from one computer to another. Each message sent has a unique address code, so any Internet server in the network can forward it to its destination. Also, The Internet does not have a headquarters or governing body. International advisory And standards groups of individual and corporate members, such as the Internet Society(www.isoc.org) and the World Wide Web Consortium (www.w3.org),promote use of the Internet and the development of new communications standards. These common standards are the key to the free flow of messages among the widely different computers and networks of the many organizations and Internet service providers (ISPs) in the system.

One of the unique aspects of the Internet is that nobody really owns it. Anyone who can access the Internet can use it and the services it offers. Because the Internet cannot be accessed directly by individuals, we need to use the services of a company that specializes in providing easy access.

Activities

Distinguish the difference between the following key types of telecommunication network with their application and values in business

1. **Internet**
2. **Intranet**
3. **Extranet**

Internet service provider

An ISP **is** a company that provides access to the Internet to individuals and organizations. For a monthly fee, the service provider gives you a software package, user name, password, and access

phone number or access protocol. With this information (and some specialized hardware), you can then log onto the Internet, browse the World Wide Web, and send and receive e-mail.

In addition to serving individuals, ISPs serve large companies, providing a direct connection from the company's networks to the Internet. These ISPs themselves are connected to one another through network access points. Through these connections, one ISP can easily connect to another ISP to obtain information about the address of A Web site or user node.

Internet Applications

The most popular Internet applications are e-mail, instant messaging, browsing the sites on the World Wide Web, and participating in newsgroups and chat rooms. Internet e-mail messages usually arrive in seconds or a few minutes anywhere in the world and can take the form of data, text, fax, and video files. Internet browser software like Netscape Navigator and Internet Explorer enables millions of users to surf the World Wide Web by clicking their way to the multimedia information resources stored on the hyperlinked pages of businesses, government, and other Web sites. Web sites offer information and entertainment and are the launch sites for e-commerce transactions between businesses and their suppliers and customers.

The Internet provides electronic discussion forums and bulletin board systems formed and managed by thousands of special-interest newsgroups. You can participate in discussions or post messages on a myriad of topics for other users with the same interests. Other popular applications include downloading software and information files and accessing databases provided by a variety of business, government, and other organizations. You can conduct online searches for information on Web sites in a variety of ways by using search sites and search engines such as Yahoo!, Google, and Fast Search. Logging on to other computers on the Internet and holding real-time conversations with other Internet users in chat rooms are also popular uses of the Internet.

• **Surf.** Point-and-click your way to thousands of hyperlinked Web sites and resources for multimedia information, entertainment, or electronic commerce.
• **e-Mail.** Use e-mail and instant messaging to exchange electronic messages with colleagues, friends, and other Internet users.
• **Discuss.** Participate in discussion forums of special-interest newsgroups, or hold real-time text conversations in Web site chat rooms.
• **Publish.** Post your opinion, subject matter, or creative work to a Web site or Weblog for others to read.
• **Buy and Sell.** Buy and sell practically anything via e-commerce retailers, wholesalers, service providers, and online auctions.
• **Download.** Transfer data files, software, reports, articles, pictures, music, videos, and other types of files to your computer system.
• **Compute.** Log onto and use thousands of Internet computer systems around the world.
• **Connect.** Find out what friends, acquaintances, and business associates are up to.
• **Other Uses.** Make long-distance phone calls, hold desktop videoconferences, listen to radio programs, watch television, play video games, explore virtual worlds, etc.

Table 3.2: Popular uses of internet

The Business Value of the Internet

The Internet provides a synthesis of computing and communication capabilities that adds value to every part of the business cycle.

What business value do companies derive from their business applications on the Internet? Substantial cost savings can arise because applications that use the Internet and Internet-based technologies (like intranets and extranets) are typically less expensive to develop, operate, and maintain than traditional systems. For example, an airline saves money every time customers use its Web site instead of its customer support telephone system. It is estimated that for certain types of transactions, the transaction cost savings are significant for online versus more traditional channels for example, booking a reservation over the Internet costs about 90 percent less for the airline than booking the same reservation over the telephone. The banking industry has also found significant cost savings via the Internet. A typical online banking transaction (payments, balance inquiry, check payment) is estimated to cost anywhere from 50 percent to 95 percent less than its bricks-and-mortar counterpart. Other primary sources of business value include attracting new customers with innovative marketing and products, as well as retaining present customers with improved customer service and support. Summarize, most companies are building e-business and e-commerce Web sites to achieve six major business values:

- Generate new revenue from online sales.

- Reduce transaction costs through online sales and customer support.
- Attract new customers via Web marketing and advertising and online sales.
- Increase the loyalty of existing customers via improved Web customer service and support.
- Develop new Web-based markets and distribution channels for existing products.
- Develop new information-based products accessible on the Web.

The Role of Intranets

Many companies have sophisticated and widespread intranets, offering detailed data retrieval, collaboration tools, personalized customer profiles, and links to the Inter Investing in the intranet, they feel, is as fundamental as supplying employees with a telephone.

Before we go any further, let's redefine the concept of an intranet, to emphasize specifically how intranets are related to the Internet and extranets. An **intranet** network inside an organization that uses Internet technologies (such as Web browsers and servers, TCP/IP network protocols, HTML hypermedia document publishing and databases, and so on) to provide an Internet-like environment within the enterprise for information sharing, communications, collaboration, and the support of business processes. An intranet is protected by security measures such as passwords, encryption, and firewalls, and thus can be accessed by authorized users through the Internet. A company's intranet can also be accessed through the intranets of customers, suppliers, and other business partners via extranet links.

Communications and Collaboration:- Intranets can significantly improve communications and collaboration within an enterprise. For example, you can use your intranet browser and your PC or NC workstation to send and receive e-mail, voice mail, pages, and faxes to communicate with others within your organization, as well as externally through the Internet and extranets. You can also use intranet groupware features to improve team and project collaboration with services such as discussion groups, chat rooms, and audio and videoconferencing.

Web Publishing:- The advantage of developing and publishing hyperlinked multimedia documents to hypermedia databases accessible on World Wide Web servers has moved to corporate intranets. The comparative ease, attractiveness, and lower cost of publishing and accessing multimedia business information internally via intranet Web sites have been the primary reasons for the explosive growth in the use of intranets in business. For example,

information products as varied as company newsletters, technical drawings, and product catalogs can be published in a variety of ways, including hypermedia Web pages, e-mail, and net broadcasting, and as part of in-house business applications. Intranet software browsers, servers, and search engines can help you easily navigate and locate the business information you need.

Business Operations and Management:- Intranets have moved beyond merely making hypermedia information available on Web servers or pushing it to users via net broadcasting. Intranets are also being used as the platform for developing and deploying critical business applications to support business operations and managerial decision making across the internetworked enterprise. For example, many companies are developing custom applications like order processing, inventory control, sales management, and enterprise information portals that can be implemented on intranets, extranets, and the Internet. Many of these applications are designed to interface with and access existing company databases and legacy systems. The software for such business uses is then installed on intranet Web servers. Employees within the company or external business partners can access and run such applications using Web browsers from anywhere on the network whenever needed.

The Role of Extranets

As businesses continue to use open Internet technologies [extranets] to improve communication with customers and partners, they can gain many competitive advantages along the way—in product development, cost savings, marketing, distribution, and leveraging their partnerships.

As we explained previously, **extranets** are network links that use Internet technologies to interconnect the intranet of a business with the intranets of its customers, suppliers, or other business partners. Companies can establish direct private network links among themselves or create private, secure Internet links called virtual private networks (VPNs). (We'll look more closely at VPNs later in this chapter.) Or a company can use the unsecured Internet as the extranet link between its intranet and consumers and others but rely on the encryption of sensitive data and its own firewall systems to provide adequate security. Thus, extranets enable customers, suppliers, consultants, subcontractors, business prospects, and others to access selected intranet Web sites and other company databases.

Telecommunications Network Alternatives

Telecommunications is a highly technical, rapidly changing field of information systems technology. Most business professionals do not need a detailed knowledge of its technical characteristics. However, it is necessary that you understand some of the important characteristics of the basic components of telecommunications networks. This understanding will help you participate effectively in decision making regarding telecommunications alternatives.

Telecommunications network

Generally, a communications network is any arrangement in which a sender transmits a message to a Receiver over a channel consisting of some type of medium.

Telecommunications network, t consists of five basic categories of components:

- **Terminals,** such as networked personal computers, network computers, or information appliances. Any input/output device that uses telecommunications networks to transmit or receive data is a terminal, including telephones and the various computer terminals.
- **Telecommunications processors,** which support data transmission and reception between terminals and computers. These devices, such as modems, switches, and routers, perform a variety of control and support functions in a telecommunications network. For example, they convert data from digital to analog and back, code and decode data, and control the speed, accuracy, and efficiency of the communications flow between computers and terminals in a network.
- **Telecommunications channels** over which data are transmitted and received. Telecommunications channels may use combinations of media**,** such as copper wires, coaxial cables, or fiber-optic cables, or use wireless systems like microwave, communications satellite, radio, and cellular systems to interconnect the other components of a telecommunications network.
- **Computers** of all sizes and types are interconnected by telecommunications networks so that they can carry out their information processing assignments. For example, a mainframe computer may serve as a host computer for a large network, assisted by a midrange computer serving as a front-end processor, while a microcomputer may act as a network server in a small network.
- **Telecommunications control software** consists of programs that control telecommunications activities and manage the functions of telecommunications networks.

Examples include network management programs of all kinds, such as telecommunications monitors for mainframe host computers, network operating s systems for network servers, and Web browsers for microcomputers. No matter how large and complex real-world telecommunications networks may appear to be, these five basic categories of network components must be at work to support an organization's telecommunications activities. This is the conceptual framework you can use to help you understand the various types of telecommunications networks in use today.

Network Alternative	Examples of Alternatives
Networks	Internet, intranet, extranet, wide area, local area, client/server, network computing, peer-to-peer
Media	Twisted-pair wire, coaxial cable, fiber optics, microwave radio, communications satellites, cellular and PCS systems, wireless mobile and LAN systems
Processors	Modems, multiplexers, switches, routers, hubs, gateways, front-end processors, private branch exchanges
Software	Network operating systems, telecommunications monitors, Web browsers, middleware
Channels	Analog/digital, switched/nonswitched, circuit/message/packet/cell switching, bandwidth alternatives
Topology/Architecture	Star, ring, and bus topologies, OSI and TCP/IP architectures and protocols

Table 3.3: Key telecommunications network component categories and examples.

Types of Telecommunications Networks

Wide Area Networks: Telecommunications networks covering a large geographic area are called **wide area networks (WANs)** . Networks that cover a large city or metropolitan area (metropolitan area networks) can also be included in this category. Such large networks have become a necessity for carrying out the day-to-day activities of many business and government organizations and their end users. For example, WANs are used by many multinational companies to transmit and receive information among their employees, customers, suppliers, and other organizations across cities, regions, countries, and the **world**.

Metropolitan Area Networks: When a wide area network optimized a specific geographical area, it is referred to as a metropolitan **area network** (MAN). Such networks can range from

several blocks of buildings to entire cities. MANs can also depend on communications channels of moderate-to-high data rates. A MAN might be owned and operated by a single organization, but it usually will be used by many individuals and organizations. MANs might also be owned and operated as public utilities. Your local cable provider or a local telephone company is probably operating on a MAN. MANs will often provide means for internetworking of local area networks.

The five basic components in a telecommunications network: (1) terminals, (2) telecommunications processors, (3) Tele communications channels, (4) computers, and (5) telecommunications software.

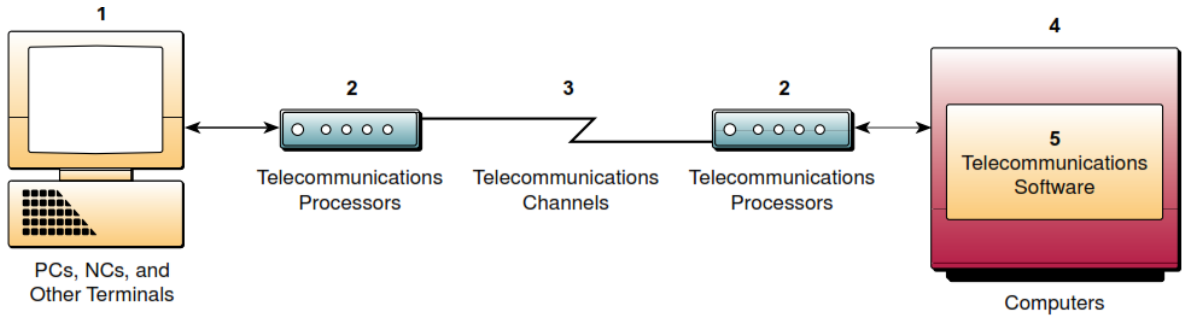


Figure 3.3: The five basic components in a telecommunications network

Local area networks (LANs) connect computers and other information processing devices within a limited physical area, such as an office, classroom, building, manufacturing plant, or other worksite. LANs have become commonplace in many organizations for providing telecommunications network capabilities that link end users in offices, departments, and other workgroups. LANs use a variety of telecommunications media, such as ordinary telephone wiring, coaxial cable, or even wireless radio and infrared systems, to interconnect microcomputer workstations and computer peripherals. To communicate over the network, each PC usually has a circuit board called a network interface card. Most LANs use a more powerful microcomputer with a large hard disk capacity, called a file server or

Network server, which contains a network **operating system** program that controls telecommunications and the use and sharing of network resources; For example, it distributes copies of common data files and software packages to the other microcomputers in the network

and controls access to shared laser printers and other network peripherals. Many organizations use **virtual private networks (VPNs)** to establish secure intranets and extranets. A virtual private network is a secure network that uses the Internet as its main backbone network but relies on network firewalls, encryption, and other security features of its Internet and intranet connections and those of participating organizations. Thus, for example, VPNs would enable a company to use the Internet to establish secure intranets between its distant branch offices and manufacturing plants and secure extranets between itself and its business customers and suppliers.

Client/server networks have become the predominant information architecture of enterprise wide computing. In a client/server network, end-user PC or NC workstations are the clients they are interconnected by local area networks and share application processing with network servers, which also manage the networks. (This arrangement of clients and servers is sometimes called two-tier client/server architecture.) Local Area networks (LANs) are also interconnected to other LANs and wide area networks (WANs) of client workstations and servers

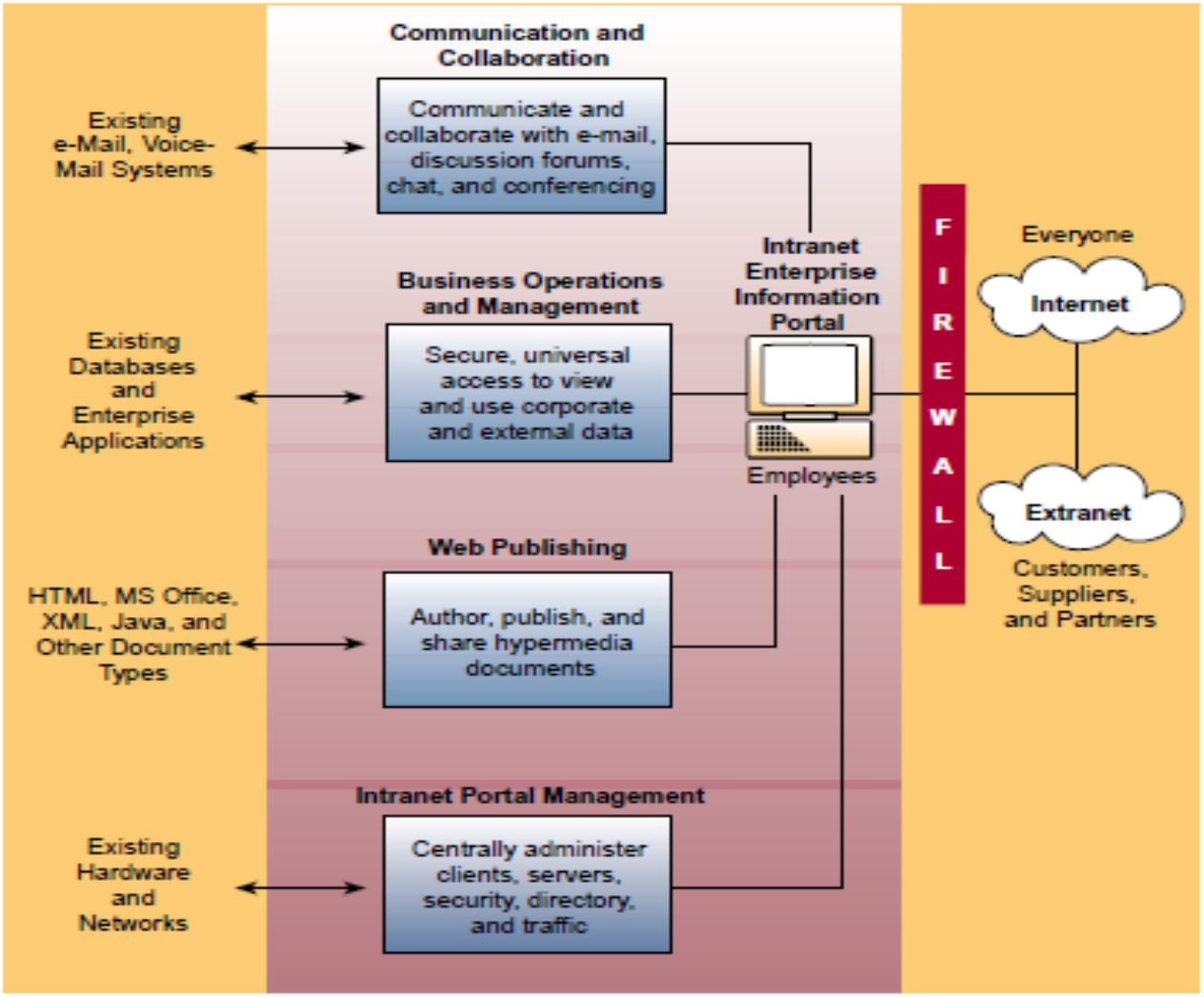


Table 3.4: Information portal for applications in communication and collaboration

Summary

This chapter familiarizes you with networking and connectivity, telecommunications, the Internet, and World Wide Web and gives you the basic information you need for appreciating the significance of these developments in medicine.

- IT includes not only computers but also communications networks and computer literacy.
- Computer literacy is knowledge of computers and their functions.
- A computer is an electronic device that can accept data as input, process the data, and produce information as output following step-by-step instructions called a program.
- Inside a digital computer, all data and information are represented by combinations of binary digits (bits).
- Physical components of a computer are called hardware.
- Input devices digitize data, so that the computer can process the data.
    - ✓ Input devices include keyboards and direct-entry devices.
    - ✓ Direct-entry devices include pointing devices, scanning devices, smart cards, optical cards, sensors, and human-biology input devices.
- The system unit includes the CPU, which is comprised of the arithmetic-logic unit and the control unit, and memory, which temporarily stores the work you are currently doing. The CPU and memory work together following the instructions of a program to process data into information.
- Output devices (printers and monitors) present the processed information to the user.
- Secondary storage devices (drives) and media (diskettes, hard disks, optical disks, Zip disks, magnetic tape, and solid-state memory devices) allow you to store information permanently.
- Software (programs) is comprised of the step-by-step instructions that tell the hardware how to process data.
- Software is classified as system software, which controls the basic operation of the hardware, and application software, which completes tasks for the user.
- When computers are connected in networks, the data that are transmitted travel over a path or medium.
- Data transmission is governed by technical standards or rules called protocols.

- Wireless transmission is becoming more and more common with the widespread use of cell phones and other wireless devices.
- The connection of computers and communications devices into networks makes many things possible, including telemedicine.
- The Internet is a global network of networks, which makes vast amounts of information available.
- The World Wide Web is part of the Internet, organized as documents with links to other documents.
- Speech-recognition software is getting better and better.

Self Test Questions

Multiple Choices

1. *Which one of the following is output device?*

- ***A.*** *Printers*
- ***B.*** *Diskettes*
- ***C.*** *Hard disks*
- ***D.*** *Optical disks*

2. *_____is one of secondary storage device.*

- ***A.*** *Monitor*
- ***B.*** *Keyboard*
- ***C.*** *Mouse*
- ***D.*** *Magnetic tape*

3. *_____is comprised of the arithmetic-logic unit and the control unit and memory*

- ***A.*** *Scanner*
- ***B.*** *Printer*
- ***C.*** *CPU*
- ***D.*** *None of the above*

4. *Direct-entry devices include;*

- ***A.*** *pointing devices*
- ***B.*** *scanning devices*
- ***C.*** *Smart cards*
- ***D.*** *All of the above*

5. *A computer literate person _____.*

A. *can use a computer to perform tasks in his or her field*

B. *is generally familiar with what a computer can do*

C. *can program a computer*

D. *A and B*

Say True or False

1. *Software (programs) is comprised of the step-by-step instructions that tell the hardware how to process data.*
2. *Physical components of a computer are called hardware.*
3. *IT includes only computers but also communications networks and computer literacy*
4. *The World Wide Web is part of the Internet, organized as documents with links to other documents.*
5. *The Internet is a global network of networks, which makes vast amounts of information available.*

CHAPTER FOUR

COMMON BUSINESS APPLICATIONS OF INFORMATION SYSTEM

Chapter Objectives

At the end of this chapter, students will be able to:

- Understand the types of IS
- Distinguish the difference between different types of IS
- Describe the similarity between the types of IS
- Explain the importance of IS
- The purpose of studying about IS

4. Introduction

Information systems can be designed to support the functional areas or traditional departments such as, accounting, finance, marketing, human resources, and manufacturing, of an organization Such systems are classified as 'functional information systems'. Functional information systems typically follow the organizational structure

Functional information systems are typically focused on increasing the efficiency of a particular department or a functional area. One disadvantage of functional systems is that although they may support a particular functional area effectively, they may be incompatible to each other(NO interaction between internal systems). Such systems, rather than aiding organizational performance will act as inhibitors to an organization's development and change.

Organizations have realized that in order to be agile and efficient they need to focus on organizational processes. A process may involve more than one functional area. Some Information Systems are cross-functional

- Example: A TPS can affect several different business areas: Accounting, Human Resources, Production, etc.
- Some Information Systems concentrate on one particular business area. For instance, Marketing information system, Accounting information system, manufacturing information system, Human resource information system etc.

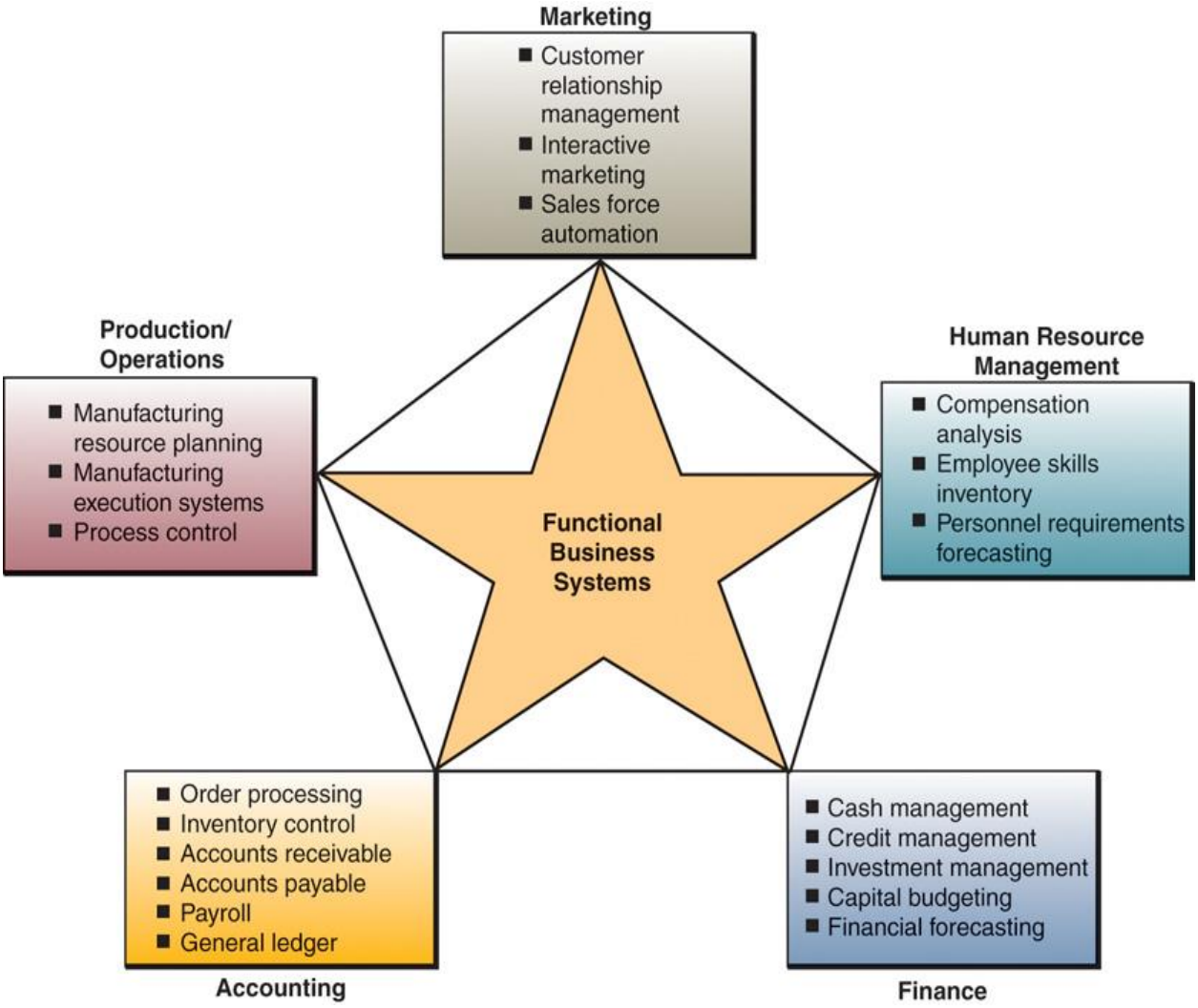


Figure 4.1. Functional business areas

4.1. Marketing information system (MkIS)

A **marketing information system** (MkIS) is a management **information system** (MIS) designed to support **marketing** decision making. Jobber (2007) defines it as a "**system** in which **marketing** data is formally gathered, stored, analysed and distributed to managers in accordance with their informational needs on a regular basis.

A system that analyzes and assesses marketing information, gathered continuously from sources inside and outside an organization. Timely marketing information provides basis for decisions such as development or improvement, pricing, packaging, distribution, media selection, and promotion. See also market information system.

Activity

1. **How can be an information system applied in marketing business?**
2. **What are the activities objective and benefit of marketing information system?**

The components of a modern marketing information system:

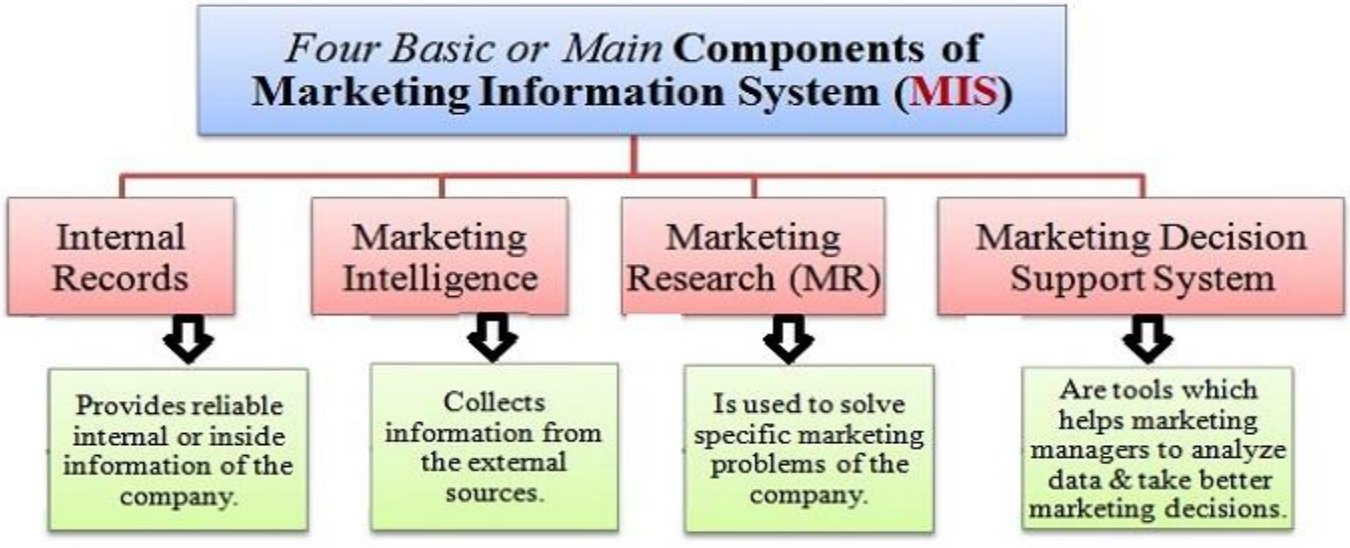
A marketing information system consists of people, equipment and procedures to gather, sort, analyze, evaluate, and distribute needed, timely, and accurate information to **marketing** decision makers.

But if you fail to allocate adequate resources to your marketing effort, or if you fail to properly organize your effort, the information you provide might well turn out to be irrelevant, late, and incorrect. Remember that a poor marketing information system is worse than unhelpful. It can be downright harmful.

The four main components of Marketing Information System (MIS) are:

- **Internal Records.**
- **Marketing Intelligence.**
- **Marketing Research (MR), and**
- **Marketing Decision Support System.**

The basic components of MIS are depicted and explained below.



1. Internal Records: The first component of MIS is 'Internal Record'. The foundation of any marketing system is the company's knowledge of itself. The more you know about your company's operations, the better you will be able to suggest strategies for improving performance.

Marketing managers get lots of information from the internal-records of the company. These records provide current information about sales, costs, inventories, cash flows and account receivable and payable. Many companies maintain their computerized internal records. Inside records help marketing managers to gain faster access to reliable information.

2. Marketing intelligence: A marketing intelligence system is a set of procedures and sources used by managers to obtain every day information about developments in the marketing environment.

It collects information from external sources. It provides information about current marketing-environment and changing conditions in the market. This information can be easily gathered from external sources like; magazines, trade journals, commercial press, so on. This information cannot be collected from the Annual Reports of the Trade Association and Chambers of Commerce, Annual Report of Companies, etc. The salesmen's report also contains information about market trends.

The information which is collected from the external sources cannot be used directly. It must be first evaluated and arranged in a proper order. It can be then used by the marketing manager for taking decisions and making policies about marketing.

3. Marketing Research (MR): Marketing Research is the systematic design, collection analysis and reporting of data and findings relevant to a specific marketing situation facing the company. MR is conducted to solve specific marketing problems of the company.

The Marketing Research Process

Those responsible for carrying out your marketing research will have to go through five basic steps.

Step 1: Define the problem and the research objectives

You've got to start by coming up with the best possible definition of the problem and your research objectives. What problem are you trying to solve? What do you need to know to solve the problem? What goes into good answers to these questions? What characterizes bad answers?

Step 2: Develop the research plan

All right. You've got your problem and your objectives. Now you need a plan to help you meet your objectives. There's a lot to consider.

You need to think about your **data sources**. *Where* are you going to get your information? You need to think about your **research approach**. *How* are you going to collect your information?
You need to think about your **research instruments**. *What* are you going to use to collect your information?
You need to have a **sampling plan**. *Who* are you going to collect your information from? How can you be sure that your sample is representative?

Once you've decided on your sampling plan, what **contact methods** are you going to use? Will you knock on doors, send letters, make calls, or send e-mails?

Step 3: Collect the information

Here's where all your planning goes into action. And this is where you're likely to spend the greatest portion of your budget. It's critical that you do everything you can prevent errors in information collection. The quality of your analysis is dependent on the quality of your information.

Step 4: Analyze the information

Now you need to turn your raw data into usable information. How can you organize your findings so they shed the clearest light on your research problem? How can you use statistics to reveal, and not distort, the real meaning of your data?

Step 5: Present the findings

Finally, you need to present your findings in a way that effectively communicates its significance to decision makers. They're the ones that need to understand your results and it's your job to make sure they do.

4. **Marketing decision support system** :

The fourth component of MIS is 'Marketing Decision Support System'. These are the tools which help the marketing managers to analyze data and to take better marketing decisions. They include hardware, i.e. computer and software programs. Computer helps the marketing manager to analyze the marketing information. It also helps them to take better decisions. In fact, today marketing managers cannot work without computers. There are many software programs, which help the marketing manager to do market segmentation, price fixing, **advertising** budgets, etc.

It helps managers in providing evidence for the decisions taken by them. The current marketing software programs assist in designing marketing research studies, market segmentation, selling prices, budget, analyzing media, and planning sales force activity.

4.2. Human resource information system (HRIS)

A **Human Resources** Management **System** (HRMS) or **Human Resources Information System** (**HRIS**), refers to the **systems** and processes at the intersection between **human resource** management (HRM) and **information** technology

Human Resources Management (HRM) is the attraction, selection, retention, development, and utilization of labor resource in order to achieve both individual and organizational objectives. Human Resources Information Systems (HRIS) is an integration of HRM and Information Systems (IS). HRIS or Human resource Information system helps HR managers perform HR functions in a more effective and systematic way using technology. It is the system used to acquire, store, manipulate, analyze, retrieve, and distribute pertinent information regarding an organization's human resources. A human resource information system (HRIS) is a system used to acquire, store, manipulate, analyze, retrieve, and distribute pertinent information about an organization's human resources (Tannenbaum, 1990). The HRIS system is usually a part of the

organization's larger management information system (MIS) which would include accounting, production, and marketing functions, to name just a few. Human resource and line managers require good human resource information to facilitate decision-making. An extensive study by Towers Perrin study revealed the following benefits of

Application of HRIS

Activities
Dear student please discuses about the area which human resource management information system applied

HRIS can be applied in the following areas of HRM

- HR planning
- Succession planning
- Work force planning
- Work force dynamics analysis
- Staffing
- Applicant recruitment and tracking
- Employee data base development
- Performance management
- Learning and development
- Compensation and benefits
- Pay roll
- Job evaluation
- Salary survey
- Salary planning
- International compensation
- Benefits management
- Develop innovative Org. Structure
- Develop IT

HRIS Benefits:

HRIS has showed many benefits to the HR operations. A few of them can be detailed as;

- Faster information process,
- Greater information accuracy,
- Improved planning and program development, and
- Enhanced employee communications (Overman, 1992).

4.3. Financial Management Information Systems

Financial Management Information Systems accumulate and analyze financial data in order to make good financial management decisions in running the business. It is a Computer-based financial information systems support financial managers in decisions concerning:

1. **The financing of a business**

2. **The allocation and control of financial resources within a business.**

FMIS is the acronym for the term "Financial Management Information Systems".
The basic objective of the financial information system is to meet the firm's financial obligations as they come due, using the minimal amount of financial resources consistent with an established margin of safety. Outputs generated by the system include accounting reports, operating and capital budgets, working capital reports, cash flow forecast, and various What-If Analysis reports. The evaluation of financial data may be performed through ratio analysis, trend evaluation, and financial planning modeling. Financial planning and forecasting are facilitated if used in conjunction with a Decision Support System (DSS).

Activity

1. **What is Financial Management Information Systems?**
2. **How financial in formation system applied in financial resource of the organization**?

Financial management information system is:

- Information system that tracks financial events and summarizes information
- supports adequate management reporting, policy decisions, fiduciary responsibilities, and preparation of auditable financial statements
- Should be designed with good relationships between software, hardware, personnel, procedures, controls and data

Generally, financial management information system refers to automating financial operations.

Features of FMIS

As the name implies, there are, and should be, three guiding characteristics for a well-designed FMIS:

It is a management tool

When developing an FMIS it is important that it cater to management needs—not just those of the central agencies, but also line agencies. Moreover, as a management tool it should support the management of change. It must be viewed as an integral part of budget system reform—hence not be designed just to meet present requirements, but also to support those needs that are likely to arise as parallel budget reforms are implemented.

It should provide a wide range of nonfinancial and financial information

As a tool of management it should provide the information required for decision making. For this purpose it is anchored in the government accounting system, and should be designed to perform all necessary accounting functions as well as generate custom reports for internal and external use. However, this does not mean that it should exclusively concentrate on financial information. Managers will require other nonfinancial information.

For example, personnel information such as numbers of employees, their grade within the organizational structure and rates of remuneration. For performance-based budgets, performance information will be important to managers, such as the identification of programs, the objectives

or outcomes of programs, the types of goods and services produced, as well as indicators by which to judge the efficiency and effectiveness of programs.

It is a system

Its role is to connect, accumulate, process, and then provide information to all parties in the budget system on a continuous basis. All participants in the system, therefore, need to be able to access the system, and to derive the specific information they require to carry out their different functions. The converse is also true, if the FMIS does not provide the required information—that is, has not the right functionality—it will not be used, and will cease to fulfill its central function as a system. Further, by automating procedures and internal controls, it strengthens financial controls and promotes accountability.

The Ideal FMIS Systems

An ideal or well-designed system should:

- Collect accurate, timely, complete, reliable, consistent information
- Provide adequate management reporting
- Support government-wide and agency policy decisions
- Support budget preparation and execution
- Facilitate financial statement preparation
- Provide information for central agency budgeting, analysis and government-wide reporting
- Provide complete audit trail to facilitate audits.

Major financial information system categories include:

1. Cash and securities management
2. Capital budgeting
3. Financial forecasting
4. Financial planning

Cash Management:

Cash management systems collect information on all cash receipts and disbursements within a company on a real time or periodic basis. Cash management systems:

1. Allow businesses to deposit or invest excess funds more quickly and thus increase the income generated by deposited or invested funds.
2. Produce daily, weekly, or monthly forecasts of cash receipts or disbursements (cash flow forecast) that are used to spot future cash deficits or surpluses.

Online Investment Management:

Many businesses invest their excess cash in short-term low-risk marketable securities or in higher return/higher risk alternatives, so that investment income may be earned until the funds are required. Online investment management services:

1. Help a financial manager make buying, selling, or holding decisions for each type of security so that an optimum mix of securities is developed that minimizes risk and maximizes investment income for the business.

Capital Budgeting:

The ***capital budgeting*** process involves evaluate the profitability and financial impact of proposed capital expenditures. This application makes heavy use of spreadsheet models that incorporate present value analysis of expected cash flows and probability analysis of risk to determine the optimum mix of capital projects for a business.

Financial Forecasting and Planning:

A variety of financial forecasting packages provide analytical techniques that result in economic or financial forecasts of national and local economic conditions, wage levels, price levels, and interest rates.

Financial Planning systems use financial planning models to evaluate the present and projected financial performance of a business or of one of its divisions or subsidiaries. Financial planning systems:

1. Help determine the financial needs of a business and analyze alternative methods of financing the business.
2. Use financial forecasts concerning the economic situation, business operations, and types of financing available, interest rates, and stock and bond prices to develop an optimal financing plan for the business.
3. They frequently use electronic spreadsheet packages and DSS generators to build and manipulate models.
4. Are used to answer what-if and goal-seeking questions in order to evaluate financial and investment alternatives.

Advantages of FMIS

There are many advantages of implementing an FMIS. A few of them are listed below:

- Integrated financial information
- Flexibility of reporting and additional control over expenditure
- Less administration required within the business

4.4. Accounting Information Systems

Accounting information systems are the oldest and most widely used information systems in business. Computer based accounting information systems:

1. Record and report the flow of funds through an organization on a historical basis and produce important financial statements such as balance sheets and income statements.
2. Produce forecasts of future conditions such as projected financial statements and financial budgets.

Operational Accounting Systems - focus on transaction processing systems. They emphasize:

1. Legal and historical record-keeping
2. Production of accurate financial statements.

Typically, these systems include transaction processing systems such as:

1. Order processing
2. Inventory control
3. Accounts receivable
4. Accounts payable
5. Payroll systems
6. General ledger systems

Management Accounting Systems - focus on the planning and control of business operations. They emphasize:

1. Cost accounting reports
2. Development of financial budgets & projected financial statements
3. Analytical reports comparing actual to forecasted performance.

The six most widely used accounting information systems include:

1. Order Processing
2. Inventory Control
3. Accounts Receivable
4. Accounts Payable
5. Payroll
6. General Ledger

Online Accounting Systems:

Accounting information systems are being affected by Internet and client/server technologies. Using the Internet, intranets, extranets, and other networks changes how accounting information systems monitor and track business activity. The online, interactive nature of such networks calls for new forms of transaction documents, procedures, and controls. This particularly applies to systems like order processing, inventory control, accounts receivable, and accounts payable. These systems are directly involved in the processing of transactions between a business and its customers and suppliers. Many companies are using or developing network links to these trading partners for such applications, using the Internet or other networks.

Order Processing:

Order processing, or sales order processing, is an important transaction processing system that captures and processes customer orders and produces data needed for sales analysis and inventory control. In many firms, it also keeps track of the status of customer orders until goods are delivered. Computer-based sales order processing systems:

1. Provide a fast, accurate, and efficient method of recording and screening customer orders and sales transactions.
2. Provide inventory control systems with information on accepted orders so they can be filled as quickly as possible.

Inventory Control:

Inventory control systems process data reflecting changes to items in inventory. A computer-based inventory control system:

1. Records changes to inventory levels and prepares appropriate shipping documents
2. May notify managers about items that need reordering and provide them with a variety of inventory status reports.
3. Help a business provide high-quality service to customers while minimizing investment in inventory and inventory carrying costs.

Accounts Receivable:

Accounts receivable systems keep records of amounts owed by customers from data generated by customer purchases and payments. Accounts receivable systems:

1. Produce invoices to customers, monthly customer statements and credit management reports.
2. Stimulate prompt customer payments by preparing accurate and timely invoices and monthly statements to credit customers
3. Provide managers with reports to help them control the amount of credit extended and the collection of money owed.
4. Help to maximize profitable credit sales while minimizing losses from bad debts.

Accounts Payable:

Accounts payable systems keep track of data concerning purchases from and payments to suppliers. Accounts payable systems:

1. Prepare checks in payment of outstanding invoices and produce cash management reports.
2. Help ensure prompt and accurate payment of suppliers to maintain good relationships, ensure a good credit standing, and secure any discounts offered for prompt payment.
3. Provide tight financial control over all cash disbursements of the business.
4. Provide management with information needed for the analysis of payments, expenses, purchases, employee expense accounts, and cash requirements.

Payroll:

Payroll systems receive and maintain data from employee time cards and other work records. Accounts payable systems:

1. Produce paychecks and other documents such as earning statements, payroll reports, and labor analysis reports
2. Are prepared for management and government agencies.
3. Help businesses make prompt and accurate payments to their employees, as well as reports to management, employees, and government agencies concerning earnings, taxes, and other deductions.
4. Provide management with reports analyzing labor costs and productivity.

General Ledger:

General ledger systems consolidate data from accounts receivable, accounts payable, payroll, and other accounting information systems. General ledger systems:

1. Produce the periodic financial statements and reports of the business.
2. Help businesses accomplish accounting tasks in an accurate and timely manner.
3. Typically provide better financial controls and management reports and involve fewer personnel and lower costs than manual accounting methods.

4.5. Manufacturing information system

A management information system that is targeted for use anywhere production is taking place. Modern management information systems are generally computerized and are designed to collect and present the data which managers need in order to plan and direct operations within the company.

Manufacturing information systems support the *production/operations* function, which includes all activities concerned with the planning and control of the processes that produce goods or services. The production/operations function is concerned with the management of the operational systems of all business firms. The planning and control information systems used for operations management and transaction processing support all firms that must plan, monitor, and control inventories, purchases, and the flow of goods and services.

Computer Integrated Manufacturing (CIM):

Activity

1. **What is the role of manufacturing information system in the process of production?**
2. **How and what types an information manufacturing information system provide?**

Computer-based manufacturing information systems use several major techniques to support ***computer-integrated manufacturing*** (CIM). CIM is an overall concept that stresses that the goals of computer use in factory automation must be to:

- **Simplify**- (reengineer) production processes, product designs, and factory organization as a vital foundation to automaton and integration.
- **Automate** - Production processes and the business functions that support them with computers and robots.
- **Integrate** - All production and support processes using computers and telecommunications networks.

Overall goal of CIM: - Is to create flexible, agile, manufacturing processes that efficiently product products of the highest quality. Thus, CIM supports the concepts of:

1. Flexible manufacturing systems
2. Agile manufacturing
3. Total quality management

Results of CIM: - Implementing such manufacturing concepts enables a company to quickly respond to and fulfill customer requirements with high-quality products and services.

Uses of computers in manufacturing include:

1. Computer-aided engineering (CAE)
2. Computer-aided design (CAD)
3. Computer-aiding processing planning (CAPP)
4. Material requirements planning (MRP)
5. Manufacturing resource planning (MRP)
6. Computer-aided manufacturing (CAM)

Computer-aided manufacturing - (CAM) systems are those that automate the production process. For example, this could be accomplished by monitoring and controlling the production process in a factory through *manufacturing execution systems*, or by directly controlling a physical process (process control), a machine tool (machine control), or machines with some humanlike work capabilities (robots).

Manufacturing execution systems - (MES) are performance monitoring information systems for factory floor operations. They monitor, track, and control the five essential components involved in a production process:

1. Materials
2. Equipment
3. Personnel
4. Instructions and specifications
5. Production facilities.

MES includes:

1. Shop floor scheduling and control systems
2. Machine control systems
3. Robotics control systems
4. Process control systems

Some of the benefits of CIM are:

1. Increased efficiency through:

   -work simplification & automation,

   - Better production schedule planning

   - Better balancing of production workloads in production capacity

2. Improved utilization of facilities, higher productivity, and better quality control through:

   - Continuous monitoring

   - Feedback and control of factory operations, equipment and robots.

3. Reduced investments in production inventories & facilities

   - work simplification

   - just-in-time inventory policies

   - better planning and control of production

   - better planning and control of finished goods requirements

4. Improved customer service

   - reducing out-of-stock situations

   - producing high-quality products that better meet customer requirements

Collaborative Manufacturing Networks:

Manufacturing processes like computer-aided engineering and design, production control, production scheduling, and procurement management typically involve a collaborative process. Increasingly, this involves using the Internet, intranets, extranets, and other networks to link the workstations of engineers and other specialists with their colleagues at other sites. These ***collaborative manufacturing networks*** may link employees within a company, or include representatives from a company's suppliers or customers wherever they may be located.

Process Control:

Process control is the use of computers to control an ongoing physical process. Process control computers are used to control physical processes in such areas as:

1. Petroleum refineries
2. Cement plants
3. Steel mills
4. Chemical plants
5. Food product manufacturing plants
6. Pulp and paper mills
7. Electrical power plants

Machine Control:

Machine control is the use of a computer to control the actions of a machine. This is also popularly called numerical control. The control of machine tools in factories is a typical numerical control application, though it also refers to the control of typesetting machines, weaving machines, and other industrial machinery.

Machine control computers are used in such areas as:

1. Factories
2. Industrial shops
3. Machine tooling shops

Robotics:

Robots are smart machines which directly control their own activities with the aid of microcomputers. ***Robotics*** is the technology of building and using machines (robots) with computer intelligence and computer controlled humanlike physical capabilities (dexterity, movement, vision, and so on).

Robots are used as "steel-collar workers" to increase productivity and cuts costs. They are used in such areas as:

1. Factories

2. Hazardous areas or work activities

Computer-Aided Engineering:

Manufacturing engineers use ***computer-aided engineering*** (CAE) to simulate, analyze, and evaluate the models of product designs they have developed using ***computer-aided design*** (CAD) methods.

Networks of powerful engineering workstations with enhanced graphics and computational capabilities and CAD software help them:

1. Analyze and design products and manufacturing processes and facilities.
2. Refine an engineer's initial drawings and provide three-dimensional computer graphics that can be rotated to display all sides of the object being designed.
3. Zoom in for close-up views of a specific part and even make parts of the product appear to move as they would in normal operation.
4. Design can be converted into a finished mathematical model of the product.

4.6. Transaction Processing System (TPS)

Transaction processing systems (TPS) are cross-functional information systems that process data resulting from the occurrence of business transactions. We introduced transaction processing systems in Chapter 1 as one of the major application categories of information systems in business.

Transactions are events that occur as part of doing business, such as sales, purchases, deposits, withdrawals, refunds, and payments. Think, for example, of the data generated whenever a business sells something to a customer on credit, whether in a retail store or at an e-commerce site on the Web. Data about the customer, product, salesperson, store, and so on must be captured and processed. This need prompts additional transactions, such as credit checks, customer billing, inventory changes, and increases in accounts receivable balances, which generate even more data. Thus, transaction processing activities are needed to capture and process such data, or the operations of a business would grind to a halt. Therefore, transaction processing systems play a vital role in supporting the vital operations of most companies today.

Online transaction processing systems play a strategic role in Web-enabled business processes and electronic commerce. Many firms are using the Internet and other networks that tie them electronically to their customers or suppliers for online transaction processing (OLTP). Such *real-time* systems, which capture and process transactions immediately, can help firms provide superior service to customers and other trading partners. This capability adds value to their products and services and thus gives them an important way to differentiate themselves from their competitors.

4.6.1. The Transaction Processing Cycle

Transaction processing systems, such as Syntellect's, capture and process data describing business transactions, update organizational databases, and produce a variety of information products. You should understand this as a transaction processing cycle of several basic activities.

• **Data Entry.** The first step of the transaction processing cycle is the capture of business data. For example, transaction data may be collected by point-of-sale terminals using optical scanning of bar codes and credit card readers at a retail store or other business. Or transaction data can be captured at an electronic commerce Web site on the Internet. The proper recording and editing of data so they are quickly and correctly captured for processing is one of the major design challenges of information systems.

• **Transaction Processing.** Transaction processing systems process data in two basic ways: (1) batch processing , where transaction data are accumulated over a period of time and processed periodically; and (2) real-time processing (also called online processing), where data are

processed immediately after a transaction occurs. All online transaction processing systems incorporate real–time processing capabilities. Many online systems also depend on the capabilities of *fault tolerant* computer systems that can continue to operate even if parts of the system fail.

• **Database Maintenance.** An organization's databases must be maintained by its transaction processing systems so that they are always correct and up-to-date. Therefore, transaction processing systems update the corporate databases of an organization to reflect changes resulting from day-to-day business transactions. For example, credit sales made to customers will cause customer account balances to be increased and the amount of inventory on hand to be decreased. Database maintenance ensures that these and other changes are reflected in the data records stored in the company's databases.

• **Document and Report Generation.** Transaction processing systems produce a variety of documents and reports. Examples of transaction documents include purchase orders, paychecks, sales receipts, invoices, and customer statements. Transaction reports might take the form of a transaction listing such as a payroll register or edit reports that describe errors detected during processing.

Inquiry Processing. Many transaction processing systems allow you to use the Internet, intranets, extranets, and Web browsers or database management query languages to make inquiries and receive responses regarding the results of transaction processing activity. Typically, responses are displayed in a variety of pre-specified formats or screens. For example, you might check on the status of a sales order, the balance in an account, or the amount of stock in inventory and receive immediate responses at your PC.

Summary

Functional Business Systems: Functional business information systems support the business functions of marketing, production/operations, accounting, finance, and human resource management through a variety of e-business operational and management information Systems.

Marketing: Marketing information systems support traditional and e-commerce processes and management of the marketing function. Major types of marketing information systems include interactive marketing on e-commerce Web sites, sales force automation, customer relationship management, sales management, product management, targeted marketing, advertising and promotion, and market research. Thus, marketing information systems assist marketing managers in electronic commerce product development and customer relationship decisions, as well as in planning advertising and sales promotion strategies and developing the e-commerce potential of new and present products, and new channels of distribution.

Manufacturing: Computer-based manufacturing information systems help a company achieve computer integrated manufacturing (CIM) and thus simplify, automate, and integrate many of the activities needed to quickly produce high-quality products to meet changing customer demands. For example, computer-aided design using collaborative manufacturing networks helps engineers collaborate on the design of new products and processes. Then manufacturing resource planning systems help plan the types of resources needed in the production process. Finally, manufacturing execution systems monitor and control the manufacture of products on the factory floor through shop floor scheduling and control systems, controlling a physical process (process control), a machine tool (numerical control), or machines with some humanlike work capabilities (robotics).

Human Resource Management: Human resource information systems support human resource management in organizations. They include information systems for staffing the organization, training and development, and compensation administration. HRM Web sites on the Internet or corporate intranets have become important tools for providing HR services to present and prospective employees.

Accounting and Finance: Accounting information systems record, report, and analyze business transactions and events for the management of the business enterprise. The six essential accounting systems: order processing, inventory control, accounts receivable, accounts payable, payroll, and general ledger. Information systems in finance support managers in decisions regarding the financing of a business and the allocation of financial resources within a business. Financial information systems include cash management, online investment management, capital budgeting, and financial forecasting and planning.

Cross-Functional Enterprise Systems: These applications include integrated cross-functional enterprise systems such as enterprise resource planning (ERP), customer relationship management (CRM), and supply chain management (SCM). These applications may be interconnected by enterprise application integration (EAI) systems so that business professionals can more easily access the information resources they need to support the demands of customers, suppliers, and business partners. Enterprise collaboration systems (ECS) are cross-functional systems that support and enhance communication and collaboration among the teams and workgroups in an organization.

Transaction Processing Systems: Online transaction processing systems play a vital role in business. Transaction processing involves the basic activities of (1) data entry, (2) transaction processing, (3) database maintenance, (4) document and report generation, and (5) inquiry processing. Many firms are using the Internet, intranets, extranets, and other networks for online transaction processing to provide superior service to their customers and suppliers.

Self Test Questions

Multiple Choices

1. A DSS that uses geographic databases to construct and display maps
    A. Geographic information system
    B. Data visualization systems
    C. Marketing and sales analysis
    D. Database marketing

2. A type of business software used to input, accumulate, track and analyze financial and accounting data.
    A. Financial information system
    B. Marketing information system
    C. Manufacturing information system
    D. All of the above
3. A type of financial information system that can handle a business with between 10 to 100 employees and revenue between $10 to $50 million
    A. Accounting Software
    B. Mid-market
    C. High-end
    D. Vertical
4. A system in which marketing data files are organized d stored.
    A. User interfaces
    B. Applications software
    C. Marketing databases
    D. Systems support
5. Which one of the following is true about the use of HRIS?
    A. Attitude survey results
    B. Restructuring costing
    C. Applicant tracking
    D. All of the above
6. From the following one is not true about the benefit of DSS.
    A. Direct access to information
    B. Information when you want it
    C. Inability to make comparisons
    D. Freedom from time consuming tasks

Say True/False

1. Marketing Information Systems a combination of computer hardware and application software which provide financial data and analysis.
2. Strategy Implementation provides support for product launches, enables the coordination of marketing strategies, and is an integral part of sales force automation
3. TPS is a computerized system that performs and records the daily routine transactions necessary to conduct the business.
4. Batch processing is the firm collects data from transactions as they occur, placing them in groups or batches.
5. Data storage – Altering databases to reflect the transaction.

CHAPTER FIVE

KNOWLEDGE MANAGEMENT SYSTEMS

Chapter Objectives

At the end of this chapter, students will be able to:

- Define the term knowledge management
- Describe the theory of knowledge management
- Explain the KM sharing
- Explain the technology to support KM
- Evaluate KM applications in an organizations

5. Introduction

We introduced knowledge management systems in Chapter 2 as the use of information technology to help gather, organize, and share business knowledge within an organization. In many organizations, hypermedia databases at corporate intranet Web sites have become the *knowledge bases* for storage and dissemination of business knowledge. This knowledge frequently takes the form of best practices, policies, and business solutions at the project, team, business unit, and enterprise levels of the company. For many companies, enterprise information portals are the entry to corporate intranets that serve as their knowledge management systems. That's why such portals are called enterprise knowledge portals by their vendors. Thus, enterprise knowledge portals play an essential role in helping companies use their intranets as knowledge management systems to share and disseminate knowledge in support of business decision making by managers and business professionals.

5.1. Definition Of Knowledge Management And System

Making personal knowledge available to others is the central activity of the knowledge creating company. It takes place continuously and at all levels of the organization. Knowledge management has thus become one of the major strategic uses of information technology.

Knowledge Management (KM) is the process of gathering, managing and sharing employees' knowledge capital throughout the organization. Knowledge sharing throughout the organization enhances existing organizational business processes, introduces more efficient and effective

business processes and removes redundant processes. It is a discipline that promotes a collaborative and integrated approach to the creation, capture, organization access and use of an enterprise's knowledge assets.

KM has now become a mainstream priority for companies of all sizes. Specific knowledge management activities help focus on organization on acquiring, storing and utilizing knowledge for problem solving, dynamic leaning, strategic planning and decision making. It also prevents intellectual assets from decay, adds to firm intelligence and provides increased flexibility.KM is not only about Knowledge Technology. KM must be an enabler to achieve strategic business objectives. The organizational debris from failed attempts to

Impose new technical infrastructures that are either inappropriate to their work environments, or where people are not willing to share knowledge is ample evidence. Hence the need of Knowledge Management initiative arises to become solution for such problems, which brings together people, process and technology and helps corporate to achieve its goals and vision.

Knowledge management is an audit of "intellectual assets" that highlights unique sources, critical functions and potential bottlenecks, which hinder knowledge flows to the point of use. It protects intellectual assets from decay, seeks opportunities to enhance decisions, services and products through adding intelligence, increasing value and providing flexibility.
KM complements and enhances other organizational initiatives such as total quality management (TQM), business process re-engineering (BPR) and organizational learning, providing a new and Urgent focus to sustain competitive position.
Many companies are building **knowledge management systems(KMS)** to manage organizational learning and business know-how. The goal of such systems is to help knowledge workers create, organize, and make available important business knowledge, wherever and whenever it’s needed in an organization. This information includes processes, procedures, patents, reference works, formulas, best practices, forecasts, and fixes. Groupware, data mining, knowledge bases, and online discussion groups are some of the key technologies that may be used by a KMS.
Knowledge management systems also facilitate organizational learning and knowledge creation. They are designed to provide rapid feedback to knowledge Workers, encourage behavior

changes by employees, and significantly improve business performance. As the organizational learning process continues and its knowledgebase expands, the knowledge-creating company works to integrate its knowledge introits business processes, products, and services. This integration helps the company become a more innovative and agile provider of high-quality products and customer services, as well as a formidable competitor in the market place. Many companies today can only realize lasting competitive advantage if they become knowledge-creating companies or learning organizations. That means consistently creating new business knowledge, disseminating it widely throughout the company, and quickly building the new knowledge into their products and services.

Why we study KM?

- The basic economic resource - the means of production is no longer capital, nor natural resources, nor labor. It is and will be knowledge.
- "The most valuable asset of a 21st century institution, whether business or non-business, will be its knowledge workers and their productivity."
- Most of our work is information based.
- Organizations compete on the basis of knowledge.
- Products and services are increasingly complex, endowing them with a significant information component.
- The need for life-long learning is an inescapable reality.
- It helps firms learn from past mistakes and successes.
- It better exploits existing knowledge assets by re-deploying them in areas where the firm stands to gain something,
- It enhances the firm's ability to innovate

Role of Knowledge management for business

- Increase people skills and expertise through sharing
- Facilitates collaboration in the innovation process
- Assist in converting tacit knowledge to explicit knowledge
- help companies to turn human capital into intellectual capital by creating values
- Provides necessary elements to solve critical problems

5.2. TYPES OF KNOWLEDGE

Activity

1. What are the difference between explicit ***knowledge****, and* ***tacit knowledge***
2. Discuses about the source of explicit ***knowledge****, and* ***tacit knowledge and how an organization can manage those two types of knowledge***

Knowledge-creating companies exploit two kinds of knowledge. One is ***explicit knowledge***, which is the data, documents, and things written down or stored on computers. The other kind is ***tacit knowledge***, of knowledge, which resides in workers. Tacit knowledge can often represent some of the most important information within an organization. Long-time employees of a company often "know" many things about how to manufacture a product, deliver the service, deal with a particular vendor, or operate an essential piece of equipment.

This tacit knowledge is not recorded or codified anywhere because it has evolved in the employee's mind through years of experience. Furthermore, much of this tacit knowledge is never shared with anyone who might be in a position to record it in a more formal way because there is often little incentive to do so or simply, "Nobody ever asked."

1. TACIT KNOWLEDGE

Tacit knowledge is personal. It is stored in the heads of people. It is accumulated through study and experience. It is developed through the process of interaction with other people. Tacit knowledge grows through the practice of trial and error and the experience of success and failure. Tacit knowledge, therefore, is context-specific. It is difficult to formalize, record, or articulate. It includes subjective insights, intuitions and conjectures. As intuitive knowledge, it is difficult to communicate and articulate.

Since tacit knowledge is highly individualized, the degree and facility by which it can be shared depends to a great extent on the ability and willingness of the person possessing it to convey it to others. The sharing of tacit knowledge is a great challenge to many organizations. Tacit

knowledge can be shared and communicated through various activities and mechanisms. Activities include conversations, workshops, on-the-job training and the like. Mechanisms include, among others, the use of information technology tools such as email, groupware, instant messaging and related technologies

.In managing tacit knowledge, the very first hurdle to most organizations is identifying the tacit knowledge that is useful to the organization. Once relevant tacit knowledge is identified, it becomes extremely valuable to the organization possessing it because it is a unique asset that is difficult for other organizations to replicate. This very characteristic of being unique and hard to replicate is what makes tacit knowledge a basis of the organization's competitive advantage. Accordingly, it is essential for an organization to discover, propagate and utilize the tacit knowledge of its employees in order to optimize the use of its own intellectual capital. In any organization, tacit knowledge is the essential prerequisite for making good decisions. A new executive not yet familiar with the organization will find it difficult to make good decisions since he or she has yet to acquire tacit knowledge about the workings of the organization. Tacit knowledge is therefore crucial to getting things done and creating value for the organization. This is the essence of the "learning organization".

Management and employees need to learn and internalize relevant knowledge through experience and action. And they need to generate new knowledge through personal and group interactions within the organization.

2. EXPLICIT KNOWLEDGE

Explicit knowledge is codified. It is stored in documents, databases, websites, emails and the like. It is knowledge that can be readily made available to others and transmitted or shared in the form of systematic and formal languages.

Explicit knowledge comprises anything that can be codified, documented and archived. These include knowledge assets such as reports, memos, business plans, drawings, patents, trademarks, customer lists, methodologies, and the like. They represent an accumulation of the organization's experience kept in a form that can readily be accessed by interested parties and replicated if

desired. In many organizations these knowledge assets are stored with the help of computers and information technology.

Explicit knowledge is not completely separate from tacit knowledge. On the other hand, the two are mutually complementary. Without tacit knowledge it will be difficult, if not impossible, to understand explicit knowledge. For example, a person without technical, mathematical or scientific knowledge(tacit knowledge) will have great difficulty understanding a highly complex

mathematical formulation or chemical process flow diagram, although it may be readily available from the organization's library or databases (explicit knowledge).And unless we try to convert tacit knowledge to explicit knowledge, we cannot reflect upon it, study and discuss it, and share it within the organization – since it will remain hidden and inaccessible inside the head of the person that has it.

5.3. KEY TERMS AND CONCEPTS' IN KNOWLEDGE MANAGEMENT

Activity

1. **Dear learner please discuses about the following key activities of knowledge management activities and how they can be managed**

- **Knowledge Creation.**
- **Knowledge Retention**
- **Knowledge Utilization**
- **Knowledge Transfer**

There are those who believe that it is impossible to truly manage knowledge, only behaviors. When individuals examine business processes, events and activities, they also tend to use a behavioral focus as the organizing framework. Accordingly, most people find that behaviors are the most comfortable frame of reference for understanding the relationships between business processes and knowledge flows. Knowledge flows comprise the set of processes, events and activities through which data, information, knowledge and meta-knowledge are transformed from one state to another. To simplify the analysis of knowledge flows, the framework described based primarily on the General Knowledge Model.

The model organizes knowledge flows into four primary activity areas: knowledge creation, retention, transfer and utilization.

Knowledge Creation. This comprises activities associated with the entry of new knowledge into the system, and includes knowledge development, discovery and capture.

Knowledge Retention. This includes all activities that preserve knowledge and allow it to remain in the system once introduced. It also includes those activities that maintain the viability of knowledge within the system.

Knowledge Transfer. This refers to activities associated with the flow of knowledge from one party to another. This includes communication, translation, conversion, filtering and rendering.

Knowledge Utilization. This includes the activities and events connected with theapplication of knowledge to business processes.

Knowledge Artifacts

Artifacts come in a variety of forms, including documents, files, papers, conversations, pictures, thoughts, software, databases, e-mail messages, data sets, winks and nods, and whatever else can be used to represent meaning and understanding. Said another way: knowledge artifacts flow among and form the linkages between the activities and events that comprise knowledge flows. Most people's involvement with a knowledge stream is through various artifacts.

Artifacts are what we deal with every day. We write reports, send e-mail, read books, remember bits and pieces of old thoughts, engage in conversations and follow procedures.

The term *knowledge artifact* does not specify the form of the artifact (e.g. information, transformation, metadata or meta-knowledge) but it is very specific as to the process that gave rise to the artifact. This makes the term valuable for explaining such things as the importance of knowledge artifact retention, establishing provenance and enabling reusability. Knowledge artifacts differ from one another in several ways: their form of codification, the way in which they are rendered, their degree of abstraction and their ability to enable actions and decisions.

Knowledge artifacts also vary in their degree of articulation; simple knowledge artifacts can be explicit, implicit or tacit. Most artifacts, however, are not simple but complex, and contain a combination of explicit, implicit and tacit components.

Explicit Knowledge Artifacts: These are knowledge artifacts that have been articulated

in such a way that they can be directly and completely transferred from one person to another. This normally means that they have been codified so it is possible to touch, see, hear, feel and manipulate them (e.g. books, reports, data files, newsreels, audio cassette sand other physical forms).

Implicit Knowledge Artifacts: These are knowledge artifacts whose meaning is not explicitly captured, but can be inferred; in effect, the codification process is incomplete. Explicit artifacts can be interpreted totally on their content. Interpreters of implicit artifacts must rely on previously retained knowledge. For example, the knowledge that a given phrase is a book title tends to be implicit. Rarely is there anything that specifically tells someone that they are reading a book title, as might be the case in an SGML or XML system when <Book Title> tags explicitly communicate semantic meaning. In most cases, the reader infers the meaning of the words from their position (on the cover of a book), formatting (big, bold and centered)and content (lacking formal subject and predicate).

Tacit Knowledge Artifacts: These may be the most insidious and powerful of the three. Michael Polanyi referred to tacit knowledge as "knowing more than we can say" (Polanyi 1966). simply stated, tacit artifacts are those that defy expression and codification. This is not to say that tacit knowledge artifacts are without influence. The most vivid example is the old saw about what would happen to the centipede if she were to stop and think about how to walk. It is important to note that, for the most part, artifacts are passive. While they can change (or, more accurately, be changed), they can't act. Has anybody ever seen a financial? Report makes a decision or a book on aerodynamics build an airplane?

5.4. TECHNOLOGY TOOLS FOR KNOWLEDGE MANAGEMENT

Knowledge Management technology is a broad concept, encompassing much more than Notes and the Web. Firms can apply a wide variety of technologies to the objectives of managing Knowledge, some of which have been available for many years. The promise of technologies aimed at Knowledge Management is that they will help organizations use their knowledge more efficiently without changing the tools they currently use to create and process it. The

technological tools currently classified as KM applications may be grouped under the headings Collaboration, content management and business intelligence.

Collaborative tools:

- Groupware (i.e. Lotus Notes)
- Meeting support systems (i.e. teleconferencing, data conferencing, videoconferencing, e-brainstorming)
- Knowledge directories (i.e. corporate Yellow Pages)
- Extranet (customer/supplier communication)
- Intranet (intra-organization communication)

Content management:

- Internet/WWW (i.e. information provider)
- Document management systems (i.e. e-filing)
- Agents and filters (i.e. information management)
- Office automation systems (i.e. assistance tools, digital image processing)
- Electronic publishing systems

Business intelligence:

- Data warehousing (i.e. data mining)
- Workflow (i.e. helpdesk)
- (Group) decision support systems (i.e. intelligent support systems, executive information systems)
- Knowledge base systems (i.e. artificial intelligence, expert systems)
- E-commerce (i.e. Internet/WWW, e-tailing)

5.5. KNOWLEGDE SHARING

Knowledge management involves the panoply of procedures and techniques used to get the most from an organization's tacit and codified know-how (Teece, 2000). While defined in many different ways, knowledge management generally refers to how organizations create, retain, and share knowledge (Argote, 1999; Huber 1991).

knowledge sharing is seen as occurring through a dynamic learning process where organizations continually interact with customers and suppliers to innovate or creatively imitate.

The study of knowledge sharing, which is the means by which an organization obtains access to its own and other organizations' knowledge, has emerged as a key research area from a broad and deep field of study on technology transfer and innovation, and more recently from the field of strategic management. Increasingly, knowledge-sharing research has moved to an organizational learning perspective. Indeed, experience and research suggest that successful knowledge sharing involves extended learning processes rather than simple communication processes, as ideas related to development and innovation need to be made locally applicable with the adaptation being done by the 'incumbent firms' (Nelson & Rosenberg, 1993) or 'the local doers of development' (Stiglitz, 1999) for the ideas to be successfully implemented. The literature identifies five primary contexts that can affect such successful knowledge-sharing implementations, including the relationship between the source and the recipient, the form and location of the knowledge, the recipient's learning predisposition, the source's knowledge-sharing capability, and the broader environment in which the sharing occurs.

A synthesis of this research suggests three types of knowledge-sharing activities to be evaluated. First, analyses of the form and the location of the knowledge are important because each can affect the types of sharing processes that will be necessary as well as how challenging these processes might be. Second, the types of agreements, rules of engagement and managerial practices adopted by the parties are important to evaluate in that they can shape both the flows of resources and knowledge between the parties and the actions taken to overcome and accommodate significant relational differences between the parties. Third, the specific knowledge-sharing activities used are important in that they are the means through which the parties seek to facilitate knowledge sharing.

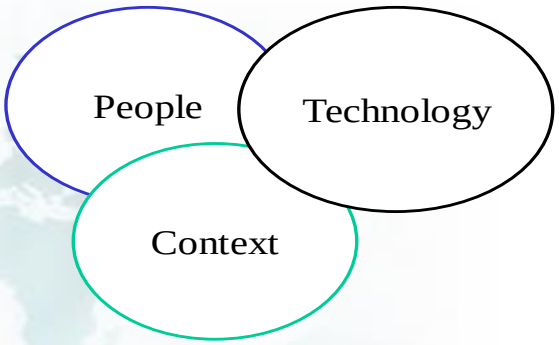
Why people do not want to share knowledge?

- Knowledge is power"
- "I don't have time"
- "That's not my job"
- "You're just using other people's ideas and taking the credit"
- "I want to do things my way"
- "This is how it's always been done"
- "I'm already suffering from information overload"

- "You should already know all the answers"
- "It's just another management fad; if I ignore it, it'll eventually go away"
- "What's in it for me?"

Knowledge architecture

- Knowledge architecture can be regarded as a prerequisite to **knowledge sharing**.
- The infrastructure can be viewed as a combination of **people**, **content**, and **technology.**
- These components are **inseparable** and **interdependent**



11.26

The people core

- knowledge workers, managers, customers, and suppliers.
- Helps to flow information the right information at the right time

The Technical Core

- The objective - enhance communication as well as ensure effective knowledge sharing.
  - Technology provides a lot of opportunities for managing tacit knowledge in the area of communication.
  - Communication networks create links between necessary databases.
- refer to the totality of the required hardware, software, and the specialized human resources.
- Attributes; Accuracy, speed, reliability, security, and integrity

The content core (User Interface Layer

- Usually a web browser represents the interface between the user and the KM system.
- Top player in knowledge architecture
- provide a way for the proper flow of tacit and explicit knowledge
- Feature while deigning user interface

- Consistency
- Relevancy
- Visual clarity
- Usability
- Ease of Navigation

Summary

The value of a firm's products and services is based not only on its physical resources but also on intangible knowledge assets. Some firms perform better than others because they have better knowledge about how to create, produce, and deliver products and services. This firm knowledge is difficult to imitate, unique, and can be leveraged into long-term strategic benefit. Knowledge management systems collect all relevant knowledge and experience in the firm and make it available wherever and whenever it is needed to support business processes and management decisions. They also link the firm to external sources of knowledge. Knowledge management systems support processes for acquiring, storing, distributing, and applying knowledge, as well as processes for creating new knowledge and integrating it into the organization. They include enterprise-wide systems for managing and distributing documents, graphics, and other digital knowledge objects, systems for creating corporate knowledge directories of employees with special areas of expertise, office systems for distributing knowledge and information, and knowledge work systems to facilitate knowledge creation.

Knowledge-creating companies exploit two kinds of knowledge. One is ***explicit knowledge***, which is the data, documents, and things written down or stored on computers. The other kind is ***tacit knowledge***, of knowledge, which resides in workers. Tacit knowledge can often represent some of the most important information within an organization

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Self Test Questions

Multiple Choices

1. *The first step of knowledge management system cycle is;*
   - ***A.*** *Store*
   - ***B.*** *Capture*
   - ***C.*** *Create*
   - ***D.*** *Disseminate*
2. *Which one of the following is/are true about aims of knowledge management initiatives ;*
   - ***A.*** *Make knowledge visible*
   - ***B.*** *Develop knowledge intensive culture*
   - ***C.*** *Build knowledge infrastructure*
   - ***D.*** *None of the above*
3. *Knowledge management involves all of the following except;*
   - ***A.*** *Creation of knowledge*
   - ***B.*** *dissemination of knowledge*
   - ***C.*** *utilization of knowledge*
   - ***D.*** *None of the above*
4. *One is true about Knowledge management systems, except;*
   - ***A.*** *Use of technologies to manage knowledge*
   - ***B.*** *Used with turnover, change, downsizing*
   - ***C.*** *Provide consistent levels of service*
   - ***D.*** *None of the above.*
5. *A knowledge created by individuals not about individuals.*
   - ***A.*** *Ontological*
   - ***B.*** *Epistemological*
   - ***C.*** *Tacit*
   - ***D.*** *Explicit*

Say True/False

1. *Tacit is a type of knowledge exists in people's heads, not articulated or documented.*
2. *Explicit is a type of knowledge can be processed by information systems codified and recorded and archived and protected.*
3. *Knowledge is the process through which organizations generate value from their intellectual property and knowledge-based assets.*

CHAPTER SIX

SECURITY AND ETHICAL CHALLENGES

Chapter objectives

After completing this chapter, students will be able to:

- Define the term ethical and security issues in IS
- Describe IS threats
- Explain about computer viruses
- Explain technologies used to protect IS threats

Introduction

There is no question that the use of information technology in business presents major security challenges, poses serious ethical questions, and affects society in significant ways. Therefore, in this section, we explore the threats to businesses and individuals as a result of many types of computer crime and unethical behavior. In Section II, we will examine a variety of methods that companies use to manage the security and integrity of their business systems.

6.1. Business/IT Security, Ethics, and Society

Activity

1. What is business IT Security?
2. Discuses about the types of computer crime and unethical behavior
3. List the Methods that companies use to manage the security and integrity of their business systems.

The use of information technologies in business has had a major impact on society and thus raises ethical issues in the areas of crime, privacy, individuality, employment, health, and working conditions.

It is important to understand that information technology has had beneficial results, as well as detrimental effects, on society and people in each of these areas. For example, computerizing a manufacturing process may have the beneficial result of improving working conditions and producing products of higher quality at lower cost, but it also has the adverse effect of

eliminating people's jobs. So your job as a manager or business professional should involve managing your work activities and those of others to minimize the detrimental effects of business applications of information technology and optimize their beneficial effects. That would represent an ethically responsible use of information technology.

6.1.1 Ethical Responsibility of Business Professionals

As a business professional, you have a responsibility to promote ethical uses of information technology in the workplace. Whether or not you have managerial responsibilities, you should accept the ethical responsibilities that come with your work activities. That includes properly performing your role as a vital human resource in the business systems you help develop and use in your organization. As a manager or business professional, it will be your responsibility to make decisions about business activities and the use of information technologies that may have an ethical dimension that must be considered.

For example, should you electronically monitor your employees' work activities and e-mail? Should you let employees use their work computers for private business or take home copies of software for their personal use? Should you electronically access your employees' personnel records or workstation files? Should you sell customer information extracted from transaction processing systems to other companies? These are a few examples of the types of decisions you will have to make that have an ethical dimension. So let's take a closer look at several ethical foundations in business and information technology.

Business Ethics

Business ethics is concerned with the numerous ethical questions that managers must confront as part of their daily business decision making. For example, the Figure below outlines some of the basic categories of ethical issues and specific business practices that have serious ethical consequences. Notice that the issues of intellectual property rights, customer and employee privacy, security of company records, and workplace safety are highlighted because they have been major areas of ethical controversy in information technology.

How can managers make ethical decisions when confronted with business issues such as those listed in Figure below? Several important alternatives based on theories of corporate social responsibility can be used. For example, in business ethics, the stockholder theory holds that

managers are agents of the stockholders, and their only ethical responsibility is to increase the profits of the business without violating the law or engaging in fraudulent practices.

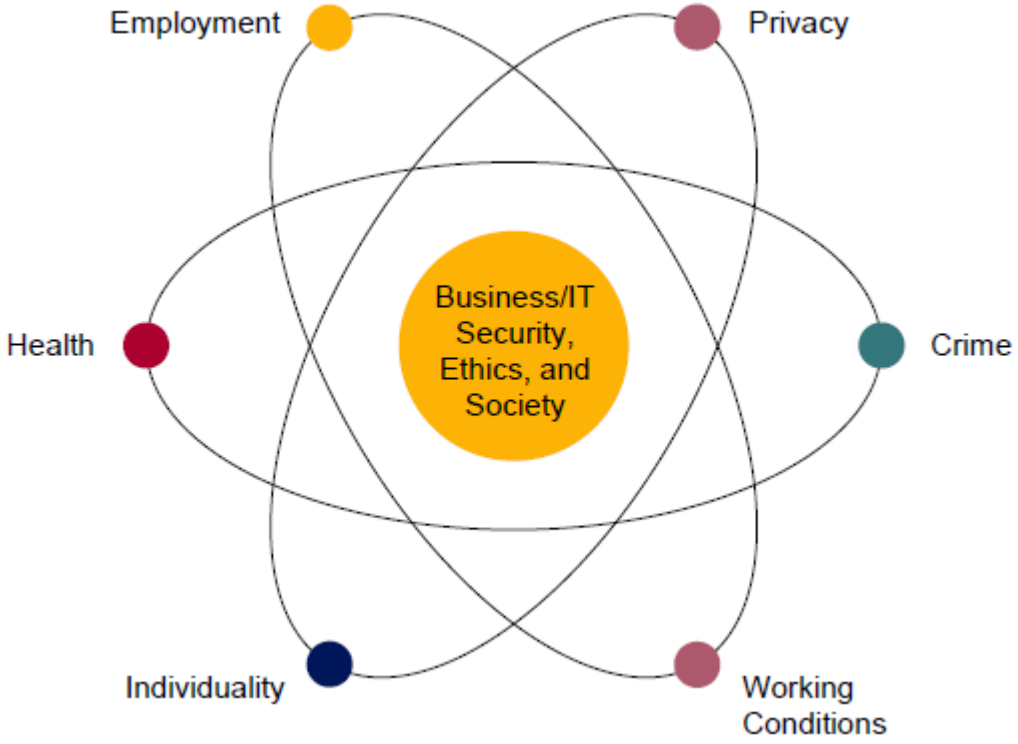

Figure 6.1: Business Ethics

However, the social contract theory states that companies have ethical responsibilities to all members of society, which allows corporations to exist according to a social contract. The first condition of the contract requires companies to enhance the economic satisfaction of consumers and employees. They must do that without polluting the environment or depleting natural resources, misusing political power, or subjecting their employees to dehumanizing working conditions. The second condition requires companies to avoid fraudulent practices, show respect for their employees as human beings, and avoid practices that systematically worsen the position of any group in society. The stakeholder theory of business ethics maintains that managers have an ethical responsibility to manage a firm for the benefit of all its stakeholders, that is, all individuals and groups that have a stake in, or claim on, a company. These stakeholders usually include the corporation's stockholders, employees, customers, suppliers, and the local community. Sometimes the term is broadened to include all groups who can affect or be affected

by the corporation, such as competitors, government agencies, and special-interest groups. Balancing the claims of conflicting stakeholders is obviously not an easy task for managers.

Technology Ethics

Another important ethical dimension deals specifically with the ethics of the use of any form of technology. These principles can serve as basic ethical requirements that companies should meet to help ensure the ethical implementation of information technologies and information systems in business. One common example of technology ethics involves some of the health risks of using computer workstations for extended periods in high-volume data entry job positions. Many organizations display ethical behavior by scheduling work breaks and limiting the exposure of data entry workers to staring at a computer monitor to minimize their risk of developing a variety of work-related health disorders, such as hand or eye injuries.

Ethical Guidelines

We have outlined a few ethical principles that can serve as the basis for ethical conduct by managers, end users, and IS professionals. But what more specific guidelines might help your ethical use of information technology? Many companies and organizations answer that question today with detailed policies for ethical computer and Internet usage by their employees.

For example, most policies specify that company computer workstations and networks are company resources that must be used only for work related uses, whether using internal networks or the Internet. Another way to answer this question is to examine statements of responsibilities contained in codes of professional conduct for IS professionals. A good example is the code of professional conduct of the Association of Information Technology Professionals (AITP), an organization of professionals in the computing field. Its code of conduct outlines the ethical considerations inherent in the major responsibilities of an IS professional. You can be a **responsible professional** by (1) acting with integrity, (2) increasing your professional competence, (3) setting high standards of personal performance, (4) accepting responsibility for your work, and (5) advancing the health, privacy, and general welfare of the public. Then you would be demonstrating ethical conduct, avoiding computer crime, and increasing the security of any information system you develop or use.

AITP Standards of Professional Conduct
In recognition of my obligation to my employer I shall: • Avoid conflicts of interest and ensure that my employer is aware of any potential conflicts. • Protect the privacy and confidentiality of all information entrusted to me. • Not misrepresent or withhold information that is germane to the situation. • Not attempt to use the resources of my employer for personal gain or for any purpose without proper approval. • Not exploit the weakness of a computer system for personal gain or personal satisfaction.
In recognition of my obligation to society I shall: • Use my skill and knowledge to inform the public in all areas of my expertise. • To the best of my ability, ensure that the products of my work are used in a socially responsible way. • Support, respect, and abide by the appropriate local, state, provincial, and federal laws. • Never misrepresent or withhold information that is germane to a problem or a situation of public concern, nor will I allow any such known information to remain unchallenged. • Not use knowledge of a confidential or personal nature in any unauthorized manner to achieve personal gain.

Table 6.1: AITP standards of professional conduct

Part of the AITP standards of professional conduct. This code can serve as a model for ethical conduct by business end users as well as IS professionals.

6.2. Computer Crime

Cyber crime is becoming one of the Net's growth businesses. Today, criminals are doing everything from stealing intellectual property and committing fraud to unleashing viruses and committing acts of cyber terrorism.

Computer crime, a growing threat to society, is caused by the criminal or irresponsible actions of individuals who are taking advantage of the widespread use and vulnerability of computers and the Internet and other networks. It presents a major challenge to the ethical use of information technologies. Computer crime also poses serious threats to the integrity, safety, and survival of most business systems and thus makes the development of effective security methods a top priority.

Computer crime is defined by the Association of Information Technology Professionals (AITP) as including (1) the unauthorized use, access, modification, and destruction of hardware, software, data, or network resources; (2) the unauthorized release of information; (3) the unauthorized copying of software; (4) denying an end user access to his or her own hardware, software, data, or network resources; and (5) using or conspiring to use computer or network resources to obtain information or tangible property illegally. This definition was promoted by the AITP in a Model Computer Crime Act and is reflected in many computer crime laws.

Hacking and Cracking

Cyber thieves have at their fingertips a dozen dangerous tools, from "scans" that ferret out weaknesses in Web site software programs to "sniffers" that snatch passwords.

Hacking, in computerizes, is the obsessive use of computers or the unauthorized access and use of networked computer systems. Hackers can be outsiders or company employees who use the Internet and other networks to steal or damage data and programs. One of the issues in hacking is what to do about a hacker who commits only electronic breaking and entering, that is, gets access to a computer system and reads some files but neither steals nor damages anything. This situation is common in computer crime cases that are prosecuted. In most cases, courts have found that the typical computer crime statute language prohibiting malicious access to a computer system did apply to anyone gaining unauthorized access to another's computer networks.

Common Hacking Tactics		
Denial of Service. This is becoming a common networking prank. By hammering a Web site's equipment with too many requests for information, an attacker can effectively clog the system, slowing performance or even crashing the site. This method of overloading computers is sometimes used to cover up an attack.	trick users into passing along critical information like passwords or credit card numbers.	**Logic Bombs.** An instruction in a computer program that triggers a malicious act.
Scans. Widespread probes of the Internet to determine types of computers, services, and connections. That way the bad guys can take advantage of weaknesses in a particular make of computer or software program.	**Trojan Horse.** A program that, unknown to the user, contains instructions that exploit a known vulnerability in some software.	**Buffer Overflow.** A technique for crashing or gaining control of a computer by sending too much data to the buffer in a computer's memory.
Sniffer. Programs that covertly search individual packets of data as they pass through the Internet, capturing passwords or the entire contents.	**Back Doors.** In case the original entry point has been detected, having a few hidden ways back makes reentry easy—and difficult to detect.	**Password Crackers.** Software that can guess passwords.
Spoofing. Faking an e-mail address or Web page to	**Malicious Applets.** Tiny programs, sometimes written in the popular Java computer language, that misuse your computer's resources, modify files on the hard disk, send fake e-mail, or steal passwords.	**Social Engineering.** A tactic used to gain access to computer systems by talking unsuspecting company employees out of valuable information such as passwords.
	War Dialing. Programs that automatically dial thousands of telephone numbers in search of a way in through a modem connection.	**Dumpster Diving.** Sifting through a company's garbage to find information to help break into their computers. Sometimes the information is used to make a stab at social engineering more credible.

Table 6.2: Common hacking tactics

Hackers can monitor e-mail, Web server access, or file transfers to extract passwords, steal network files, or plant data that will cause a system to welcome intruders. A hacker may also use remote services that allow one computer on a network to execute programs on another computer to gain privileged access within a network. Telnet, an Internet tool for interactive use of remote computers, can help hackers discover information to plan other attacks. Hackers have used Telnet to access a computer's e-mail port, for example, to monitor e-mail messages for passwords and other information about privileged user accounts and network resources. These are just some of the typical types of computer crimes that hackers commit on the Internet on a regular basis. That's why Internet security measures like encryption and firewalls, as discussed

in the next section, are so vital to the success of e-commerce and other e-business applications. The hacking community is quick to make the distinction between hacking and cracking. A cracker (also called a black hat or dark side hacker) is a malicious or criminal hacker. This term is seldom used outside of the security industry and by some modern programmers. The general public uses the term hacker to refer to the same thing. In computer jargon, the meaning of hacker can be much more broad. The name comes from the opposite of white hat hackers. Usually a cracker is a person who maintains knowledge of the vulnerabilities he or she finds and exploits them for private advantage, not revealing them to either the general public or the manufacturer for correction. Many crackers promote individual freedom and accessibility over privacy and security. Crackers may seek to expand holes in systems; any attempts made to patch software are generally to prevent others from also compromising a system over which they have already obtained secure control. In the most extreme cases, a cracker may work to cause damage maliciously or make threats to do so for blackmail purposes.

The term cracker was coined by Richard Stallman to provide an alternative to abusing the existing word hacker for this meaning. This term's use is limited (as is "black hat") mostly to some areas of the computer and security field and, even there, is considered controversial. One group that refers to themselves as hackers consists of skilled computer enthusiasts. The other, and more common usage, refers to people who attempt to gain unauthorized access to computer systems. Many members of the first group attempt to convince people that intruders should be called crackers rather than hackers, but the common usage remains ingrained.

Cyber Theft

Many computer crimes involve the theft of money. In the majority of cases, they are inside jobs that involve unauthorized network entry and fraudulent alteration of computer databases to cover the tracks of the employees involved. Of course, many computer crimes involve the use of the Internet. One early example was the theft of $11 million from Citibank in late 1994. Russian hacker Vladimir Levin and his accomplices in St. Petersburg used the Internet for an electronic break-in of Citibank's mainframe systems in New York. They then succeeded in transferring the funds from several Citibank accounts to their own accounts at banks in Finland, Israel, and California. In most cases, the scope of such financial losses is much larger than the incidents reported. Companies don't usually reveal that they have been targets or victims of computer

crime. They fear scaring customers and provoking complaints by shareholders. In fact, several British banks, including the Bank of London, paid hackers more than a half million dollars not to reveal information about electronic break-ins.

Cyber terrorism

Cyber terrorism is the leveraging of organizations or government's computers and information, particularly via the Internet, to cause physical, real-world harm or severe disruption of infrastructure. There are some that argue cyber terrorism is really a form of hacking or information warfare. They disagree with labeling it terrorism because of the unlikelihood of the creation of fear, significant physical harm, or death in a population using electronic means, considering current attack and protective technologies. The National Conference of State Legislatures (NCSL) puts a much finer point on the definition of the term: the use of information technology by terrorist groups and individuals to further their agenda. This can include use of information technology to organize and execute attacks against networks, computer systems and telecommunications infrastructures, or for exchanging information or making threats electronically.

Cyber terrorism can have a serious large-scale influence on significant numbers of people. It can significantly weaken a country's economy, thereby denying it access to vital resources and making it more vulnerable to military attack. Cyber terror can also affect Internet-based businesses. Like bricks and mortar retailers and service providers, most Web sites that produce income (whether by advertising, monetary exchange for goods, or paid services) could stand to lose money in the event of downtime created by cyber criminals. As Internet-businesses have increasing economic importance to countries, what is normally cyber crime becomes more political and therefore "terror" related. To date, there have been no reported cyber attacks on the United States. There have, however, been several large-scale examples of cyber terrorism in other countries. One such example occurred in Romania when cyber terrorists illegally gained access to the computers controlling the life-support systems at an Antarctic research station, endangering the 58 scientists involved. However, the culprits were stopped before damage actually occurred. Mostly nonpolitical acts of sabotage have caused financial and other damage, as in a case where a disgruntled employee caused the release of untreated sewage into water in Maroochy Shire, Australia. Computer viruses have degraded or shut down some nonessential systems in nuclear power plants, but this is not believed to have been a deliberate attack.

More recently, in May 2007 Estonia was subjected to a mass cyber attack in the wake of the removal of a Russian World War II war memorial from downtown Talinn. The attack was a distributed denial of service attack in which selected sites were bombarded with traffic in order to force them off-line; nearly all Estonian government ministry networks as well as two major Estonian bank networks were knocked off-line; in addition, the political party Web site of Estonia's current Prime Minister Andrus Ansip featured a counterfeit letter of apology from Ansip for removing the memorial statue. Despite speculation that the attack had been coordinated by the Russian government, Estonia's defense minister admitted he had no evidence linking cyber attacks to Russian authorities. Russia called accusations of its involvement "unfounded," and neither NATO nor European Commission experts were able to find any proof of official Russian government participation. In January 2008 a man from Estonia was convicted for launching the attacks against the Estonian Reform Party Web site and fined.

Unauthorized Use at Work

The unauthorized use of computer systems and networks can be called time and resource theft. A common example is unauthorized use of company-owned computer networks by employees. This use may range from doing private consulting or personal finances to playing video games to unauthorized use of the Internet on company networks. Network monitoring software, called sniffers, is frequently used to monitor network traffic to evaluate network capacity, as well as to reveal evidence of improper use.

According to one survey, 90 percent of U.S. workers admit to surfing recreational sites during office hours, and 84 percent say they send personal e-mail from work. So this kind of activity alone may not get you fired from your job; however, other Internet activities at work can bring instant dismissal. For example, The New York Times fired 23 workers because they were distributing racist and sexually offensive jokes on the company's e-mail system. Xerox Corp. fired more than 40 workers for spending up to eight hours a day on pornography sites on the Web. Several employees even downloaded pornographic videos, which took so much network bandwidth that it choked the company network and prevented coworkers from sending or receiving e-mail. Xerox instituted an eight member SWAT team on computer abuse that uses software to review every Web site its 40,000 computer user's view each day. Other companies clamp down even harder by installing software like Surf Watch, which enables them to block and monitor access to off-limit Web sites.

Internet Abuses	Activity
General E-mail Abuses	Include spamming, harassments, chain letters, solicitations, spoofing, propagations of viruses/worms, and defamatory statements.
Unauthorized Usage and Access	Sharing of passwords and access into networks without permission.
Copyright Infringement/ Plagiarism	Using illegal or pirated software that costs organizations millions of dollars because of copyright infringements. Copying of Web sites and copyrighted logos.
Newsgroup Postings	Posting of messages on various non-work–related topics from sex to lawn care advice.
Transmission of Confidential Data	Using the Internet to display or transmit trade secrets.
Pornography	Accessing sexually explicit sites from workplace as well as the display, distribution, and surfing of these offensive sites.
Hacking	Hacking of Web sites, ranging from denial of service attacks to accessing organizational databases.
Non-Work–Related Download/Upload	Propagation of software that ties up office bandwidth. Use of programs that allow the transmission of movies, music, and graphical materials.
Leisure Use of the Internet	Loafing around the Internet, which includes shopping, sending e-cards and personal e-mail, gambling online, chatting, game playing, auctioning, stock trading, and doing other personal activities.
Usage of External ISPs	Using an external ISP to connect to the Internet to avoid detection.
Moonlighting	Using office resources such as networks and computers to organize and conduct personal business (side jobs).

Table 6.3: Internet abuses in the workplace

Software Piracy

Computer programs are valuable property and thus the subject of theft from computer systems. However, unauthorized copying of software, or software piracy , is also a major form of software theft. Software piracy by company employees is widespread, which has resulted in lawsuits by the Software Publishers Association, an industry association of software developers, against major corporations that allowed unauthorized copying of their programs. Unauthorized copying is illegal because software is intellectual property that is protected by copyright law and user licensing agreements. For example, in the United States, commercial software packages are

protected by the Computer Software Piracy and Counterfeiting Amendment to the Federal Copyright Act. In most cases, the purchase of a commercial software package is really a payment to license its fair use by an individual end user. Therefore, many companies sign site licenses that legally allow them to make a certain number of copies for use by their employees at a particular location. Other alternatives are shareware, which allows you to make copies of software for others, and public domain software, which is not copyrighted.

The most recent study by the Business Software Alliance, an antipiracy group whose members include Apple Computer, IBM, Intel, and Microsoft, shows that in 2007, pirated software accounts for 38 percent of software in use worldwide. Reported losses from software piracy in 2007 were almost $48 billion—up $8 billion from the year before. "That's over a third of the industry's revenue," says Bob Kruger, the group's vice president for enforcement. According to the findings, only $50 billion of the $100 billion in software purchased in 2007 was legally acquired. In other words, for every dollar spent on software purchased legitimately worldwide, there was 50 cents' worth of software that was obtained illegally.

Theft of Intellectual Property

Software is not the only property that is subject to computer-based piracy. Other intellectual property theft occurs in the form of infringements of copyrighted material, such as music, videos, images, articles, books, and other written works, which most courts have deemed illegal. Digitized versions can easily be captured by computer systems and made available for people to access or download at Internet Web sites or can be readily disseminated by e-mail as file attachments. The development of peer-to-peer (P2P) networking technologies has made digital versions of copyrighted material even more vulnerable to unauthorized use. For example, P2P file-sharing software enables direct MP3 audio file transfers of specified tracks of music between your PC and those of other users on the Internet. Thus, such software creates a peer-to-peer network of millions of Internet users who electronically trade digital versions of copyrighted or public domain music stored on their PC's hard drives. More recently, music publishers and manufacturers are offering legal, and relatively inexpensive, methods to access online music in a variety of formats. Because of this proactive posture, the music industry reports that illegal downloading of music and video properties is down and continuing to drop significantly. Let's

look at the ongoing debate in this controversial area more closely with a real-world example that emphasizes the threat of developments in IT to intellectual property rights.

Computer Viruses and Worms

One of the most destructive examples of computer crime involves the creation of a computer virus or worm. Virus is the more popular term, but technically, a virus is a program code that cannot work without being inserted into another program. A worm is a distinct program that can run unaided. In either case, these programs copy annoying or destructive routines into the networked computer systems of anyone who accesses computers infected with the virus or who uses copies of magnetic disks taken from infected computers. Thus, a computer virus or worm can spread destruction among many users. Although they sometimes display only humorous messages, they more often destroy the contents of memory, hard disks, and other storage devices.

Computer viruses typically enter a computer system through e-mail and file attachments via the Internet and online services or through illegal or borrowed copies of software. Copies of shareware software downloaded from the Internet can be another source of viruses. A virus usually copies itself into the files of a computer's operating system. Then the virus spreads to the main memory and copies itself onto the computer's hard disk and any inserted floppy disks. The virus spreads to other computers through e-mail, file transfers, other telecommunications activities, or floppy disks from infected computers. Thus, as a good practice, you should avoid using software from questionable sources without checking for viruses. You should also regularly use antivirus programs that can help diagnose and remove computer viruses from infected files on your hard disk. We will discuss defense against viruses further in Section II.

Adware and Spyware

Two more recent entries into the computer vulnerabilities arena are adware and spyware. By definition, adware is software that, while purporting to serve some useful function and often fulfilling that function, also allows Internet advertisers to display advertisements as banners and pop-up ads without the consent of the computer user. In the extreme, adware can also collect information about the user of its host computer and send it over the Internet to its owner. This special class of adware is called **spyware** and is defined as any software that employs users' Internet connection in the background without their knowledge or explicit permission. Spyware programs collect specific information about you, ranging from general demographics like name,

address, and Internet surfing habits to credit card, Social Security number, user names, passwords, or other personal information. It is important to understand that not all adware programs are spyware. Proper adware represents a viable, albeit sometimes irritating, revenue model for many software companies that allows you to get products for free and, when used correctly, does not pose any significant privacy threat. In contrast, spyware is and should be considered a clear threat to your privacy. Whereas proper adware generally allows the computer user to opt in to its use in exchange for free use of a piece of software, spyware operates under a rather bizarre ethical model. Consider the following:

• You illegally enter a bank's computer system and place a stealth piece of software in their system. If you are detected or caught, you might be prosecuted and may go to jail.

• You write a worm or virus and spread it around the Internet or other networks. If you are detected or caught, you might be prosecuted and may go to jail. You write a program that spreads a spyware agent across computer systems connected to the Internet that steals the private information of the users it infects, manipulates their Internet experience, and uses other people's Web sites and browsers to display your advertising. If you are detected or caught, you may get rich, you don't go to jail, and the computer users are left with possibly rebuilding their computer system to get rid of your spyware. Spyware has a variety of characteristics, beyond its potential for stealing valuable private information, which make it undesirable to most computer users. At the very least, it plagues the user of the infected machine with unwanted advertising. More often, it watches everything a user does online and sends that information back to the marketing company that created the spyware. Often, spyware applications add advertising links to Web pages owned by other people, for which the Web page owner does not get paid, and may even redirect the payments from legitimate affiliate-fee advertisers to the makers of the spyware. Other undesirable characteristics include setting an infected system's browser home page and search settings to point to the spyware owner's Web sites (generally loaded with advertising), often in a manner that prevents you from changing back the settings (referred to as home-page hijacking). In the extremes, spyware can make a dial-up modem continually call premium-rate phone numbers, thus causing large telephone charges (and usually fees to the spyware owner) or leave security holes in an infected system allowing the makers of the spyware—or, in particularly bad cases, anyone at all—to download and run software on the infected machine (such downloads are called Trojans). In almost all cases, spyware severely degrades system

performance. As you can see, spyware doesn't have any redeeming features except for the benefits to its owner. Its use is pervasive, and failing to protect against it virtually ensures that your system will eventually become infected. Protecting against adware and spyware generally requires the purchase and installation of one of a variety of programs designed to prevent the software from being downloaded and installed. Once a computer is infected, however, removal programs are often not completely successful in eliminating the nuisance.

Privacy Issues

Information technology makes it technically and economically feasible to collect, store, integrate, interchange, and retrieve data and information quickly and easily. This characteristic has an important beneficial effect on the efficiency and effectiveness of computer-based information systems. The power of information technology to store and retrieve information, however, can have a negative effect on the **right to privacy** of every individual. For example, confidential e-mail messages by employees are monitored by many companies. Personal information is being collected about individuals every time they visit a site on the World Wide Web. Confidential information on individuals contained in centralized computer databases by credit bureaus, government agencies, and private business firms has been stolen or misused, resulting in the invasion of privacy, fraud, and other injustices. The unauthorized use of such information has badly damaged the privacy of individuals. Errors in such databases could seriously hurt the credit standing or reputation of an individual. Governments around the world, but none more than in the United States, are debating privacy issues and considering various forms of legislation. With regard to the Internet, opt-in versus opt-out is central to the debate over privacy legislation. Consumer protection groups typically endorse an opt-in standard, making privacy the default. An opt-in system automatically protects consumers who do not specifically allow data to be compiled about them. Most business interests back opt-out, arguing it doesn't disrupt the flow of e-commerce. Interestingly, current laws in this regard differ between the United States and Europe. In the United States, opt-out is the default position, whereas in Europe, consumers must opt-in or their information cannot be used. Additional privacy issues under debate include:

• Accessing private e-mail conversations and computer records and collecting and sharing information about individuals gained from their visits to Internet Web sites and newsgroups (violation of privacy).

• Always knowing where a person is, especially as mobile and paging services become more closely associated with people rather than places (computer monitoring).

• Using customer information gained from many sources to market additional business services (computer matching).

• Collecting telephone numbers, e-mail addresses, credit card numbers, and other personal information to build individual customer profiles (unauthorized personal files).

Privacy on Internet

If you don't take the proper precautions, any time you send an e-mail, access a Web site, post a message to a newsgroup, or use the Internet for banking and shopping . . . whether you're online for business or pleasure, you're vulnerable to anyone bent on collecting data about you without your knowledge. Fortunately, by using tools like encryption and anonymous remailers—and by being selective about the sites you visit and the information you provide—you can minimize, if not completely eliminate, the risk of your privacy being violated.

The Internet is notorious for giving its users a feeling of anonymity when in reality they are highly visible and open to violations of their privacy. Most of the Internet and its World Wide Web, e-mail, chat, and newsgroups are still a wide open, unsecured electronic frontier, with no tough rules on what information is personal and private. Information about Internet users is captured legitimately and automatically each time you visit a Web site or newsgroup and is recorded as a "cookie file" on your hard disk. Then the Web site owners or online auditing services like Double Click may sell the information from cookie files and other records of your Internet use to third parties. To make matters worse, much of the Net and Web is an easy target for the interception or theft by hackers of private information furnished to Web sites by Internet users. Of course, you can protect your privacy in several ways. For example, sensitive e-mail can be protected by encryption, if both e-mail parties use compatible encryption software built into their e-mail programs. Newsgroup postings can be made privately by sending them through anonymous remailers that protect your identity when you add your comments to a discussion. You can ask your Internet service provider not to sell your name and personal information to mailing list providers and other marketers. Finally, you can decline to reveal personal data and interests on online service and Web site user profiles to limit your exposure to electronic snooping.

Computer Matching

Computer profiling and mistakes in the computer matching of personal data are other controversial threats to privacy. Individuals have been mistakenly arrested and jailed and people have been denied credit because their physical profiles or personal data have been used by profiling software to match them incorrectly or improperly with the wrong individuals. Another threat is the unauthorized matching of computerized information about you extracted from the databases of sales transaction processing systems and sold to information brokers or other companies. A more recent threat is the unauthorized matching and sale of information about you collected from Internet Web sites and newsgroups you visit, as we discussed previously. You are then subjected to a barrage of unsolicited promotional material and sales contacts as well as having your privacy violated.

Privacy Laws

Many countries strictly regulate the collection and use of personal data by business corporations and government agencies. Many government privacy laws attempt to enforce the privacy of computer-based files and communications. For example, in the United States, the Electronic Communications Privacy Act and the Computer Fraud and Abuse Act prohibit intercepting data communications messages, stealing or destroying data, or trespassing in federal-related computer systems. Because the Internet includes federal-related computer systems, privacy attorneys argue that the laws also require notifying employees if a company intends to monitor Internet usage. Another example is the U.S. Computer Matching and Privacy Act, which regulates the matching of data held in federal agency files to verify eligibility for federal programs.

More recently, new legislation intended to protect individual privacy has created some new challenges for organizations. Sarbanes-Oxley, the Health Insurance Portability and Accountability Act (HIPAA), Gramm-Leach-Bliley, the USA PATRIOT Act, the California Security Breach Law, and Securities and Exchange Commission rule 17a-4 are but a few of the compliance challenges facing organizations. In an effort to comply with these new privacy laws, it is estimated that a typical company will spend 3–4 percent of its IT budget on compliance applications and projects. The Health Insurance Portability and Accountability Act (HIPAA) were enacted by the U.S. Congress in 1996. It is a broad piece of legislation intended to address a wide variety of issues related to individual health insurance. Two important sections of HIPAA include the privacy rules and the security rules. Both of these portions of the law are intended to

create safeguards against the unauthorized use, disclosure, or distribution of an individual's health-related information without their specific consent or authorization. While the privacy rules pertain to all Protected Health Information (PHI) including paper and electronic, the security rules deal specifically with Electronic Protected Health Information (EPHI). These rules lay out three types of security safeguards required for compliance: administrative, physical, and technical. For each of these types, the rules identify various security standards, and for each standard, name both required and addressable implementation specifications. Required specifications must be adopted and administered as dictated by the HIPAA regulation. Addressable specifications are more flexible. Individual covered entities can evaluate their own situation and determine the best way to implement addressable specifications.

6.3. Tools of Security Management

The goal of security management is the accuracy, integrity, and safety of all information system processes and resources. Thus, effective security management can minimize errors, fraud, and losses in the information systems that interconnect today's companies and their customers, suppliers, and other stakeholders. Security management is a complex task. As you can see, security managers must acquire and integrate a variety of security tools and methods to protect a company's information system resources. We discuss many of these security measures in this section.

Internetworked Security Defenses

Few professionals today face greater challenges than those IT managers who are developing Internet security policies for rapidly changing network infrastructures. How can they balance the need for Internet security and Internet access? Are the budgets for Internet security adequate? What impact will intranet, extranet, and Web application development have on security architectures? How can they come up with best practices for developing Internet security policy? The security of today's networked business enterprises is a major management challenge. Many companies are still in the process of getting fully connected to the Web and the Internet for e-commerce and are reengineering their internal business processes with intranets, e-business software, and extranet links to customers, suppliers, and other business partners. Vital network links and business flows need to be protected from external attack by cyber criminals and from subversion by the criminal or irresponsible acts of insiders. This protection requires a variety of

security tools and defensive measures and a coordinated security management program. Let's take a look at some of these important security defenses.

Encryption

Encryption of data has become an important way to protect data and other computer network resources, especially on the Internet, intranets, and extranets. Passwords, messages, files, and other data can be transmitted in scrambled form and unscrambled by computer systems for authorized users only. Encryption involves using special mathematical algorithms, or keys, to transform digital data into a scrambled code before they are transmitted, and then to decode the data when they are received. The most widely used encryption method uses a pair of public and private keys unique to each individual. For example, e-mail could be scrambled and encoded using a unique public key for the recipient that is known to the sender. After the e-mail is transmitted, only the recipient's secret private key could unscramble the message. Encryption programs are sold as separate products or built into other software used for the encryption process. There are several competing software encryption standards, but the top two are RSA (by RSA Data Security) and PGP (which stands for "pretty good privacy"), a popular encryption program available on the Internet. Software products including Microsoft Windows XP, Novell NetWare, and Lotus Notes offer encryption features using RSA software.

Firewalls

Another important method for control and security on the Internet and other networks is the use of firewall computers and software. A network firewall can be a communications processor, typically a router, or a dedicated server, along with firewall software. A firewall serves as a gatekeeper system that protects a company's intranets and other computer networks from intrusion by providing a filter and safe transfer point for access to and from the Internet and other networks. It screens all network traffic for proper passwords or other security codes and only allows authorized transmissions in and out of the network. Firewall software has also become an essential computer system component for individuals connecting to the Internet with DSL or cable modems because of their vulnerable, "always-on" connection status.

Internet/intranet firewall system

Firewalls can deter, but not completely prevent, unauthorized access (hacking) into computer networks. In some cases, a firewall may allow access only from trusted locations on the Internet

to particular computers inside the firewall, or it may allow only "safe" information to pass. For example, a firewall may permit users to read e-mail from remote locations but not run certain programs. In other cases, it is impossible to distinguish the safe use of a particular network service from unsafe use, so all requests must be blocked. The firewall may then provide substitutes for some network services (such as e-mail or file transfers) that perform most of the same functions but are not as vulnerable to penetration.

Denial of Service Attacks

Major attacks against e-commerce and corporate Web sites in the past few years have demonstrated that the Internet is extremely vulnerable to a variety of assaults by criminal hackers, especially distributed denial of service (DDOS) attacks. The steps organizations can take to protect themselves from DDOS attacks. Denial of service assaults via the Internet depend on three layers of networked computer systems: (1) the victim's Web site, (2) the victim's Internet service provider (ISP), and (3) the sites of "zombie" or slave computers that the cyber criminals commandeered. For example, in early 2000, hackers broke into hundreds of servers, mostly poorly protected servers at universities, and planted Trojan horse.exe programs, which were then used to launch a barrage of service requests in a concerted attack on e-commerce Web sites like Yahoo! and eBay.

E-mail Monitoring

Spot checks just aren't good enough anymore. The tide is turning toward systematic monitoring of corporate e-mail traffic using content-monitoring software that scans for troublesome words that might compromise corporate security. The reason: Users of monitoring software said they're concerned about protecting their intellectual property and guarding themselves against litigation. Internet and other online e-mail systems are one of the favorite avenues of attack by hackers for spreading computer viruses or breaking into networked computers. E-mail is also the battleground for attempts by companies to enforce policies against illegal, personal, or damaging messages by employees versus the demands of some employees and others who see such policies as violations of privacy rights.

Virus Defenses

Is your PC protected from the latest viruses, worms, Trojan horses, and other malicious programs that can wreak havoc on your PC? Chances are it is, if it's periodically linked to the corporate network. These days, corporate antivirus protection is a centralized function of information technology. Someone installs it for you on your PC and notebook or, increasingly, distributes it over the network. The antivirus software runs in the background, popping up every so often to reassure you. The trend right now is to automate the process entirely.

Many companies are building defenses against the spread of viruses by centralizing the distribution and updating of antivirus software as a responsibility of their IS departments. Other companies are outsourcing the virus protection responsibility to their Internet service providers or telecommunications or security management companies. One reason for this trend is that the major antivirus software companies like McAfee (VirusScan) and Symantec (Norton Antivirus) have developed network versions of their programs, which they are marketing to ISPs and others as a service they should offer to all their customers. The antivirus companies are also marketing security suites of software that integrate virus protection with firewalls, Web security, and content blocking features.

Security Codes

Typically, a multilevel password system is used for security management. First, an end user logs on to the computer system by entering his or her unique identification code, or user ID. Second, the end user is asked to enter a password to gain access into the system. (Passwords should be changed frequently and consist of unusual combinations of upper and lowercase letters and numbers.) Third, to access an individual file, a unique file name must be entered. In some systems, the password to read the contents of a file is different from that required to write to a file (change its contents). This feature adds another level of protection to stored data resources. For even stricter security, however, passwords can be scrambled, or encrypted, to avoid their theft or improper use. In addition, smart cards, which contain microprocessors that generate random numbers to add to an end user's password, are used in some secure systems.

Backup Files

Backup files, which are duplicate files of data or programs, are another important security measure. Files can also be protected by file retention measures that involve storing copies of files from previous periods. If current files are destroyed, the files from previous periods can be used

to reconstruct new current files. Sometimes, several generations of files are kept for control purposes. Thus, master files from several recent periods of processing (known as child, parent, and grandparent files) may be kept for backup purposes. Such files may be stored off-premises, that is, in a location away from a company's data center, sometimes in special storage vaults in remote locations.

Summary

Ethical and Societal Dimensions: The vital role of information technologies and systems in society raises serious ethical and societal issues in terms of their impact on employment, individuality, working conditions, privacy, health, and computer crime.

Employment issues include the loss of jobs—a result of computerization and automation of work—versus the jobs created to supply and support new information technologies and the business applications they make possible. The impact on working conditions involves the issues of computer monitoring of employees and the quality of the working conditions of the jobs that use information technologies heavily. The effect of IT on individuality addresses the issues of the depersonalization, regimentation, and inflexibility of some computerized business systems.

Employees' heavy use of computer workstations for long periods raises issues about and may cause work-related health disorders. The use of IT to access or collect private information without authorization, as well as for computer profiling, computer matching, computer monitoring, and computer libel and censorship, raises serious privacy issues. Computer crime issues surround activities such as hacking, computer viruses and worms, cyber theft, unauthorized use at work, software piracy, and piracy of intellectual property. Managers, business professionals, and IS specialists can help solve the problems of improper use of IT by assuming their ethical responsibilities for the ergonomic design, beneficial use, and enlightened management of information technologies in our society.

Ethical Responsibility in Business: Business and IT activities involve many ethical considerations. Basic principles of technology and business ethics can serve as guidelines for business professionals when dealing with ethical business issues that may arise in the widespread use of information technology in business and society. Examples include theories of corporate social responsibility, which outline the ethical responsibility of management and employees to a company's stockholders, stakeholders, and society.

Security Management: One of the most important responsibilities of the management of a company is to ensure the security and quality of its IT-enabled business activities. Security management tools and policies can ensure the accuracy, integrity, and safety of the information systems and resources of a company and thus minimize errors, fraud, and security losses in its business activities. Examples mentioned in the chapter include the use of encryption of confidential business data, firewalls, e-mail monitoring, antivirus software, security codes, backup files, security monitors, biometric security measures, computer failure controls, fault-tolerant systems, disaster recovery measures, information system controls, and security audits of business systems.

Self Test Questions

Multiple Choices

1. *Information systems ethics that deals with Protecting one's personal information;*
   - ***A.*** *Computer Literacy*
   - ***B.*** *Privacy*
   - ***C.*** *Digital Divide*
   - ***D.*** *Identity theft*
2. *_____is any illegal act for which knowledge of computer technology is used to commit the offense.*
   - ***A.*** *Fraud*
   - ***B.*** *Intrusions*
   - ***C.*** *Extortion*
   - ***D.*** *Error*
3. *___ is stealing of another's social security number, credit card number, or other personal information.*
   - ***A.*** *Computer Literacy*
   - ***B.*** *Computer Ethics*
   - ***C.*** *Privacy*
   - ***D.*** *Identity theft*
4. *Which one of the following is true about information accuracy?*
   - ***A.*** *Deals with who own information about individuals and how information can be sold and exchanged.*
   - ***B.*** *Deals with authentication/verification and fidelity/reliability of information.*

C. *Deals with what information a person has the right to obtain about others and how the information can be used.*

D. *None of the above*

5. *_____are duplicate files of data or programs.*

A. *Virus defenses*

B. *Security codes*

C. *Backup files*

D. *All of the above*

Say True/False

1. *Information property is deals with who own information about individuals and how information can be sold and exchanged.*

2. *Computer Security is precautions taken to keep computers and the information they contain safe from unauthorized access*

3. *Encryption is the process of encoding messages before they enter the network or airwaves, then decoding them at the receiving end of the transfer.*

4. *Firewall is hardware and software designed to keep unauthorized users out of network systems*

5. *Information manipulation can occur at virtually any stage of information processing from input to output.*