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PREFACE

Management information systems, which are required in many business administration or management programs as part of the common body of knowledge required of all business majors. Thus, this module treats the subject area known as management information systems as a major functional area of business that is important to management education as are the areas of accounting, finance, operations management, marketing, and human resource management.

This module has fire chapters, chapter 1: General Introduction Chapter 2: Computer resources, chapter 3: Application of information in management levels and functions, chapter 4: Information systems planning and Chapter 5: Management of information systems.

Each Chapter Contains study objectives, activities, exercises, summary, and self tests that can be taken as module examinations augmented with the main text. Therefore, in your study look at the study objectives of the beginning of each Chapter carefully, and go through all what is included in it.

Generally you are supposed to study the course independently in addition, tutorial class will be arranged to assist you resolve all the problems you will encounter during your independent study. There fore, I recommended you to with this opportunity by making yourself ready for this class in advance.
You will be evaluated on the following bases:

Evaluation Type	Frequency	Weighting
Assignments	2	35%
Attendance of Tutoring		5%
Final Examinations		60%
Total		100%

You are kindly requested your comments on the course material, you may send it to the tutor who will be assigned at your center or directly to the department of mgt .P.O.Box 79, Bahir Dar university.

CHAPTER –ONE

GENERAL INTRODUCTION

INTRODUCTION

Dear students
Welcome to the course management information system.

Why study information systems? That's the same as asking why any one should study accounting, finance, operations management, human resource management, or any other major business function. Information systems have become a vital component of successful business firms and other organizations. It thus constitutes an essential field of study in business administration and management. That's why most business majors must take a course in information systems. Since you probably intend to be a manager, entrepreneur, or business professional, it is just as important to have a basic understanding of information systems as it is to understand any other functional area in business.

CHAPTER OBJECTIVE

After reading and studying this chapter, you should be able to:

- Explain why knowledge of information systems is important for managerial end users.
- Identify five areas of information systems knowledge they need.
- Provide a framework for organizing a managerial end user's knowledge of information systems.
- Identify and give examples of the components and functions of the generic concept of a system introduced in this chapter.
- Discuss uses, importance, and significance of information systems in management decision making.

1.1 AN INTRODUCTION TO INFORMATION MANAGEMENT

ACTIVITY 1:
What do you think information systems are in different dimensions?

1.1.1 *MANAGERIAL END USER PERSPECTIVE*

An information system is a set of people, procedures, and resources that collects, transforms, and disseminates information in an organization. Today's managers rely on many types of information systems (IS). They might include simple manual (Paper- and -pencil) information systems and informal (word -of-mouth) information systems. However, in this text, we will concentrate on computer- based information systems that use hardware, software, telecommunications, and other forms of information technology (IT) to transform data resources into a variety of information products. In particular, we will discuss several types of management information systems (MIS) that provide information for decision making by managers.

Any one who uses an information system or the information it produces is an end user. This usually applies to most people in an organization, as distinguished from the smaller number of people who are information system specialists, such as systems analysts or professional computer programmers. A managerial end user is a manager, or professional computer programmer's professional who personally uses information systems. So, most managers are managerial end users.

Information systems can play a vital role in business success. They can provide the information a business needs for efficient operations, effective management, and competitive advantage. However, information systems can fail. If information systems do not properly support the strategic objectives, business operations, or management needs of an organization, they can seriously damage its prospects for survival and success. So, the proper management of information systems is a major challenge for managers. Thus, for managerial end users, the information systems function represents.

- A major functional area of business that is as important to business success as the functions of accounting, finance, operations management, marketing, and human resource management.
- A major part of the resources of an organization and its cost of doing business, thus posing a major resource management challenge.
- An important factor affecting operational efficiency, employee productivity and morale, and customer service and satisfaction.
- A major source of information and support needed to promote effective decision making by managers.
- An important ingredient in developing competitive products and services that give an organization a strategic advantage in the global market place.
- A Vital, dynamic, and challenging career opportunity for millions of men and women.

1.1.2 INTERNATIONAL AND ETHICAL DIMENSIONS OF IS

Information is a basic resource in today's society. We are living in a global information society, with a global economy which is increasingly dependent on the creation, management, and distribution of information resources. People in many nations no longer live in agricultural societies, composed primarily of farmers, or even industrial societies, where a majority of the work force consists of factory workers. Instead, the work force in many nations consists primarily of workers in service occupations or knowledge workers, that is, people who spend most of their workday creating, using, and distributing information.

Knowledge workers include executives, managers, and supervisors; professionals such as accountants, engineers, scientists, stockbrokers, and teachers; and staff personnel such as secretaries and clerical office personnel. Most of them are end users who make their living using information systems to create, distribute, manage, and use information resources. Thus, information systems help them manage the human, financial, materials, energy, and other resources involved in their work responsibilities.

This brings up the questions of what your responsibilities are in the ethical use of information technology. As a prospective managerial end user and knowledge worker, you should begin to think about what ethical responsibilities are generated by the use of

information systems. For example, what uses of information systems might be considered improper or irresponsible to other individuals or to society? What is the proper use of organizations information resources? What does it take to be a responsible end user of information technology? These are some of the questions that online the ethical dimensions of information systems which we will discuss next.

Information and information systems, then, are valuable resources for knowledge workers, their organizations, and society. A major challenge for our global information society is to manage its information resources to benefit all members of society while meeting the strategic goals of organizations and nations. This means, for example, using information systems to find more efficient, profitable, and socially responsible ways of using the world's limited supplies of materials, energy, and other resources. Since the information systems of so many organizations are interconnected by local, regional, and global telecommunications networks, knowledge workers can now access and distribute information and manage resources all over the world. For these reasons, information systems play an increasingly vital role in our global economy.

1.1.3 TECHNOLOGICAL AND BEHAVIORAL DIMENSIONS OF IS

Computer Science, engineering, and mathematics are disciplines that distribute to the technological aspects of information systems in business. It is these disciplines, along with the information systems discipline, whose research drives developments in computer hardware, software, and telecommunications, database management, and other information technologies. Areas such as psychology, sociology, and political science, on the other hand, contribute to the behavioral aspects of information systems in organizations. The research findings of these behavioral disciplines and the discipline of information systems shed light on how individuals and organizations can effectively use and manage information technology. The behavioral side of MIS focuses on adjusting information technology to support individual and organizational goals, as well as helping individuals and organizations take advantage of the benefits of information systems.

Both of these aspects, the technological and behavioral, are important for managerial end users. That's because computer- based information systems, hongs heavily dependent on information processing technologies, are designed, operated, and used by people in a variety of organizational settings. Thus, for managerial end users, the success of an information system should be measured not only by its efficiency in the use of information technologies, but also by its effectiveness in meeting the goals of end users and their organizations.

1.1.4 WHAT MANAGERIAL END USERS NEED TO KNOW

Business firms and other organizations need people who can help them manage their information resources. Knowledgeable managerial end users can play a major role in information resource management (IRM). That is, they can learn to manage information system hardware, software, data, and information resources so they are used for the efficient operation, effective management, and strategic success of their organizations.

However, what exactly does a managerial end user need to know about information systems? The answers are as diverse and dynamic as the area itself. As we have just

mentioned, the field of information systems, like other areas in management and business administration, is based on a variety of academic disciplines and encompasses a great amount of technological and dramatic technological developments and behavioral research findings push back the frontiers of this dynamic discipline.

1.1.5 A FRAME WORK FOR MANAGERIAL END USERS

"Most of our top management team really doesn't have a clue what to do about IT. They are at the merely of the techies. They just not their heads and hope they don't show their ignorance." That is a comment from a senior manager of a large bank that is a leader in the use of information technology! is so dynamic in this field that a tactical knowledge that concentrates on detailed characteristics and capabilities would soon be outdated. Instead, you should focus on generic capabilities, major developmental trends, and management challenges in the use of information systems technology.

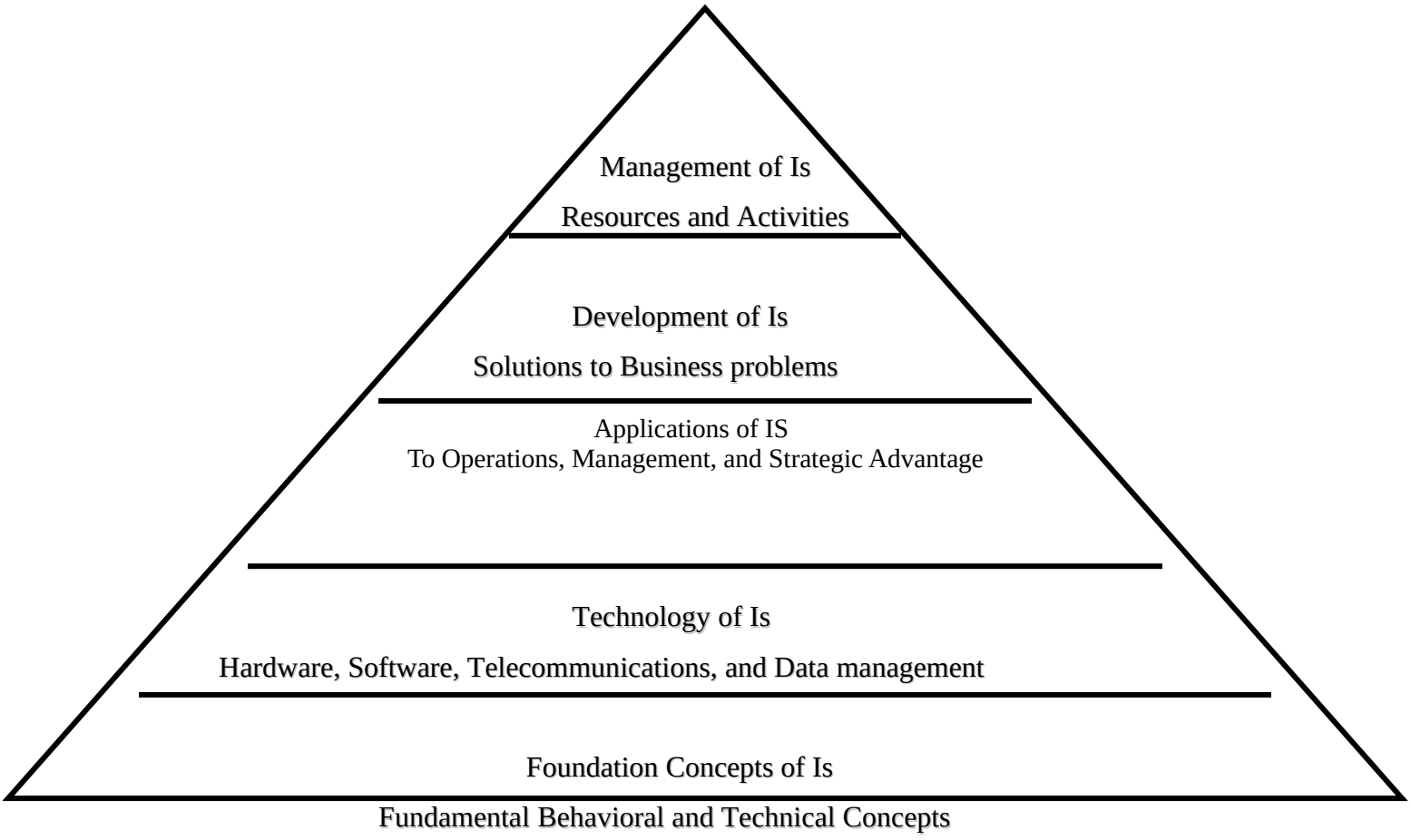


Figure-1 this framework outlines the major areas of information systems knowledge needed by managerial end users.

1.1.6 APPLICATIONS

In What ways can information systems assist end users and organizations in accomplishing their work activities and meeting their strategic objectives? Answering this question requires knowledge of the major applications of information systems for end user activates and the operations, management, and strategic advantage of organizations. You should gain a basic understanding of information systems concepts and applications in areas such as end user computing, office automation, transaction processing, the functional areas of business, management reporting, decision support, executive support, and artificial intelligence.

1.1.7 MANAGEMENT

How should managerial end users meet the major challenges they face in managing the information systems of their organizations? Answering this question requires understanding what methods you can use to manage the resources, technologies, and activities of information systems. Developing and using information technology can be as difficult and costly as it is beneficial to a firm.

Thus, you should understand concepts such as information resource management and information systems planning, implementation, and control as well as important international and ethical issues in information systems. So, even top executives can feel over whelmed by the complex technologies, abstract behavioral concepts, and specialized applications involved in the field of information systems. How ever, most managers and other end users do not have to absorb all of this knowledge. Figure1 illustrates a useful conceptual framework that outlines what a managerial end user needs to know about information systems. It emphasizes that you should concentrate your efforts in five areas of knowledge: foundations concepts, technology, applications, development, and management.

1.1.8 FOUNDATION CONCEPTS

What are information systems, and why are they important to end users and their organizations? In order to answer this question, you need to understand what the basic components and properties of information systems are. This requires an understanding of some fundamental concepts in general systems theory and information processing. However, you should also appreciate the vital roles played by information systems in businesses and other organizations. For example, you should learn some fundamental behavioral and technical concepts that will help you understand how information systems can support the business operations, managerial decision making, and strategic advantage of business firms and other organizations.

1.1.9 DEVELOPMENT

How should managerial end users or information specialists develop information systems solutions to business problems? To answer this question, you should learn some fundamental problem solving and developmental concepts. You should understand how

methodologies such as the systems approach, the systems development life cycle, and prototyping can be used to construct information systems applications that successfully meet end user and organizational needs.

1.1.10 TECHNOLOGY

What should managerial end users know about the technologies used in computer - based information systems? The answer to this question is that they should have an understanding of major concepts, developments, and management issues in information technology, that is, hardware, software, telecommunications, database management, and other information processing technologies. Technology is so dynamic in this field that a factual knowledge that concentrates on detailed characteristics and capabilities would soon be outdated. Instead, you should focus on generic capabilities, major developmental trends, and management challenges in the use of information systems technology.

Exercise 1.1

1. Who is a managerial end user? Is a managerial end user also a knowledge worker? Explain.
2. What are five major areas of information systems knowledge? How could knowledge of these areas help a managerial end user?

1.2 AN INTRODUCTION TO CONCEPTS OF SYSTEMS AND ORGANIZATION MANAGER'S VIEW

Activity 2: How do you define a system?

Dear learners,

When you begin the study of information systems, you should become acquainted with a theoretical framework for understanding their use, development, and effect on organization; that is, you need to have an understanding of systems concepts as a foundation for further study. The word system is often misunderstood. Some people think you are referring to a computer system when you use the term, but you may hear people talk about financial systems, air - conditioning systems, school system, and investment systems as well as about information systems. A system is a collection of people, machines, and methods organized to accomplish a set of specific tasks. Information systems which are a major topic in this text gave the same components and characteristics as systems in general.

The chapter introduces the concepts of systems, their characteristics, and their interaction with systems and you'll need feedback about their performance. Information is the feedback you need to determine if systems are achieving their objectives, operating with the necessary components, and meeting the necessary standards. Information systems are designed to give managers the information they require as feedback.

In this chapter, you will learn about the systems approach to problem solving. As a manager, you will be dealing with many types of systems and you will be responsible for

improving their performance. For example, you'll determine if procedures, personnel, and equipment need to be changed to achieve objectives. Or you'll need to assess the effect on new equipment on current work methods, procedures, and organization. The systems approach to problem solving will help you deal with these kinds of tasks.

Finally, this chapter explains how organizations operate as systems, with unique characteristics, information flows, and decision processes. You will learn about the components of organizations and about different types of organizations structures. You will need to recognize the structures of organizations to understand the decision-making processes that occur with in different types of organization.

1.2.1 SYSTEMS CONCEPTS

A System is an integrated set of components, or entities, that interact to achieve a particular function or goal. Systems have characteristics such as boundaries, out puts and inputs, methods of converting inputs into outputs, and systems interfaces, as we will see. Systems are composed of interrelated and interdependent subsystems. Examples of systems are all around us infect, an excellent examples is a college class. The components of the classroom situation, including an instructor, the students, textbooks, and facilities, all interact to make the accomplishment of learning goals possible. (Figure 2: depicts a model of a classroom system.)

A business is also a system. A business uses resources such as people, capital, materials, and facilities to achieve the goal of making a profit. Business procedures, such as order banding, marketing research, financial planning, and manufacturing, are the interactions that need to be managed to achieve this objective.

For a more thorough understanding of systems you need to be familiar with concepts like boundary and interface.

i. System Boundaries

All systems have a boundary that depicts its scope of activities in a class include lectures, discussion, testing, grading, and preparation of assigned course work. These activities may represent the boundary of the system for which a teacher is responsible. Within the systems of the classroom, the teacher is responsible for organizing class time, assigning homework to students, and evaluating student progress. The boundary, then, delineates an area of responsibility. When defining a system, you must establish a boundary.

System boundaries are also established within a business system. A sales manager may be responsible for managing, motivating, and evaluating the performance of a sales organization. The owner of the business, however, faces different boundaries and may develop a financial plan, a marketing strategy, and a long-range business plan.

ii. System and Subsystems

System may consist of numerous subsystems, each of which has elements, interactions, and objectives. Subsystems perform specialized tasks related to the overall objectives of the total system. For example, an educational system may consist of individual courses

that are subsystems. Each course provides specific knowledge that is apart of the overall educational systems and contributes to its goals.

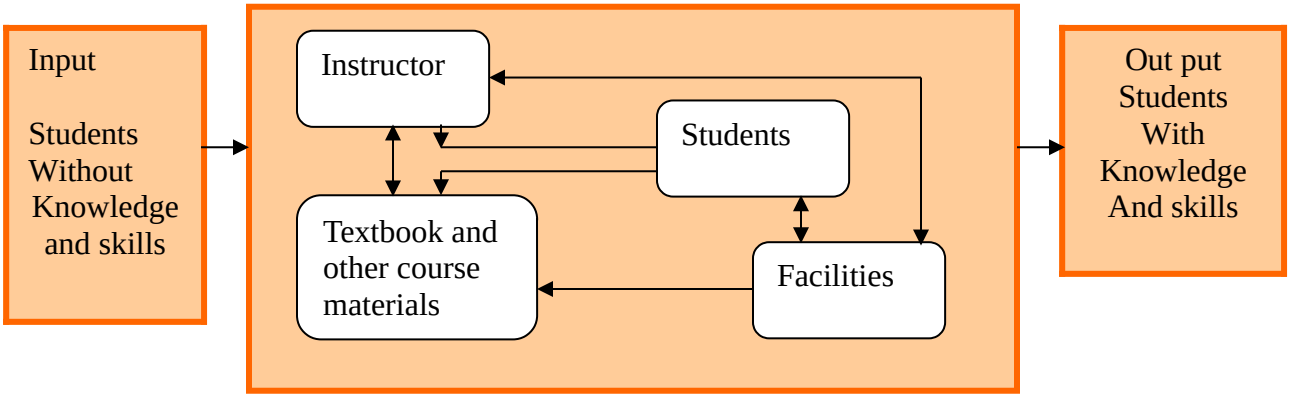


Figure 2. Classroom system

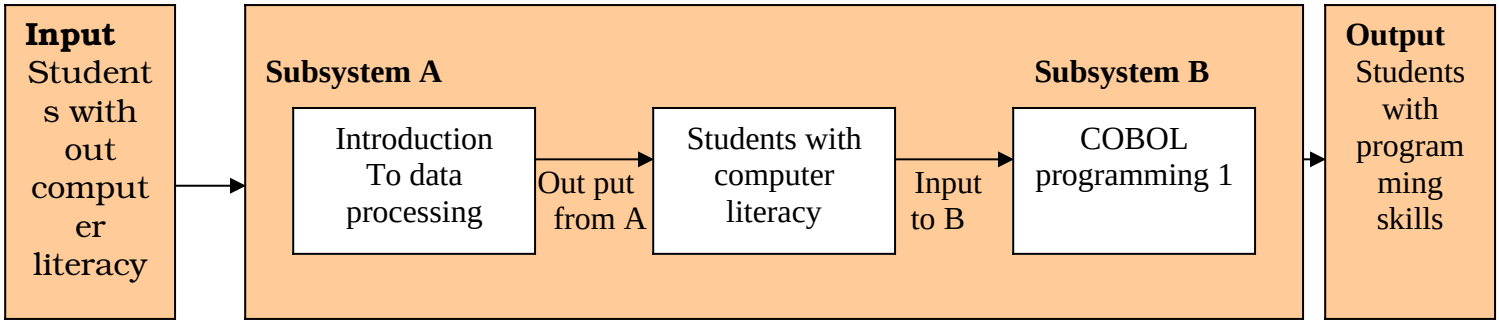


Figure -3 Typical Subsystem: An example

In a business system, various functions are subsystems. Marketing, finance, and manufacturing, for example, are subsystems. Within the marketing subsystem, the sales order entry and credit checking functions are subsystems. Each subsystem uses its resources to meet specific objectives. Successful achievement of these goals requires good management of internal resources. For instance, in managing the sales order entry function, the supervisor needs to develop sales order procedures, maintain sales order records, and train sales order personnel.

iii. **Outputs and Inputs**

The inner workings of a systems or subsystems are organized to produce outputs from inputs. In this conversation process, some value or utility should be added to the inputs. For example, a training program should produce trained employees with certain skills, knowledge, or behavior from its inputs- untrained employees.

The outputs of one subsystem usually become inputs in to the next. The out puts of a course in introductory data processing concepts, for instance, become inputs in to the next course in COBOL programming. (These two subsystems are depicted in figure 3.)

As you'd expect, the outputs of a subsystem have to adhere to certain standards to be acceptable to the next. If students coming out of the introductory data processing course don't understand basic concepts of file organization and file processing, they won't have the prerequisite skills needed for COBOL. If they're not permitted to enter COBOL until they meet certain standards, though, the problems would be alleviated. The more exactly standards are adhered to; the easier it will be to interface the two courses, or subsystems.

An interface is a connection at system or subsystem boundaries. An interface serves as a medium to convey the output from one system to the input of another system. An example will help clarify this concept. Two typical business systems that interface with each other are inventory control and purchasing. If inventory levels drop below ascertain level, then additional stock of these items should be purchased. Purchasing will need to know what quantity of a particular item to obtain to replenish the stock and information on sales inventory turnover to learn which items are in greatest demand so these items can be replenished on a timely basis. An inventory control system will provide information on stock to be reordered based up on sales and inventory turnover trends.

However, if the inventory control subsystem triggers erroneous information about the amount of stock to be reordered, then inputs in to purchasing will be wrong. This problem can be partially overcome by establishing an economic order quantity, or the quantity of an item that is most economical to buy, for each item in inventory. This quantity, derived from order history and inventory turnover rate, can serve as a standard and prevent reordering too -much or too little stock.

iv. Subsystem interface and interface problems

In the previous section we discussed how some interface problems can be alleviated through the development of standards. But you might encounter other types of interface problems. Some times the output of one subsystem is not sufficient to accommodate the needs of the next subsystem. For example, the production subsystem may not be able to produce enough stock to meet sales demands during certain peak periods. One way of handling this interface problem is through the use of slack resources. In this situation, excess inventories can be built up on purpose to meet the demand for sufficient inventory at peak times.

Another system interface problem can occur between the authoring subsystem and the editorial subsystem in the development of the text-book. Another who wait until the last minute to finish their writing may not be able to produce manuscript fast enough to meet production schedules, which involve editing, artwork, layout and design, typesetting, and proofreading tasks. This problem can be avoided in several ways. First, an author may be asked to complete several chapters before production activities begin. This is another example of using slack resources.

Second, an author may be asked to adhere to certain standards for input in to the production subsystem. For example, the author may be asked to create and store all text using a word processing package that can be transported to a computer- based type setting system without rekeying.

Third, an author could hire a library researcher, photo researcher, and typist to provide a support subsystem to expedite the development of manuscript. This is an example of how creating a new subsystem can help solve a system interface problem.

Another situation in which a system interface problem can be solved by designing a new subsystem occurs at a college when it accepts some students with deficiencies in their academic backgrounds. To bridge the gap between high school and college, a remedial subsystem can be created to help students develop prerequisite skills for college work> For instance, students lacking basic writing skill may be required to take a remedial writing class to learn spelling, grammar, Punctuation, and composition skill. On successfully completing this class, they may receive permission to enroll in classes in literature.

v. **Systems And Their Environments**

The system's environment consists of people, organizations, and other systems that supply data to or that receive data from the system. Not surprisingly, the environment is perceived differently by different managers. A sales manager, for example, envisions the system environment to be the company's customers and vendors of the products and services being marketed. But the owner of the business perceives the environment to include the firm's competitors, financial institutions that provide resources for expansion, and government agencies with jurisdiction over company plans and products. Moreover, not only can the environment be perceived differently by different managers, but also various kinds of systems don't always interact with the environment in the same way.

vi. **Open and Closed Systems**.

Open systems operate in an external environment and exchange information and material with that environment. The external environment consists of the activities external to the system boundary with which the system can interact. An open system needs to receive feedback to changed and to continue to exist in its environment. For example, a marketing system, which is an open system, operates in an environment of competition. If a competitor introduces new technology by providing customers with on line order entry terminals, the marketing function must adapt to the change in the environment or remain at a competitive disadvantage. One way of accommodating the change in the environment is to offer a similar on-line order entry service. The same type of adjustment is necessary when an airline offers a new service, such as a frequent flier bonus program. Though the new service may temporarily give the air carries the competitive advantage, the other airlines soon follow suit and offer a similar program.

In contrast, a closed system is relatively self- contained; it doesn't exchange information with its environment. closed systems don't get the feed back they need from the external environment and tend to deteriorate. For instance, if a training program administrator doesn't respond to the needs of the business environment for trained graduates, students

may no longer be able to get jobs and may go elsewhere for training. Eventually, the training program may be discontinued.

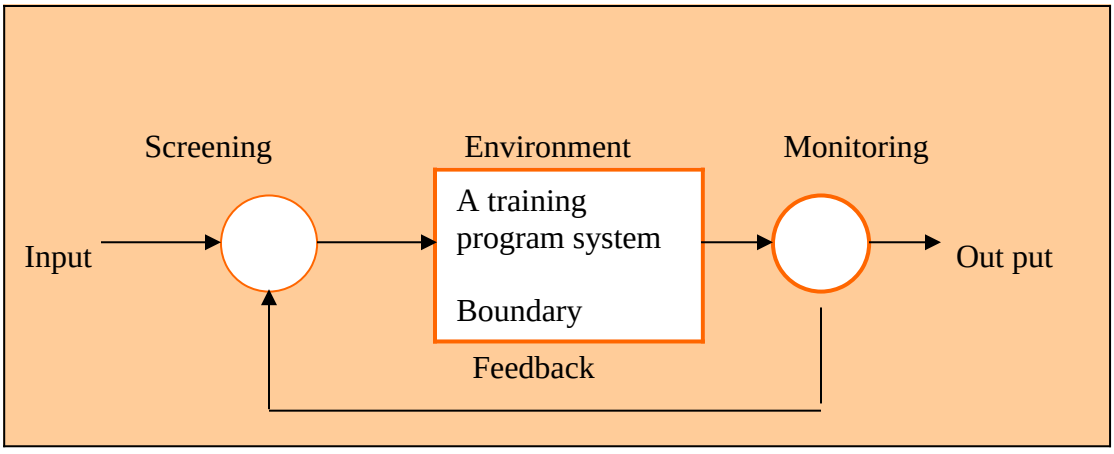
You might wonder why closed systems exist at all. More often than not, participants in a system become closed to external feedback without fully being aware of it. For example, a university may only offer graduate courses during the daytime hours because it has always scheduled these courses in this way. Without recognizing the growing number of working adults wishing to enroll in evening graduate programs, the university may find registrations dwindling and may even have to discontinue certain courses. If university officials had been more responsive to students needs, however, they might have enjoyed booming enrollments among the population of adult evening students.

vii. System Feed Back

A system needs feedback to do its job. Feed back is an indicator of how current Performance rates when compared to a set of standards. With effective feed back, continuing adjustments in the activities of a system can be made to assure that the system achieves its goals. Measuring performance against a standard is an effective control mechanism. Employees need feedback to learn how well they are achieving job goals. Students receive grades or other kinds of evaluations from instructors that show whether they are meeting course objectives.

Product managers also need feedback on how well new products fare in certain markets. They conduct market research studies in test markets to compare new products with established products. They can use feedback from these market tests to redesign a new product or identity target markets for which the product is suitable before its introduction. Products such as shampoos, honey roasted peanuts, and detergents are all market tested in this way. Sometimes a company receives feedback after introducing a new product. When coca-cola introduced new coke, negative feedback from its established customer base forced the reintroduction of its original formula as classic coke.

Figure 4 A training system and its environment



Formulas from one cell to arrange of cells and may experience difficulty performing this procedure on the job. This feed back may be used to build more exercises on the copy command into training classes. Figure.3 depicts a training system and its environment. It also shows how feedback from the external environment can be used to modify or

improve the system's internal workings. So far we've emphasized the constructive aspect of feedback. Sometimes the wrong kind of feedback is provided, however. This would be true if students were rewarded for the number of book reports they complete, rather than for the quality of the reports. They may skim books to get just enough information to complete and submit each report without developing comprehension and reading skills the real objectives of the exercise. Or if employees get the wrong kinds of feed back, they may increase their efforts in areas that aren't useful in achieving the objectives of the system. For example, if sales people are rewarded for the number of sales calls they make instead of the number of sales they close, they will try to fit in as many calls a day as they can rather than spending the time with each customer to make a sale. As a result, the company may lose business and not achieve its objectives.

Such considerations make it clear that feedback mechanisms must be designed for effective control of business functions with is an organization. In a business setting, an inventory manager needs to mange the inventory levels of hundreds of items to avoid shortages of items in demand and to prevent excess inventory levels of items that do not turn over frequently. The inventory manger needs feedback to control these inventory levels and determine when to order new stock of certain items. An inventory control system can automatically generate a purchase order for stock replenishment when an item in inventory levels fall below a safe level, incoming customers order cannot be filled. However, if excess inventories build up, cash will be tied up unnecessarily.

In short, many information systems provide managers with information they need to allocate their resources to achieve business goals. By having information about current business activities, managers can control production, inventory, and marketing resources and invest these resources in the most profitable ways. Information on planned versus actual sales, for example, can be used to detect slow moving items and cut production of these items. Fast moving items should trigger production so the sales function can take advantage of market demand.

viii. SYSTEM ENTROPY

Systems can run down if they are not maintained. System entropy corresponds roughly to chaos or disorder- a state that occurs without maintenance. If employees do not have opportunities to learn new concepts and techniques, the skills they apply to performing job tasks will become out of date. The process of maintain a system is a process of decreasing entropy or increasing orderliness. Sending automobile mechanics to training classes to learn new diagnostic techniques is an example of decreasing entropy. Orderliness can be achieved through preventive maintenance checks, such as a yearly physical examination for an employee or a routine tune-up for an automobile, and then taking action as a result of these regular checks. These checks provide valuable feed back to help detect faults or problems when none have anticipated. Diagnostic tools for equipment and machinery help prevent downtime, which may cause delays in production and cost thousands of dollars in lost business.

ix. SYSTEM STRESS AND CHANGE

System changes over time. Some of these changes occur because of identified problems, new business opportunities, and new management directives. Systems may also change

as a result of stresses. The achievement levels needed to meet existing goals may changes. For example, because of reduced profit margins on sales, a division sales manager may insist on a sales increase of 10 percent instead of 7 percent to achieve the same profits. The tendency is to localize the stress so the pressure for adjusting to new demands is felt primarily by one subsystem, in this case the division sales force.

It is easier to deal with change with in one subsystem than with in the total system because stress may require rethinking existing work methods and organization. In this case, the sales manager may have to develop more effective procedures to improve the profitability of sales. The sales manage may recommend cutting down calls to smaller customer accounts and substituting telemarketing to service their needs. Sales people might need to reallocate their time so they can pay special attention to customers who purchase the most profitable product lines and encourage customers who purchase less profitable lines of look at high margin products. All these procedures require a close analysis of the current system, changes in work procedures, and effective time management.

Another source of system stress occurs if inputs cannot be monitored but the system is expected to produce the same quality of out put. Many colleges and universities screen applicants using standardized test scores, high school grades, and references. Some educational institutions, however, have open admissions policies that make it possible for all high school graduates to apply and be admitted. Because admitting candidates without the necessary academic skills for college study places undue stress on the entire educational system, colleges with open admissions policies typical localize this stress by establishing remedial programs and hiring specially trained teachers for these students. Students are expected to pass remedial course work before entering regular college courses.

In a business situation, the same thing happens. New workers participate in training programs before being places in positions with in the firm. During the training period, they learn specific job related practices so they can become productive in the work environment as soon as possible. After training, they are placed in positions consistent with their skill levels and backgrounds. This orientation and training process helps minimize the stress that might occur if the new employees were placed directly in to positions with in the firm.

Although it is of ten easier to deal with stress by changing the activities of a subsystem, it is also important to remember that the subsystem is a part of the whole system and interacts with other subsystem in achieving overall objectives. It may be necessary to consider the entire system in responding to a problem and to modify activities in other subsystems as well.

1.2.2 SYSTEMS CONCEPTS IN BUSINESS

The Systems approach is away of analyzing business problems. This approach views the business organization as a system of interrelated parts designed to accomplish goals. Each subsystems both a self- contained unit and apart of a larger system. Mangers must

understand the goals of the total system and design the function of subsystems within the total system to make it possible to accomplish these goals.

More specifically, management is the practice of organizing resources, including people, materials, procedures, and machines, to achieve objective. In other words, it entails organizing subsystems to accomplish specific tasks. Using a systems approach, a manager organizes various activates of the business in to separate organizational subsystems. The subsystems of the business are connected by resource flows through the firm.

To consider an example, the market research subsystem of the business may obtain information from customers about modifications that need to be made in the firm's products and services. This information can be transmitted to the manufacturing subsystem that builds product design changes in to its processes. Finally, the finished products are sold to customers through the marketing subsystem. If technical problems occur, the service subsystem may need to provide follow -up support.

1.2.3 AN INFORMATION SYSTEM AS A SYSTEM

In many ways, information systems have the same characteristics as systems in general. The major purpose of an information system is to convert data in to information - information is data with meaning. In a business context, an information system is a subsystem of the business system of an organization. Each business system has goals, such as increasing profits, expanding market share, and providing service to customers. The information systems of an organization should provide information on the day –to-day activities of a business, such as processing sales order or checking credit, These system are called operational system. Information systems also must be designed to provide information that lets management allocate resources effectively to achieve business objectives. These systems are known as tactical systems. Finally, information systems must support the strategic plants of the business, and these systems are known as strategic planning systems. You'll learn more about these systems in the next chapter. But to sum up our discussion so far, information provides managers with the feedback they need about a system and its operations- feedback they can use for decision making, using this information, a manager can reallocate resources, redesign jobs, or reorganize procedures to accomplish objectives successfully.

An information system consist of components that interact to achieve the objective of providing information about day-to-day activities that mangers can use to control business operations. Information systems can also be designed to provide information to enable mangers to allocate resources and establish long- business plans. An information system contains such elements and hardware, software, personnel; databases, and procedures to accomplish its objectives. The hardware consists of the computer devices that support data processing, communications processing, and other compute-related actives. Software consists of the instructions that the hardware uses to process information, Software includes both application software and system software. Application software consists of the programs written to support specific business function, such as order entry, inventory control, and accounts receivable, systems

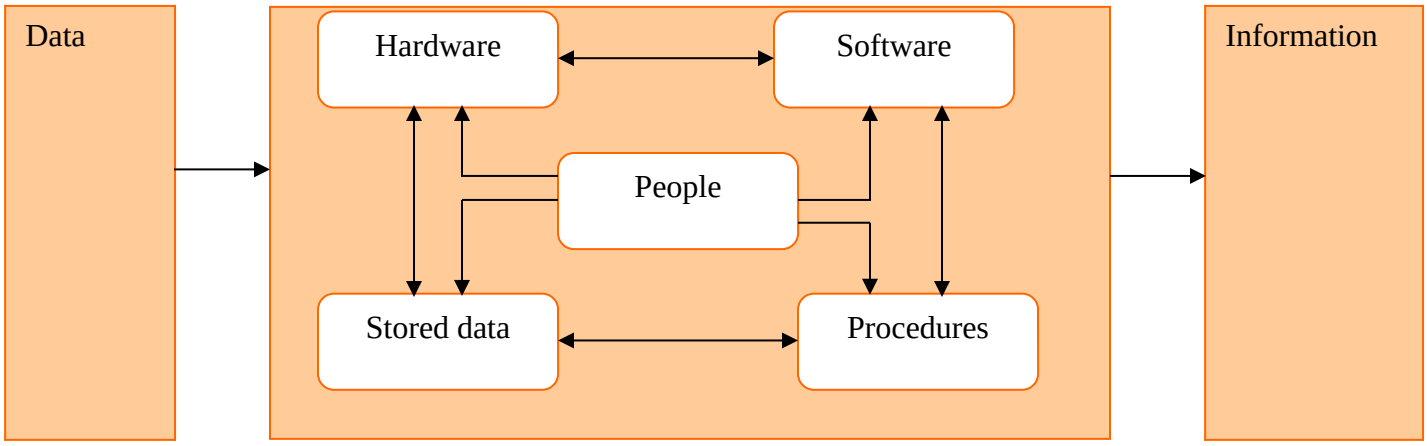
software enables the hard ware to process application software programs. System software consists of the programs that handle such function a sorting data, converting programs into the machine language the computer can understand, and retrieving data from storage areas.

Information – processing personnel, such as systems designers and programmers, design and write the application programs to support information processing activities. Operations personnel, such as data entry operators and equipment operators, handle day - to –day operations activities. Finally, all personnel have to follow specific procedures to organize and mange a company's information–processing activities. These procedures include designing and implementing programs, maintaining hardware and software, and managing the operations function. The interactions among these elements constitute the information-processing procedures that are used to generate information needed for decision-making. (A general) model of an information system is shown in figure-5).

SUBSYSTEMS

Operational systems, which are designed to provide information about day- to- day activities, are composed of subsystems that accomplish specialized tasks. A mail order business, for example, needs a system to process customer orders. The order processing systems actually consists of subsystems set up to handle incoming order, update inventory levels, and bill customer. Other sub systems are created to purchase new stock, to handle accounts payable transactions, and to apply cash receipts from customers to out standing accounts receivable balances. Each of these subsystems performs a specialized task that supports the business objectives of increasing sales and providing customer service.

Figure -5 A model of an information system



However, if one of these subsystems breaks down, the overall business will feel the effect. For example, if the mail – order company does not maintain sufficient inventories, customer may become frustrated with constant back – orders and shift their business to other mail order companies.

SYSTEMS CONCEPTS IN ORGANIZATIONS

The Organization is also a system. Henry Mintzberg, in his book The structuring of organization, describes five basic parts of organizations and how they function together as a system in which materials , information, and decision processes flow. Mintzberg also identified five different types of organizational structures, including the simple structure, the machine bureaucracy, the professional bureaucracy, the divisional zed form and the adhocracy.

THE FIVE PARTS OF THE ORGANIZATION

The five parts of the organization are the operating core, the strategic apex, the middle line, the technostructue, and the support staff as Figure 5 shows. The operating core is comprised of the operators that carry out the basic work of the organization. They obtain inputs, transform inputs into outputs, and distribute the outputs. They also provide direct support for these input, transformation, and output functions. You might think of the operating core of an automobile manufacturer as the assembly –line workers.

The administrative component of the organization is made up of the strategic apex, the middle line, and the techno structure. The strategies apex is top level management. Top management is responsible for allocating resources, resolving conflicts, reviewing activities, disseminating information, and serving as spokespersons for the organization in dealing with the external environment. Most importantly, they develop the organization's strategic plans.

The middle line consists of middle level mangers who are below top managers in the chain of command. The middle line managers are responsible for coordination and control of activities with in their functional units. They allocate resources, initiate change, handle conflicts, monitor the environment, establish strategy, and negotiate with outsider-all to serve the needs of their functional units.

The technostruture consists of analysts who help standardize the work of others within the organization to control outputs and adapt to the environment. Examples of groups in the technostructure are work - study analysts who standardize work processes, planning and budget analysts who standardize outputs, and personnel analysts- trainers who standardize skills used by the organization.

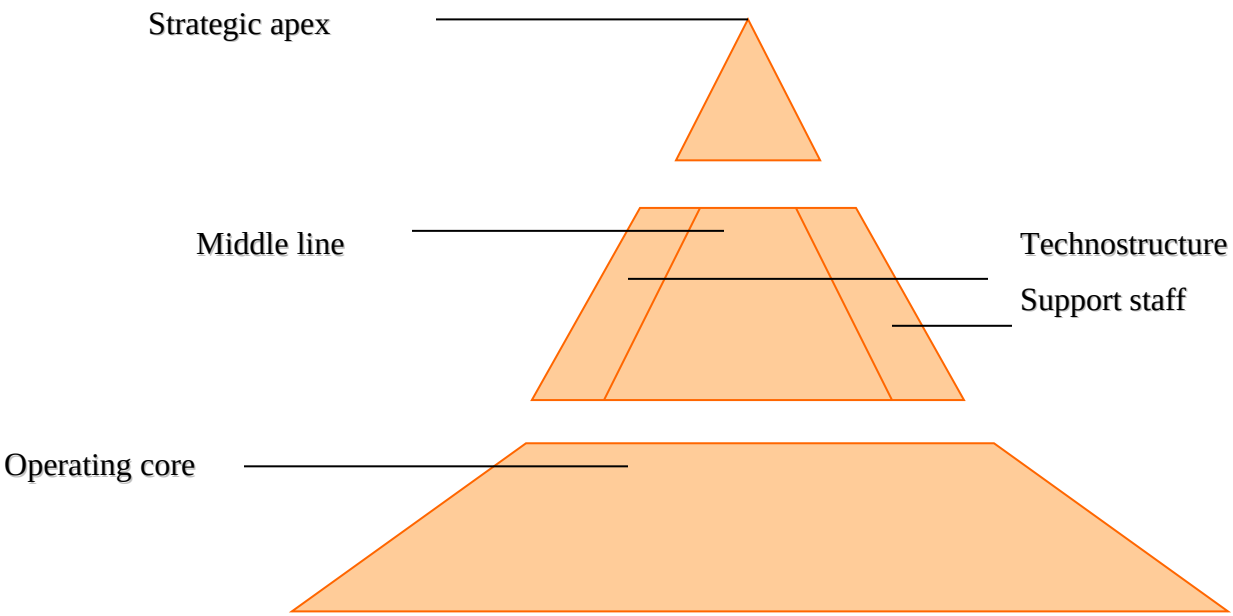


Figure 6 The five basic parts of organizations

The fifth group in the organization, the support staff, is responsible for supporting the operating core outside the flow of operating work. Support groups include the cafeteria, legal, payroll, public relations, and research and development staffs.

THE ORGANIZATION AS A SYSTEM OF FLOWS

The five parts of the organization are joined together by flows of authority, work materials, information, and decision processes. At the operating level, the parts moving down the assembly line are work flows. Control information flows from the operating level to middle management and serves as feedback. As feedback information passes up through each level of the hierarchy, it becomes more highly aggregated until it reaches the strategic apex. Typically, information about exceptions passes upward through the hierarchy until it reaches a manager who has the formal authority to handle the situation. In addition, commands flow downward from top and middle management to the operating, core.

The communications patterns within organization vary depending up on the Structure of the organization. In more traditional organization, information is filtered as it moves upwards through the hierarchy. In emerging form of “networked” organization, informal communication may link members of prefect team who represent diverse areas and who work in different location, by learning about their communications patterns, you can understand how different types of organization function using feedback from both internal and external sources.

TYPES OF ORGANIZATIONAL STRUCTURES

In Mintzberg's analysis, the five types of organization the simple structure, the machine bureaucracy, the professional bureaucracy, the divisional zed form, and the adhocracy- have unique ways of handling information and communication. As Organizations become information based, information becomes a shared resource that facilitates interaction among specialists in diverse area. As information technology moves on to the desktop of every manager, it will become a vehicle that supports the transition the more advanced networked forms of Organization.

The Simple Structure: - What do an automobile dealership, middle sized retail store, a small corporation run by an aggressive entrepreneur, and a brand –new government department have in common? They are all examples of the simple structure.

The classic case of the simple structure is the owner-managed entrepreneurship. The chief executive has most of the power and is responsible for formulating strategy and policy. The simple structure has little or no techno structure, few support staffers, and a small management hierarchy. Jobs in the operating core are unspecialized and interchangeable. An example of simple structure is a family owned restaurant where the husband is the chef and the wife does the inventory management, purchasing, and accounting. The waiters are the unspecialized operating workers.

In the simple structure, information follows a traditional path through the hierarchy to the single chief executive, the major decision maker. One possible problems is that the leader may become so enmeshed in operating- level information that he or she forgets the strategic direction of the organization.

The Machine Bureaucracy: What do a national post office, security agency, a steel company, an airline, and automobile companies have in common? They are all machine bureaucracies. Characteristics of the machine bureaucracy are a clearly defined hierarchy of authority, centralized power for decision making and formal communications thought the organization. At the operating core, you will find standardized procedures and proliferation of rules and regulations. In the machine bureaucracy, analysis in the techno structure – work analysts, job designers, quality control engineers, and operations researchers standardize work methods and procedures.

An example of a machine bureaucracy is a fast food restaurant chain. In each restaurant, food is standardized. Recipes, menus, prices, and specials are fixed. Even the uniforms, interior décor, and externals appearance of each restaurant is fixed. Customers depend up on fast food restaurant chains for consistent food- whether they go to Peoria or Tokyo.

As you have already learned, the machine bureaucracy has a clear chain of command, with clearly defined authority at the top. The information system of the machine bureaucracy aggregates information as it moves up the hierarchy, at the risk of excessive filtering. By the time information hits the strategic apex, bad news may be blocked and

good news may be highlighted. Yet, the managers making up the strategic apex are still responsible for making most of the decisions. Sometimes without the information they need. This is one of the major issues of the machine bureaucracy.

The Professional Bureaucracy: Universities, general hospitals, school systems, general accounting firms, and social work agencies are still another type of organization, the professional bureaucracy. The professional bureaucracy hires professionals who are specialists in their fields and gives them control over their work. Professionals work independently of their colleagues; they work closely with the clients they serve. Professionals have several tasks: diagnosing a clients need, presenting one or more alternatives, and proceeding with a particular course of action.

You might wonder why professionals join organizations at all. One factor is the market for their skill; students whishing business training and students seeking a broad liberal arts background represent two distinct markets for a university. Hence a university may group itself into departments, including a marketing department to train students in career skills and a philosophy department to train generalists.

The professional organization is highly decentralized, with most of its power at the operating core. Professional organizations are collegial organizations. Much of the work in policy- setting and organizing activities takes place in committees of the professionals. In this way, the professionals get collective control over the administrative decisions that affect them. In most universities, for example, professors determine their own rules for tenure and promotion. New initiatives, such as the development of new degree programs, are developed by committees of the professionals.

The professional bureaucracy is a democratic form of organization, which means that information flows are widespread and diverse. Much of the feedback comes from the external environment. If the faculty of a business program doesn't receive feed back from potential employers, they may not change programs to prepare graduates with the skills and knowledge they need to succeed in entry-level positions.

The Divisionalized Form: - The divisionalized organization consists of a group of quasi-autonomous entities coupled together by a central administrative structure. There are divisionalized corporations and universities with multiple campuses. A corporation, for example, may have 15 different divisions each with its own purchasing, manufacturing, and marketing functions.

The divisionalized structure usually emerges in response to distinct markets. The divisionalized form works well when different products and services are offered to different markets. For example, a multidivisional corporation may have divisions selling copiers, computers, and printing presses to three different markets. In the 1920s, Sloan converted General Motors in to divisionalized firm (e.g., Chevrolet, Cadillac, etc.) but retained central office controls for some functions, including research, engineering, quality control, styling, pricing, and dealer relations. Today, the corporate offices divisional zed firms provide support services such as financial, legal, personnel services, market research, and research and development.

The key to managing a divisionalized enterprise is a management information system that alerts senior management to deviations in business performance. In this way, the strategic apex can correct fundamental problems of the business, shift resources, and focus on products and markets where business performance is strong. The tendency of the management information system that monitors division performance is to focus on such indicators as profit, sales growth, and return on investment.

The Adhocracy:- What do a management consulting firm and an innovative theater project company have in common? They are both examples of an adhocracy, the fifth type of organizational structure. The adhocracy combines groups of specialists into small market. Based project teams each team is a task force designed to conduct a specific project. A high - technology firm, for example, establishes an interdisciplinary project team consists of highly trained experts. The adhocracy thrives in a rapidly changing environment with strong competition.

The function of management in an adhocracy is different form the other forms of organization. Top managers scan the external environment looking for new projects and sell their services to potential clients. Managers at various level of the organization work to coordinate project - related activities. They serve as peers, not as supervisors. Their influence is derived from their expertise and interpersonal skill, not their positions power.

The adhocracy works well in organizations developing and marketing diverse, high technical products in a rapidly changing environment. Sometimes temporary adhocracies are formed to draw together specialists from different organizations to execute single projects. An all- star sports team, an election campaign committee, and a special presidential task force are examples. The matrix- type structure, emphasis on expertise, and project-team orientation make the adhocracy a fashionable form of organizational structure in the 1990.

TRANSITION TO THE INFORMATION- BASED ORGANIZATION

The transition to the information - based organization is the transition from a traditional bureaucratic organization to a networked organization, or adhocracy. The role of information is different in these two types of organizations.

In the traditional organization, information is "owned" by each functional area. Summary information is transmitted up through the hierarchy to senior management. In the adhocracy, information is shared. Team with representatives from many different functional areas share access to common information resources, Such as customer databases, accounting databases, and product development databases.

The role of information is a critical factor in the transition to the networked organization. Access to information is the key to empowering the worker. For example, insurance application reviewers at Mutual Benefit Life can use desktop workstations to authorize insurance policies because they have access to local and national credit history databases and prior loan records.

Some of the characteristics of the information -based organization are contrasted with the traditional organization in Figure 6.

As you can see from this chart, the nature of jobs in the information based organization changes radically. People like deal structures, insurance screeners, and product designers have much broader roles. In the information based organization, people are drawn in to process teams to accomplish projects. These teams are assembled and disassembled based upon market needs. Through out their carriers, people may serve on a variety of teams. That is why adaptability and flexibility are so important.

In his article, "The new society of organization," Peter Drucker suggests that as more and more organizations become information based, people must increasingly act as responsible decision makers." Managers must be prepared to abandon every thing they know," Drucker argues, because organizations will be under constant pressure to improve every thing they do continuously. Innovation will be key. Change will be constant. In this environment, the ability to capitalize on knowledge, gained from information, will be more critical than remembering the procedures of the past.

The system of information flows will vastly different from the information flows in the traditional organization. In many respects, information technology facilitates the transition to the networked organization. Technologies such as networking and shared databases are enabling factors in the transition to the networked organization. Without these technologies, the transformation will not be possible.

Organizational Characteristics	*Traditional*	*Information-Based*
Job design	Simple tasks	Multidimensional work
Structure	Hierarchical	Flattened
People's roles	Controlled	Empowered
Performance measures	Activity- Based	Results-Based
Role of managers	Supervisor	coaches
Work groups	Functional departments	
Educational Implications	Job preparation	Continuous educations
People needed	structured	Adaptive

Figure -7 Transition to the Information - based organization

Exercise 1.2

1. What is the difference between a computer system and a computer based information system? Give an example to illustrate your answer.
2. What are the characteristics of a system?

1.3 *USES, IMPORTANCE, AND SIGNIFICANCE OF INFORMATION SYSTEMS IN MANAGEMENT DECISION MAKING*

AN OVERVIEW OF INFORMATION SYSTEMS. SYSTEMS.

Activity 3: What are the three major roles of information systems?

In this section, as figure 'A' illustrates, we will emphasize that information systems per form three major roles in an organization.

- Support of business operations
- Support of managerial decision making
- Support of strategic organizational advantage.

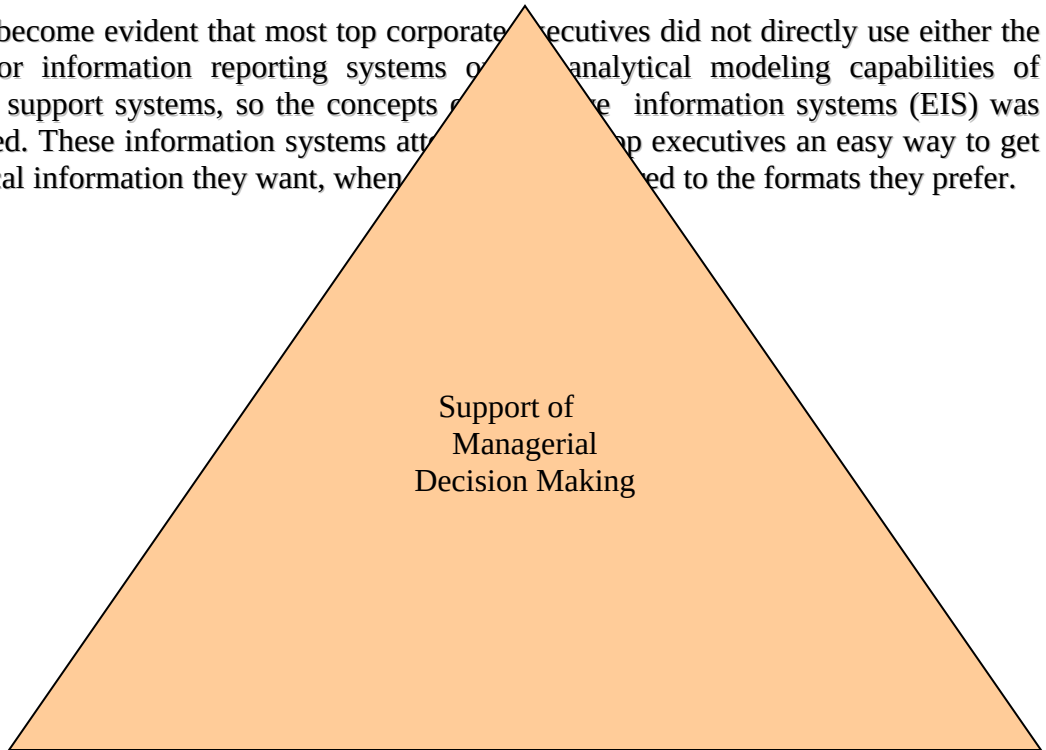
1.3.1 THE EXPANDING ROLES OF INFORMATION SYSTEMS

The roles given to the information systems function in an organizations have expanded significantly over the years. Figure-2.2. Summarizes these changes. Until the 1960s, the role of information systems was simple: transaction processing, record keeping, accounting , and other electronic data processing (EDP) applications. Then, another role was added, as the concept of management information systems (MIS) was conceived. This new role focused on providing managerial end users with predefined management reports that would give managers the information they needed for decision-making purposes.

By the 1970s, it was evident that the prespecified information products produced by such information reporting systems were not adequately meeting many of the decision - making needs of management. So the concept of decision support systems (DSS) was born. The new role for information systems was to provide managerial end users with adhoc and interactive support of their decision-making processes. This support would be tailored to the unique decision - making styles of managers as they confronted specific types of problems in the real world.

In the 1980s, several new roles for information systems appeared. First, the rapid development of microcomputer processing power, applications software packages, and telecommunications networks gave birth to the phenomenon of en duser computing. Now, end users can use their own computing resources to support their job requirements instead of waiting for the indirect support of corporate information services departments.

Next, it become evident that most top corporate executives did not directly use either the reports or information reporting systems or analytical modeling capabilities of decision support systems, so the concepts e information systems (EIS) was developed. These information systems att p executives an easy way to get the critical information they want, when ed to the formats they prefer.



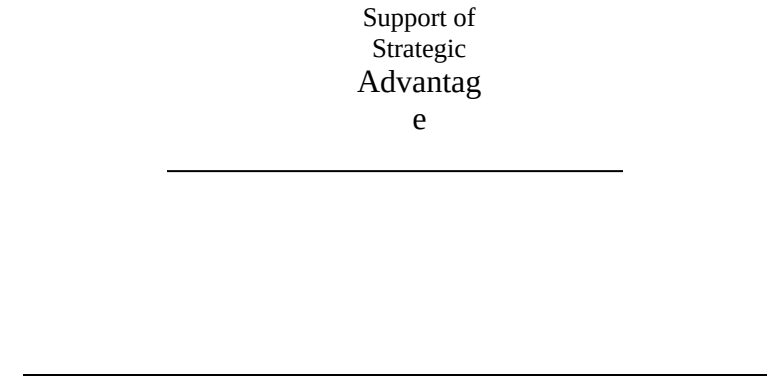


Figure 8. The three major roles of information systems. Information systems provide on organizations with support for business operations, managerial decisional making, and strategies advantage.

Data processing: 1950_s- 1960_s
Electronic data processing systems
Transaction processing, record keeping, and traditional accounting applications
Management Reporting: 1960_s-1970_s

Management information systems
Management reports for prespecified in formation to support decision-making **Decision support: 1970_s- 1980_s.**
Decision Support Systems
Interactive ad hoc support of the managerial decision-making process
Strategic and End user support: 1980s-1990_s

End User Computing systems
Direct computing support for end user productivity
Executive information systems.
Critical information for top management
Expert systems
Knowledge based expert advice for end users
Strategic information systems
Strategic products and services for competitive advantage

Figure 9. The expending roles of information systems. Note how the roles of computer based information systems have expanded over time. Also, note the impact of these changes on the end users and managers of an organization.
Third, breakthroughs were made in the development and application of artificial intelligence (AI) techniques to business information systems. Expert systems (ES) and other knowledge- based systems forged a new role for information systems. Today, expert systems can serve as consultants to users by providing expert advice in limited subject areas.

Finally, an important new role for information systems appeared in the 1980_s and continues in to the 1990_s. This is the concept of a strategic role for information systems, sometimes called strategic information systems (SIS). In this concept, information systems are expected to play a direct role in achieving the strategic objectives of a firm. This places a new responsibility on the information systems function of a business. No longer is IS merely an information utility, a service group providing information processing services to end user departments within the firm. Now it must become a producer of information - based products and services that earn profits for the firm and also give it a competitive advantage in the market place.

All these changes have increased the importance of the information systems function to the success of a firm. However, as we will see in this text, they also present new challenges to managerial end users to effectively capitalize on the potential benefits of information technology.

1.3.2 *OPERATIONS AND MANAGEMENT CLASSIFICATIONS*

Information systems perform important operational and managerial support roles in businesses and other organizations. Therefore, several types of information systems can be classified conceptually as either operations or management information systems. Figure-10 illustrates this conceptual classification of information systems. Information systems are categorized this way to spotlight the major roles each plays in the operations and management of a business.

1.3.3 INFORMATION SYSTEMS FOR BUSINESS OPERATIONS

Information systems have always been needed to process data generated by and used in business operations. Such operations information systems produce a variety of information products for internal and external use. However, they do not emphasize producing the specific information products that can best be used by managers. Further processing by management information systems is usually required. The role of a business firm's operations information systems is to efficiently process business transactions, control industrial processes, support office communications and productivity, and update corporate databases.

1.3.4 *TRANSACTION PROCESSING SYSTEMS*

Operations information systems include the major category of transaction processing systems (TPS). Transaction processing systems record and process data resulting from business transactions. Typical examples are information systems that process sales, purchases, and inventory changes. The results systems that process sales, purchases, and inventory changes. The results of such processing are used to update customer, inventory, and other organizational databases. Transactions processing systems also produce a variety of information products for internal or external use. For example, they produce customer statements, employee paychecks, sales receipts, purchase orders, dividend checks, tax forms, and financial statements. Transaction processing systems process transactions in two basic ways. In batch processing, transactions data is processed immediately after a transaction occurs. For example, point of sale (POS) systems at retail stores may use electronic cash register terminals to capture and transmit sales data over telecommunications links to regional computer centers for immediate real time or nightly (batch) processing.

1.3.5 *PROCESS CONTROL SYSTEMS*

Operations information systems also make routine decisions that control operational processes. Examples are automatic inventory reorder decisions and production control decisions. This includes a category of information systems called process control systems (PCS), in which decisions adjusting a physical production process are automatically made by computers. For example, petroleum refineries and the assembly lines of automated factories use such systems. They monitor a physical process, capture and process data detected by sensors, and make real time adjustments to a process

1.3.6 OFFICE AUTOMATION SYSTEMS

Another major role of operations information systems is the transformation of traditional manual office methods and paper communications media. Office automation systems (OAS) collect, process, store, and transmit information in the form of electronic office communications. These automated systems rely on text processing, telecommunications, and other information systems technologies to enhance office communications and productivity. For example, a business may use word processing for office correspondence, electronic mail to send and receive electronic messages, desktop publishing to produce a company newsletter, and teleconferencing to hold electronic meetings.

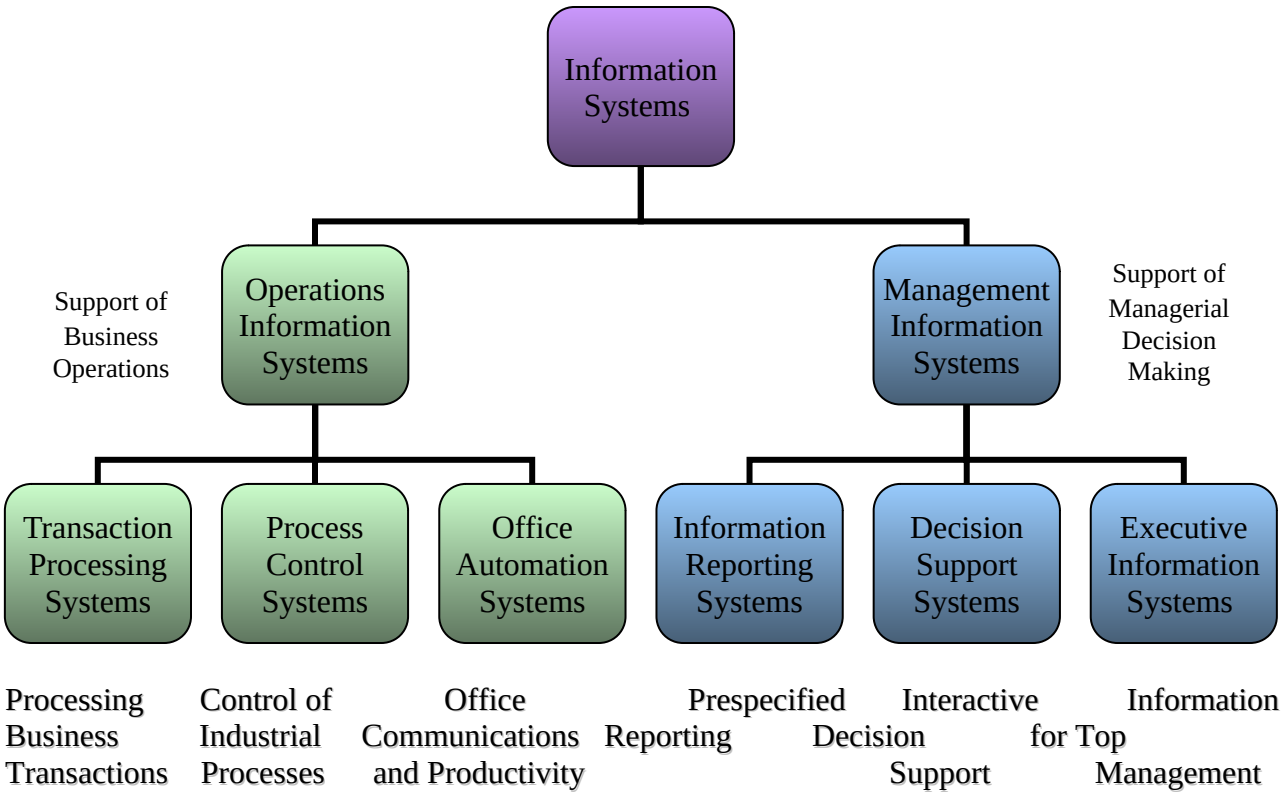


Figure 10 Operations and management classifications for information systems. Note how this conceptual overview emphasizes the main purpose of information systems that support business operations or managerial decision-making.

1.3.7 *INFORMATION SYSTEMS FOR MANAGERIAL DECISION MAKING*

When information systems focus on providing information and support for effective decision making by managers, they are called management information systems. The concept of management information systems (MIS) originated in the 1960s and became of management information systems was developed to contract such inefficient development and ineffective use of computers. Though tarnished by early failures, the MIS concept is still recognized as vital to efficient and effective information systems in organizations for two major reasons:

- It emphasizes the management orientation of information technology in business A major goal of computer- based information systems should be the support of management decision making, not merely the processing of data generated by business operations.
- It emphasizes that a systems framework should be used for organizing information systems applications. Business applications of information technology should be viewed as interrelated and integrated computer- based information systems and not as independent data- processing jobs.

Figure11. Illustrates the relationship of management information systems and operations information systems to business operations and management. Management information systems support the decision making needs of strategic (top) management, tactical

(middle) management, and operating (supervisory) management. Operations information systems support the information processing requirements of the day- to - day operations of a business, as well as some lower- level operations management functions.

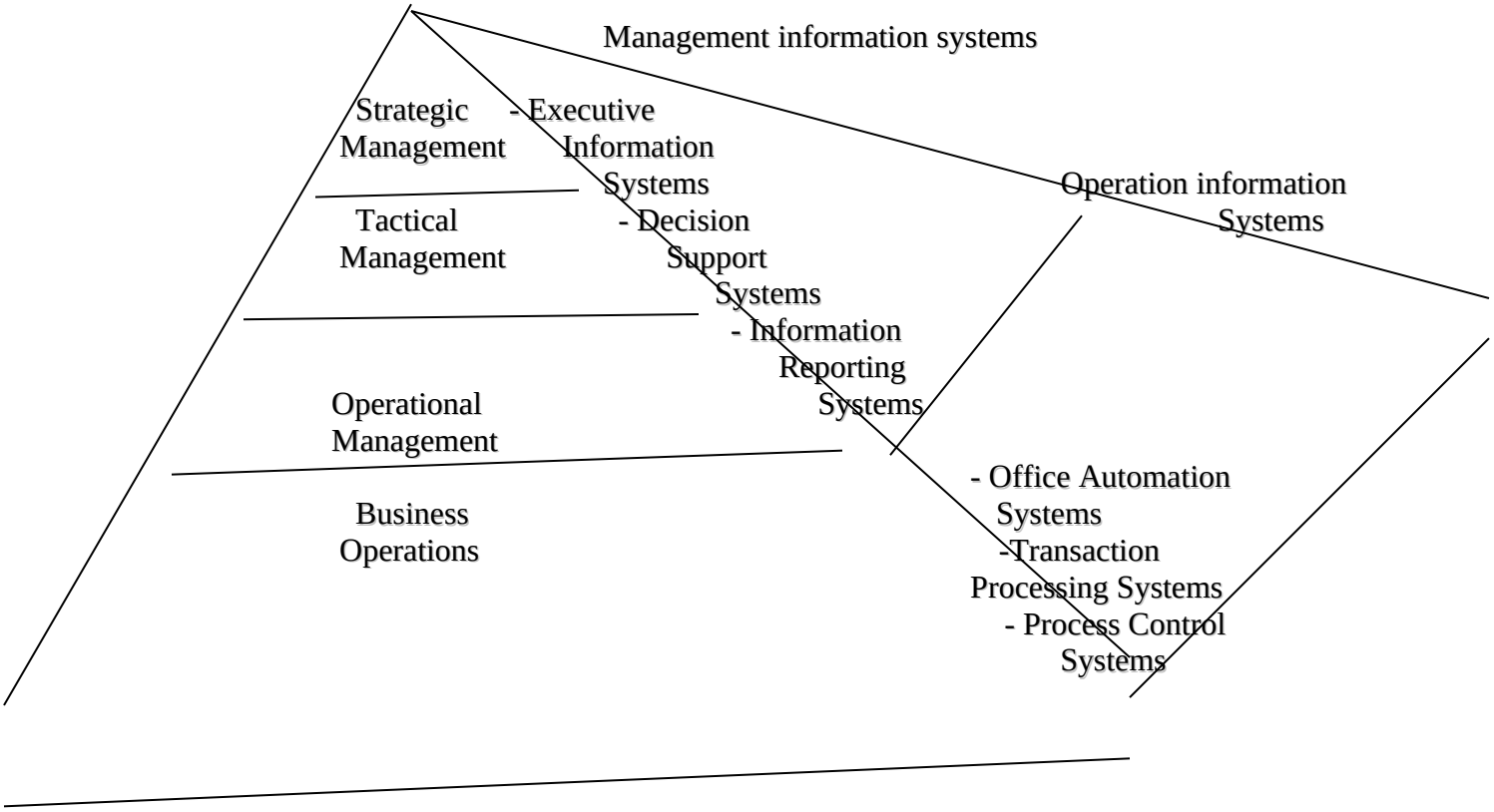


Figure 11. The relationship of management information systems and
Operations information systems to business operations and the levels of management.

Providing information and support for management decision making by all levels of management (from top executives to middle managers to supervisors) is a complex task. Conceptually, several major types of information systems are needed to support a variety of managerial end user responsibilities.

1.3.8 *INFORMATION REPORTING SYSTEMS*

Information reporting systems (IRS)are the most common form of management information systems. They provide managerial end users with information products that support much of their day-to-day decision. Making needs. Information's reporting systems provide a variety of reports and displays to management. The content of these information's products are specified in advance by managers so that they contain information that managers need. Information reporting systems retrieve information about internal operations from database that have been updated by transaction processing systems. They also obtain data about the business environment from external sources.

Information products provided to managers include displays and reports that can be furnished (1) on demand, (2) periodically, according to a predetermined schedule, or (3) whenever exceptional conditions occur. For example, sales managers could receive :(1) instantaneous visual displays at their workstations in response to requests for information about the sales of a particular product: (2) weekly sales analysis reports evaluating sales results by product, sales person, and sales territory; or (3) reports produced automatically whenever a sales person fails to produce sales result during a specified period.

1.3.9 DECISION SUPPORT SYSTEMS

Decision support systems (DSS) are a natural progression from information reporting systems and transaction processing systems. Decision support systems are interactive, computer-based information systems that use decision models and specialized databases to assist the decision-making processes of managerial end users. Thus, they are different from transaction processing systems, which focus on processing the data generated by business transactional and operations. They also differ from information reporting systems, which focus on providing mangers with prespecified information (reports) that can be used to help them make more effective, structured types of decisions.

Instead, decision support systems provide managerial end users with information in an interactive session on an adhoc (as needed) basis. A DSS provides managers with analytical modeling, data retrieval, and information presentation capabilities. Managers generate the information they need for more unstructured types of decisions in an interactive, computer- based process. For example, electronic spreadsheets and other decision support software allow a managerial end user to pose a series of "What if?" questions and receive interactive responses to such ad hoc requests for information.

Thus, information form a Dss differs from prespecified responses generated by information reporting systems. When using a Dss, managers are exploring possible alternatives and receiving tentative information based on alternative sets of assumptions. Therefore, managerial end users do not have to specify their information needs in advance. Instead, a Dss interactively helps them find the information they need.

1.3.10 Executive INFORMATION SYSTEMS

Executive information systems (ETS) are management information systems tailored to the strategic information needs of top management. Top executives get the information they need from many sources, including letters, memos, periodicals, and reports produced manually as well as by computer systems. Other Sources of executive information are meetings, telephone calls, and social activities. Thus, much of a top executive's information comes from non computer sources. Computer generated information has not played a primary role in meeting many top executive's information needs.

The goal of computer based executive information systems is to provide top management with immediate and easy access to selective information about key factors that are critical to accomplishing a firm's strategic objectives. Therefore, EIS are easy to operate and understand. Graphics displays are used extensively, and immediate access to internal and

external databases is provided. EIS provide information about the current status and projected trends for key factors selected by top executives. EIS have become so popular in recent years that their use is spreading into the ranks of middle management.

1.3.11 *OTHER CLASSIFICATIONS OF INFORMATION SYSTEMS*

Several other categories of information systems provide more unique or broad classifications than those we have just mentioned. That's because these information systems can support either operations or management applications. For example, expert systems can provide expert advice for operational chores like equipment diagnostics, or managerial decisions such as loan portfolio management. Another example is end user computing systems, which provide direct hands on support of end users for either operational or managerial applications. Finally, information systems which focus on operational or managerial applications in support of basic business functions such as accounting or marketing are known as business information systems.

1.3.12 *EXPERT SYSTEMS*

The frontiers of information systems are being affected by developments in artificial intelligence (AI). Artificial intelligence is an area of computer science whose long range goal is to develop computers that can think, as well as see, hear, walk, talk, and feel. For example, AI projects involve developing natural computer interfaces, advanced industrial robots, and intelligent computer software. A major thrust is the development of computer functions normally associated with human intelligence, such as reasoning, learning, and problems solving.

One of the most practical applications of AI is the development of expert systems (ES). An expert system is a knowledge based a specific area to act as an expert consultant to users. The components of an expert system are a knowledge base and software modules that perform inferences on the knowledge base and software modules that perform inferences on the knowledge and offer answers to a user's questions. Expert systems are being used in many different fields, including medicine, engineering, the physical sciences, and business. For example, expert systems now help diagnose illnesses, search for minerals, analyze compounds, recommend repairs, and do financial planning. Expert systems can support either operations or management activities.

1.3.13 *END USER COMPUTING SYSTEMS*

End User computing systems are computer- based information systems that directly support both the operational and managerial applications of end users. You should think of end user computing primarily as a direct, hands on use of computers by end users, instead of the direct use provided by the hardware, software, and professional resources of an organizations information services department. In end user computing systems , end users typically use microcomputer workstations and a variety of software packages and database for personal productivity, information retrieval, decision support, and application development. For example, users may do word processing, send electronic

mail, retrieve information from a database, manipulate an analytical model, or develop a new business applications.

1.3.14 *BUSINESS INFORMATION SYSTEMS*

As a future managerial end user, it is important for you to realize that information systems directly support both operations and management activities in the business functions of accounting, finance, human resource management, marketing, and operations management. Such business information systems are needed by all business functions.

For example, marketing managers need information about sales performance and trends provided by marketing information systems. Financial managers need information concerning financing costs and investment returns provided by financial information systems. Production managers need information analyzing resource requirements and worker productivity provided by a variety of manufacturing information systems. Personnel managers need the information concerning employee compensation and professional development provided by human resource information systems. Thus, business information systems provide managers with a verity of information products to support their decision making responsibilities in each of the functional areas of business.

1.3.15 *INTEGRATED INFORMATION SYSTEMS*

It is also important to realize that information systems in the real world are typically integrated combinations of several types of information systems we have just mentioned. That's because conceptual classifications of information systems are designed to emphasize the many different roles of information systems. In practice, these roles reintegrated in to composite or cross-functional information systems that provide a variety of functions. Thus, most information systems are designed to produce information and support decision making for various levels of management and business functions, as well as do record- keeping and transactions processing chores. For example, a payroll systems that processes employee time cards and produces employee paychecks is an operations information systems. An information system that uses payroll data to produce labor analysis reports showing variances and trends in labor costs is a human resources management information systems. However, in most cases, these functions are combined in an integrated payroll/ Labor analysis system.

Another example involves sales order/transaction processing, which is an operations information system, and sales analysis, which is a marketing management information system. However, these two systems are typically integrated in a business. Thus, a sales order processing system would collect and record sales transaction data and provide input to a sales analysis system, which produces reports for sales managers concerning sales performance.

So whenever you analyze a business information system, you will probably see that it provides information for a variety of managerial levels and business functions. Figure.

12. Summarizes the major categories of information systems we have discussed in this section.

Operations information systems. process data generated by business operation.
Major categories are:

- **Transaction processing systems** process data resulting from business transactions, update operational databases, and produce business documents.
- **Process control systems** monitor and control industrial processes.
- **Office automation systems** automate office procedures and enhance office communications and productivity.

Management information systems provide information and support needed for effective decision making by managers. Major categories are:

- **Information reporting systems** provide information in the form of prespecified reports and displays to managers.
- **Decision support systems** provide interactive adhoc support for the decision making process of managers.
- **Executive information systems** provide critical information tailored to the information needs of top management.

Other categories of information systems can support either operations, management, or strategic applications.

- **Expert systems** are knowledge based systems that provide expert advice and act as expert consultants to users.
- **End user computing systems** support the direct, hands on use of computers by end users for operational and managerial applications.
- **Business information systems** support the operational and managerial applications of the basic business functions of a firm.
- **Strategic information's systems** provide a firm with strategic products, services, and capabilities for competitive advantage.

Figure- 12. A Summary of the major categories of information systems.

Exercise 1.3

1. Can the same information system support business operations managerial decision making, and strategic advantage for an organization? Give a business example to support your answer.
2. How do decision support systems differ from information reporting systems and executive information systems in their support of a manager's decision making?

CHAPTER SUMMARY

- The importance of information systems. An understanding of the effective and responsible use and management of information systems is important for managerial end users in today's global information society. Information systems play a vital role in the operations, management, and strategic success of businesses and other organizations and have be come a major functional area of business administration.

- System concepts: A system is a group of interrelated components working toward the attainment of a common goal by accepting inputs and producing outputs in an organized transformation process. Feed back is data about the performance of a system. Control is the component that monitors and evaluates feedback and makes any necessary adjustments to the input and processing components to ensure that proper output is produced.
- Information system concepts. An information system uses the resources of hard ware (machines and media) , software (Program and procedures) , and people (Specialists and users) to perform input, processing, output, storage and control activities that convert data resources in to information products. Data is first collected and converted to a form that is suitable for processing (input). then the data is manipulated and converted into information (Processing) , stored for future use (Storage) , or communicated to its ultimate user (out put) according to correct processing procedures (control)
- Categories of information systems. Major conceptual categories of information systems include operations information systems, such as transaction processing systems, process control systems, and automated office systems, and management information systems, such as information reporting systems, decision support systems, and executive information systems. Other major categories are end user computing systems, expert systems, strategic information systems, and business function information systems. However, in the real world, these conceptual classifications are typically combined in to integrated information systems which provide information and decision support for managers and also perform operational information processing activities.

REVIEW QUESTIONS

1. What is the difference between data and information?
2. What is the role of top management in an organization with a simple structure?
3. What is one of the main roles of the professional administrator in the professional bureaucracy?
4. What are the characteristics of an adhocracy
5. What are some of the advantages of the divisionalized form?
6. What information does head quarters management use in an organization with a divisionalized form?

QUESTIONS FOR DISCUSSION

1. Why is feed back useful in controlling the interval workings of system?
2. What is a close system likely to deteriorate?

SELF-TEST: ONE

1. ---------- is a manager, entrepreneur, or managerial level professional who personally uses information systems.
    A. Managerial end user
    B. System analyst
    C. Technical workers
    D. System builders
    E. Non

2. ---------- is a connection at a system or subsystem boundaries.
    A. Modularity
    B. Cohesion
    C. Interface
    D. Data entry
    E. None

3. ---------- is a state that occurs with out maintenance.
    A. System stress
    B. System Entropy
    C. System maintenance
    D. System boundary
    E. None

4. ---------- Consists of analysts who help standardize the work of others with in the organization to control out puts and adapt to the environment.
    A. Middle line
    B. Techno structure
    C. Operating core
    D. Support staff
    E. None

5. ---------- Which one of them is not a characteristics of the machine bureaucracy?
    A. A clearly defined hierarchy of authority
    B. Centralized power for decision making
    C. Formal communications thought the organization
    D. A and C
    E. None

CHAPTER – TWO

2. COMPUTER RESOURCES

Objectives of the chapter

- Assess the performance of information technology.
- Identify the components and functions of a computer system.
- Out line the major differences and uses of microcomputers, minicomputers, main frame, and networked computers.
- Out line the functions of operating systems and operating environments.
- Identify the different types of software.

Activity 2.1

Dear learners, how to evaluate the significance of new technology investments?

2.1 PERFORMANCE OF INFORMATION TECHNOLOGY

Dear students, we start with the performance perspective, because the continual announcements about ever-greater computer and telecommunications capabilities often lead of questions about how to evaluate the significance of new technology investments.

2.1.1 *PERFORMANCE VARIABLE FOR IT*

Technology performance could be summarized in terms of just four performance variables. Functional capabilities and limitations, ease of use, compatibility, and maintainability. Table.1 shows that each of these four performance variables for IT is tied to a set of more specific performance variables. Notice that some of the terms used for IT performance are also use at other times for process or product performance. It is also known security as a performance variable for the process rather than the technology even though it is sometimes directly related to the technology issue.

2.1.1. A FUNCTIONAL CAPABILITIES

Functional capabilities of a particular type of information technology identify the types of processing it is supposed to perform and the degree of capability it has. Functional capabilities are often measured as capacity or speed, using terms such as number of instructions executed per second, amount of data that can be stored, and rate of data transfer. Another aspect of technology performance is reliability, the likelihood that the technology will continue operating with out errors or unplanned interruptions. A final aspect of functional capabilities is operating conditions, which include issues such as how much something weighs, how much space it takes, and how much electricity it uses. While these questions may not seen to be technological issues, they often determine whether a particular technology, such as the laptop computer, is effective in a particular situation.

Because the productivity of a business process depends partially on the cost of the technology and other resources it uses, it is always important to think of performance in terms of price – performance, the relationship between the price of technology and the performance it provides. The more general term is cost- effectiveness, the relationship between what something costs and how much it accomplishes.) For example, competition among personal computer manufacturers throughout the 1990s generated major improvements in both performance and price. Performance. Computers became faster and more powerful (performance) at the same time that the price for any given level of processing power plummeted (price-performance). Similar improvements have occurred in all areas of computing for four decades.

2.1.1. B EASE OF USE

Although ease of use is often associated with the use interface, it is actually a broader idea including ease of learning how to use the technology, ease of setting it up, ease of becoming proficient, and ease of using it directly. Every day experience with audio equipment such as a walkman shows that features that contribute to ease of use include size, portability, user interface, and compatibility with technology standards such as the dimensions of the tape cassette. These same aspects of each of use apply for business technology such as telephones and computers**.**

2.1.1. C COMPATIBILITY

Compatibility is important because most information technology is genuinely useful only in combination with other information technology. Compatibility is the extent to which the characteristics and features of particular technology fit with those of other aspects of the situation. You understand the importance of compatibility and conformance to standards if you have ever wanted to plug an American hair dryer in to a typical wall socket in Europe or Asia. “The plug’s shape is not compatible with the outlet’s shape, and the hair dryer won’t operate unless you have a special adapter. Compatibility issues range from “technical” details, such as internal machine languages and data coding methods, to mundane issues such as the size of paper in copy machines and the shape of plugs.

Compatibility issues arise at several different levels. At one level, maintenance of two devices or programs is simpler if both of them operate according to the same standards even if they do not have to work together. At another level, the questions is whether the two devices or programs can be used together, even if they use different brands of hardware or are written using different computer languages. This type of compatibility is called interoperability. An essential feature of Internet technology is the way it applies standards to permit convenient usage through a wide variety of other wise incompatible computers and networks.

Table 1-performance variables for IT

Group of performance variables	Typical issue raised when using this term to describe a particular technology.
Functional capabilities and limitations	What types of processing is the technology supposed to perform and what capabilities does it have?
- Capacity	How much information can it store or process?
- Speed	How fast can it process data or instructions?
- Price- performance	How many dollars does it cost per amount of information stored or for a given calculation speed?
- Reliability	How long will it likely continue operating without errors or unplanned interruptions?
- Operating conditions	How much space does it take up?
	How much does it weigh?
	What temperature does it require?
	How much electricity does it use?
Ease of use	How easy is it to use this technology?
- Quality of user interface	How intuitive and easy to learn is the method for instructing the technology to perform its task?
- Ease of becoming proficient	How much effort is required to become proficient in using the technology?
- Portability	How easy is it for the user to move the technology in the course of doing work?
Compatibility	How easy is it to get this technology to work with other complementary technologies?
- Conformance to standards	To what extent does the technology conform to accepted industry standards?
- Interoperability	To what extent does the technology use the same internal coding and external interfaces as other technology it must operate with or substitute for?
Maintainability	How easy is it to keep the technology operating over time?
- Modularity	Is it divided into modules that can be snapped together when building systems? Can these modules be replaced by equivalent modules if necessary?
- Scalability	It possible to significantly increase or devise capacity without major disruptions?
- Flexibility	Is it possible to change important aspects of systems operation without major disruptions?

2.1.1. D MAINTAINABILITY

Maintainability is the ease with which users or technical specialists can keep the technology running and upgrade it to suit the changing needs of the situation. It is easier to maintain technology if the components are designed for modularity, Separation in to a

set of components that can be developed, tested, and understood independently and then plugged into other related components to create a system or device. Dividing systems into modules makes them easier to build and understand because of solving many small problems is usually easier than solving one big problem. The modules work together based on the way the outputs of one become the inputs of others. Scalability, the ability to significantly increase or decrease capacity with out major disruptions, is another important aspect of maintainability because upgrading capacity beyond certain limits often requires a complete change in the technology. For example it is possible to hitch a trailer behind most cars, but if the trailer is too big, the car can't drive safely and it is necessary to switch to a truck.

Exercise 2-1

1. What are the four performance variables for IT?
2. How do you define compatibility?
3. What do we mean functional capabilities?

2.2 OVERVIEW OF COMPUTER SYSTEMS

Introduction

Dear students,

Before we examine the major types of computers in use to day, we should review what the term computer system means. A computer is more than a processing "Box" or a collection of electronic devices performing a variety of information processing chores. A computer is a system – an interrelated combination of components that performs the basic system functions of input, processing, output, storage and control, thus providing end users with a powerful information processing fool. Understanding the computer as a computer system is vital to the effective use and management of computers.

A computer is a system of HW devices organized according to the ff system functions:

- **In put**: The input devices of a computer system include key boards, touch screens, pens, electronic "mice", optical scanners, and so on. They convert data in to electronic machine- readable form for direct entry or through telecommunications links into a computer system.
- **Processing**: The central processing unit (CPU) is the main processing component of a computer system. (In microcomputers, it is the main microprocessor) In particular, the arithmetic logic unit, one of the CPU's major components, per forms the arithmetic and logic functions required in computer processing.
- **Out Put:** The out put devices of a computer system include video display units, printers, a video response units, and so on. They convert electronic information produced by the computer system into human intelligible form for presentation to end users.

- **Storage**: The storage function of a computer system takes place in the computer's primary storage unit or memory, and in secondary storage devices such as magnetic disk and tape units these devices store data and program instructions needed for processing.
- **Control**: the control unit of the CPU is the control component of a computer system. It interprets computer program instructions and transmits directions to the other components of the computer system.

Activity 2.2

Why is it important to think of a computer as a system instead of an information processing "box"?

2.2.1 TYPES OF COMPUTERS

Dear students, the original concept of computation, storage, input, and output has developed in to many types of computers. This sections focuses on computers whose users see them as computers rather than as components of other machines. A computer that is an internal component of an other machine is called an embedded computer. Machines ranging from air planes to television sets and automatic coffee makers contain embedded computers. Embedded computers used for controlling chemical and mechanical processes in industry are essential components of information systems for factory automation.

Non-embedded computers are classified based on a combination of speed, and ability to control or link to other computers or terminals. A reasonable first cut at computer categories includes personal commuter, work station, midrange computer, mainframe, and supercomputer. Although these categories have merged somewhat and have become less meaningful, they are still part of everyday terminology and they help in visualizing new options related to networked computer systems.

A personal computer (PC) is a single- user computer that sits on a desktop or can be carried around by the user. Laptop and notebook computers are portable Pcs that fit in to a briefcase but contain enough computing power and disk storage to support a business professionals personal requirements for word processing, spread sheets, and storage of documents. Pen computers, which lack a key Board and use an electronic pen for writing input on the screen, have been adopted in specific types of applications where key boards are inconvenient and handwritten input is adequate. A work station is a powerful single user computer used for computing – intensive work such as complex data analysis, graphic design, and engineering. Workstations often come with large screens needed to work with complex images. Although the first pcs could only run simple word processors, spreadsheets, and specialized applications, technical advances in hardware and software permit current pcs to perform tasks previously reserved for workstations.

Current Pcs are divided in to desktop and laptop units and are typically advertised in terms of their processing power, storage, and input and output devices processing power is summarized by the type of microprocessor and the amount of RAM and hard disk

memory. The head live on the typical advertisement might mention a desktop computer with a 233 MHZ Pentium microprocessor, 32 MB of RAM, and a 2.6 GB hard drive. Input and output features include the type of display and size of the screen, the speed of the modem, the speed of the CD-ROM drive, and the type of sound card. Features such as the size of cache memory (extremely fast temporary storage for instructions and data) and the speed of internal "bus" that transfers data to and from the microprocessor are also mentioned frequently because these technical features affect the computers' internal speed in processing instructions and moving data.

Midrange computers and mainframes typically perform all the processing for a large number of users working at terminals. Midrange computers. (Previously called minicomputers) are centralized computers typically shared by a department for processing transactions, accessing corporate databases, and generating reports. Mainframe computers are even more powerful: they are typically linked to hundreds or even thousands of terminals for processing high volumes of online transactions and generating reports from large databases. Mainframe systems contain extensive data storage capabilities. The tape library might contain thousands of tapes, and the computer center could include dozens of freestanding hard disk units containing enormous databases. Printed outputs could be produced on high-speed printers at centralized locations or on low speed printers at end user locations. Mainframes are usually housed in environmentally controlled and physically secure computer rooms. Supercomputers were initially thought of as computers designed for exceptionally high volume, high-speed calculations, rather than transaction processing. Such computers have been used for complex analysis problems such as simulations of the weather or the flow of air around a wing. More recent applications have occurred in banking, manufacturing, and data mining.

The trend toward computer networks has spawned a newer category of computers that overlaps with all the others. Servers are specialized computers linked to other computers on a network in order to perform specific types of tasks requested through those computers. Low and servers and basically powerful pcs configured to perform specific tasks, such as finding data in a database, controlling printing, or controlling electronic mail. High end servers perform similar functions for larger networks or larger databases and often compete with midrange computers or even mainframes. For example, in 1998 a top-end server form Compaq, originally a personal computer company, had 4 gigabytes of RAM and 708 gigabytes of disk storage, linked to 9:00 personal computers, and cost half a million dollars.

Many observers believe that mainframe computers will gradually evolve in to databases servers that control and update large databases.

2.2.2 *DATA INPUT: CAPTURING DATA*

Input devices used to enter data in to computer systems range from keyboards and bar code readers to devices for voice or handwriting recognition. Before looking at specific devices, it is Like any other device, it should be inexpensive reliable, accurate, and convenient to use. An ideal input device would also have characteristics unique to input

devices. It should capture data automatically at its source and shouldn't require human intervention that might cause delays and might introduce errors. For example, it should be unnecessary for people to record data in one form /Such as handwriting/ and then transcribe in to another form by typing it. In addition, an ideal input device should do whatever is possible to ensure accuracy of the data. This section looks at several forms of data input involving key boards and related devices, characters recognition, and inputting images and sounds.

A KEYBOARDS AND POINTING DEVICES

Although many Americans take keyboards for granted, even this familiar technology raises many issues, starting with the shape and layout of current key boards. People who designed the first typewriters experimented with many different layouts before standardizing on what is called the "qwerty" keyboard because of the order of letters in the third row. Ironically, this lay out of keys was developed to force people to type more slowly, thereby reducing the incidence of jammed keys in the mechanical typewriters of the time. Typewriters are no longer mechanical, but the qwerty keyboard had remained the standard.

Whether or not the qwerty keyboard is ideal for English, it simply doesn't fit many other languages, which have different alphabets or writing systems consider for example, the problems faced by a consultant doing a training session in Belgium for Digital Equipment corporation. The training center had three types of keyboards, Flemish, French, and U.S. English. Trainees switching between exercises sometimes had to use different computers that had different keyboards. Needless to say, the resulting confusion did not speed the training.

The whole idea of a keyboard containing a limited number of alphabetical symbols breaks down for Asian languages whose ancient writing system uses thousands of symbols called kanji, each representing an idea rather than an alphabetic character. Because it takes a long time to learn thousands of symbols.

Japanese is written in two ways, within the first few years at school, children learn approximately 100 kana, phonetic characters in two alphabets called hiragana and katakana. But since kana are rarely used by adults in business settings, computer usage requires a way to deal with kanji. Difficulty dealing with kanji is a key reason why Japanese officers have not used computers as much as use officers have. Computers are becoming more widespread in Japanese offices as direct input of handwritten kanji becomes easier.

The basic idea of the keyboard has also been adapted to make if more effective for particular situations. Modified cash registers such as those used in MC Donald's make it unnecessary for the cashier to remember the price of an item. In stead, the cashier presses a key that represents a particular type of hamburger or drink. The hand held terminal and touch-tone phone made it possible to enter data from work locations without being anchored to a bulky VDT. Because the touchtone phone has no visual display, data input through a touchtone phone is a response to audio prompts from the computer systems.

The last adaptations of the keyboard is to criminate the keys altogether. The touch screen made it possible to enter data by pointing to a spot on a screen. Pointing on a touch screen is less precise than pointing with a mouse and is there fore limited to applications where pointing to areas of the screen suffices.

The mouse and other pointing devices made it possible to point with more precision. The mouse was an important breakthrough for expressing commands to a computer. Before it was developed, users had to type commands such as "print clist- File". Users had to know the commands, syntax, and the file names, and had to spell every thing correctly, which made it difficult for users to control computers. With the mouse, touch screen , or screen designed for input using an electronic pen, a user can simply point to select the command and the file. Pointing is an excellent way to make computers easier to use, but it is not a way to enter large amounts of data. This is where the key board remains for more effective.

2.2.2.B OPTICAL CHARACTER RECOGNITION

Several types of input technology are based on recognizing characters or special markings. Magnetic ink character recognition (MICR) was developed by banks as an early technology of this type. With MICR, account numbers are written on checks and deposit slips in a standard location and format using magnetic ink that can be recognized by special input devices. This technology expedites the clearing of checks and deposits.

Optical character recognition (OCR) applies a similar idea to capture machine- generated or hand - printed numbers or text. OCR involves two steps: Capturing an image and then deciphering it. The deciphering step is a soft ware function that consists of finding the individual characters, subdividing them in to the equivalent of findings the individual characters, subdividing them in to the equivalent of pixels, and identifying the input character by comparison with previously stored patterns.

Although OCR started with collecting data from forms filled in carefully by hand, bar coding to identify objects is the most important current applications of the general idea. As you can see by looking at the bar code label on a grocery product, bar coding represents characters by using bars in the standard format. Bar code reader come in several forms. Some are stationary and scan the bar code as the object moves by. Others are more like pens that scan across a stationary object. Bar codes are often integrated in to point - of- sale terminals used in department stores to record sales and track inventory. Bar coding makes it unnecessary for people to read the data and then copy it Bar coding applications typically decrease the effort required to input data and increase accuracy substantially.

OCR for hand printing can be used with paper input forms or electronic tablets. For OCR to work with hand printing, either the person must be trained to write letters in a prespecified format or the computer must be trained to recognize an individuals printing. OCR is used with portable computers for application such as checking inventory and writing parking tickets. However, existing OCR systems are not efficient for inputting large amounts of text and cannot decipher cursive handwriting accurately. OCR can also

be used for inputting previously typed or typeset characters. For less than $500, a scanner and OCR program can input previously typed text at 500 words per minute with 98% accuracy, which still means that someone will have to cheek the recovered text to identify the 10 words out of 500 that need corrections.

2.2.2.C CAPTURING PICTURES, SOUNDS, AND VIDEO

Dear learners, Earlier it is showed how every type of data can be digitized and can there fore be handled by a computer. Two approaches are used for inputting image and audio data in to computer systems. One approach consists of simply recording or coping the data in a computer readable form. This is what happens when a scanner captures an image and stores it in a computer system. Electronic cameras perform a similar function. The other approach is to capture image or audio data and then, as part of the input process, do something to interpret what it means. This approach is used with voice recognition systems.

Voice recognition matches the sound patterns of spoken words with previously stored sound patterns. Work situations in which voice input is important include input while the speaker's hands are busy; input while mobility is required; and input while the user's eyes are occupied. Typical users are people looking through a microscope and not having to look away each time they make a note, or aircraft engine inspectors, Who can use a wireless microphone and a limited vocabulary to issue orders, reed serial numbers, or retrieve maintenance records. Voice recognition also has potential advantages for workers who lack reading or writing skills. At a Raytheon plant that produce circuit boards for patriot missiles, inspectors gazing through microscopes dictate defect reports instead of writing them by hand. One special beneficiary was a Vietnamese refugee who had trouble reading and writing English, but had "trained" a voice recognition system to understand his pronunciation, as long as he said the words the same way each time. For example E* Trade, an online brokerage, provides its customers a voice recognitions system that lets them manage their accounts and make trades 24 hours a day. The company's idea is to be able to market to anyone who is comfortable using a telephone.

While typing is faster than handwriting for some people, there has been some speculation about whether keyboards will be by passed in favor of direct voice input or handwritten input in many applications over the next several decades. Although no one knows what will happen, this type of development would have major impacts on managerial, professional, and clerical work. Bypassing keyboards may also be crucial for expanding computer use in china and Japan, whose use of kanji was mentioned earlier. Surprisingly, the complexity of these characters may help computers recognize them. Because the strokes in kanji characters are typically written in a particular order, handwriting - recognition devices have been developed that use the order use of the strokes as information for deciphering the characters.

2.2.2.D STORING AND RETRIEVING DATA

An ideal strong device should be able to store and retrieve any data immediately and in a minimum amount of space. Space use and storage and retrieval times are useful

indicators for comparing storage technologies. This section looks at several forms of data storage: paper, micrographics, magnetic storage, optical storage, and flash disks.

2.2.2.E PAPER AND MICROGRAPHICS

Paper is a 2,000- year -old medium for storing data. Punched cards were the primary medium for storing data in the first computerized business systems. Although paper is easy for people to use when they are reading or annotating a document, it has many short comings. For one thing, it is so bulky that many large businesses have rooms full of paper records and documents. Finding specific data in a personal file cabinet can take seconds or minutes. Finding it in a firm's paper achieves can take hours, days, or weeks, if it can be found at all. Another shortcoming is that paper is not conveniently computer readable even though OCR scanners can input text from paper documents.

Computer Output microfilm is a solution to the bulkiness of paper that reduces pages of output to ting images stored on film. A hand-sized card called a microfiche can store the equivalent of hundreds of pages of computer output. Although microfilm greatly reduces the amount of physical space required to store data, it is not conveniently computer readable, which makes it useful only for rarely accessed data. Finding a particular item of information using a microfilm or microfiche reader takes several minutes at best. Furthermore, microfilm can not be changed once it is produced.

2.2.2.F MAGNETIC TAPES AND DISKS

The shortcomings of paper media led to the development of media based on the magnetization or demagnetization of thing locations on iron oxide surface. The first of these was the magnetic tape, a plastic tape on which data could be stored using numerical codes. The ability to magnetize and demagnetize the same region of a magnetic tape without punching a hole means that the data on the tape can be modified by writing over it in a process similar to recording over an audio tape or video tape. Like entertainment audiotapes and videotapes, tapes for storing computer data are sequential devices whose data are read in their order of location on the tape. The fact that tapes must be read sequentially greatly limits the types of processing they can be used for , but they are well suited for backup due to their speed and reliability.

Data can also be stored magnetically on a hard disk, which is a rotating device that stores data using magnetization and demagnetization methods like those for magnetic tapes. Like diskettes, hard disks store data in concentric circles called tracks. Unlike diskettes, many hard disks have multiple platters. While in use, a hard disk rotates continually. Whenever data are required, a program determines the location of the data on the disk and instructs a disk arm to look for the data at that point. The disk arm moves a read head into postion over the correct track and performs the read. The data are read when the rotation brings the required location under the read head. Hard disks are also called DASDS, which stands for direct access storage devices. The special advantage of hard disks over tapes it their ability to access data immediately instead of having to read sequentially through all previous data on the device. A major disadvantage of hard disks is that they rely on continuous rotation at thousands of revolutions per minute with a read

head just 15. millionths of an inch above the disk. Occasionally the read head crashes in to the disk, destroying both the data and the disk. This is one of the reasons why it is especially important to make frequent backup copies of any important data stored on a hard disk.

Rotating disks come in a variety of sizes. Pocket - sized 3.5. inch diskettes Commonly hold 1.4 megabytes of data. Continual improvements in hard disks have created the same type of exponential performance increase and cost decrease that chip improvements have created. The average capacity of hard disks sold in 1990 was around 60 megabytes. By 1998 this increased to around 3 gigabytes, a fifty - fold increase in 8 years. During this period the price of hard disk storage decreased by a similar ration, making it possible to buy a gigabyte of disk storage for less than $100. The combination of vastly increased RAM and hard disk capacities have made it practical to use Pc software with vastly more powerful features and capabilities than the early Pc software that had to reside entirely on a single diskette or with in limited hard disk storage. Inexpensive removable disks providing between 100 megabytes and 2 gigabytes of backup storage have created another important option for data storage and buck up. For example a 100 megabyte zip disk that costs less than $10 holds the same amount data as 70 diskettes. This technology permits business professionals to carry much of their frequently used data on single portable disk even when they are not carrying a laptop.

2.2.2.G OPTICAL DISKS

Optical disk technology involves the use of a laser beam to store or retrieve data as microscopic spots on a disk. The first optical disks came out in 1978 and competed with videotapes in the home entertainment market. Audio compact disks came out in 1982 and revolutionized the record business in the late 1980s. The CD- ROM was the first application of optical storage for business processing. CD- ROMS are 650 megabyte compact disks that can be read but not written on. They emerged in 1985 for publishing databases, directories, and encyclopedias. CD-ROMs make data readily transportable but were initially limited because the user could not change the data. The initial CD-ROM drives operated at 150 Kbps, but the more current drives operate many times faster. For example a 24X drive operates 24 times as fast as the initial standard.

Several additional optical disk options have been developed. Recordable CD-R disks along with a CD-R drive make it possible for any one to master a CD-ROM just as they might make multiple copies of a diskette. Rewritable CD-RW disks use a somewhat different technology to produce CD- ROMs using media that can be rewritten up to 1,000. times. Unfortunately, the different technology creates a different degree of reflectivity, which means that many CD-ROM and CD-R drives can not read CD-RW disks. The DVD (digital versatile disk), which words 4.7 gigabytes of data, enough for a two-hour movie, may eventually supplant CD- ROMs if and when the necessary standards are agreed up on.

Optical disks are used for two types of applications, bases on whether the data can change. CD- ROMs are excellent for distributing large files of computer readable data ranging from software programs to technical manuals. They cost less than $1 to produce

and there fore deliver data much more cheaply than diskettes. CD- R and CD-RW disks are used mostly for buck up and long term data storage of image data. Insurance companies and other paper intensive business find optical storage especially attractive for this purpose. However, current erasable disk technology is too slow for high - volume online transaction processing.

2.2.2. H FLASH MEMORY

Although hard disks and optical disks can store an enormous amount of information, they are both mechanical devices with moving parts. They therefore have shortcomings involving the breakage of the moving parts and energy usage necessary to spin the disk and move the read/ write mechanism. In contrast, RAMs with in the computer itself are semiconductor devices with out moving parts. But they have the problem of losing information when the computer is turned off.

A flash memory is a semiconductor device that stores and modifies information while the computer is operating, but that also retains information when the computer is turned off. Currently flash memory chips are used in battery - powered products such as electronic cameras, cellular phones, and notebook computers. An early demonstration of the potential of flash memory came in 1993 with the Hewlett - Packard omni book 300, a 2.9 pound portable computer that could run on four AA batteries but was not very powerful by today's standards. The 10-megabyte flash memory chips (effectively doubled with data compression) were packaged in a card the size of a thick credit card inserted in to one of four slots in the computer. Flash memory is still much more expensive per bit than RAM memory, but it illustrates yet another direction in which storage technology may develop.

2.2.3 DATA OUTPUT: DISPLAYING DATA

Output devices display data for users. A side from being inexpensive and reliable, an ideal output device would make it easy to convert data into the most useful information for the users. Early printers and terminals were limited because they were anchored to fixed locations and because they could not produce good practical output. Recent advances incorporate graphics, images, voice, other sounds, and video. The capabilities that started becoming technologically feasible in the 1980s make it possible to go far beyond the forms of data output that are common even today.

We will look at out put devices in the following categories: Screen outputs, paper outputs, and audio outputs.

2.2.3.A SCREEN OUT PUTS

The most common device for interactive output on screens is the VDT monitor, such as those used with most PCs. Improvements in monitors over the years include higher resolution (more dots per inch), larger screen size, graphical out puts rather than just numbers and text, and color displays rather than just black and white. All of these improvements have made monitor easier to use and have permitted them to display better information to the users. VDTS have shortcomings, however, such as being bulky and

taking up a lot of space on a desk. Extensive use often leads to eyestrain. In addition, they give off electromagnetic radiations that may be a health hazard, at least for people whose desks are behind the monitors.

A great deal of work has been done to produce flat screens such as those used with laptop computers. By the late 1990s the tiny black and white screens of early laptops had been replaced by 12 inch (diagonal) color screens that were much larger and much easier on the eyes. Flat screens for desktops are available but are substantially more expensive than VDT monitors with similar screen size. Flat screens are also used in factories where a wall mounted screen is more convenient than a desktop device. Screen display technology is important not only for the future of computer displays but also for television screens.

Specialized displays of many other types have also been used. “Heads up" displays originally developed for military applications have been used in some automobiles to project auto control panel information in front of the driver instead of forcing the driver to look down. In amore advanced version of this idea, a head mounted display developed by Boeing to help workers performing complex writing tasks in airplane manufacturing. This display uses semi reflective lenses that permit the worker to see a wiring diagram transmitted from a computer superimposed on top of the circuit board being *wired.*

2.2.3.B PAPER OUT PUTS

Many different types of printers are available for paper outputs from computer systems. The first computer systems used impact printers, which create marks on paper by hitting a print head against a ribbon. Non-impact printers include inkjet printers and laser prints. Inject printers "Spit" ink on to the paper. Laser printers create marks on paper by focusing laser beams on black participles of toner. It is now possible to buy a small laser printer for less than $400, whereas other types of personal printers may cost less than $200. Color also become a practical feature of printers in the early 1990s, With inexpensive color printers costing less than $500 but taking a comparatively long time to print text, and longer to print pictures.

2.2.3.C AUDIO OUT PUTS

Audio outputs are starting to appear more prominently in many business computer systems. In voice- mail systems and many systems for obtaining standardized data such as bank balances, prerecorded prompting messages help the user specify what information is needed. In applications such as voice annotation of spreadsheets and documents, users can hear a comment recorded earlier by some one else. In other computer audio applications, the voice sounds are synthesized. For example, Bell Canada uses voice synthesis to read locations of broken phone equipment to repair people and to tell them how to fix the equipment. Graduate refinements in speech synthesis have resulted in more natural - sounding synthesized speech, making future applications more likely.

This chapter has covered a variety of methods used for data input, storage, and out put. Some, such as magnetic tapes, hard disks, and impact printers, have been used for decades. Others, such as unic recognition, are less common today but will have wider

impact in the future. Although technological progress will continue, it is difficult to predict which technologies will be adopted widely enough to change the way people work.

Exercise 2.2

1. What are the different forms of data input?
2. what are the basic components of a computer system?
3. What are the different types of computer?
4. What are the different forms of data storage?
5. What are the different forms of data output?

2.3 COMPUTER SOFT WARE

Activity 2.3 Dear Students,

How do the differences between system software and application software affect you as an end user?

Introduction:

Dear learners,

This section presents an overview of the major types of software you will depend on as you work with computers. It dis asses their characteristics and purposes and gives examples of their uses. Information systems depend on software resources to help end users use computer hardware to transform data resources into a variety of information products. Software is needed to accomplish the input, processing, out put, storage, and Control activities of information systems.

2.3.1 TYPES OF SOFTWARE

The software in a computer system is the coded instructions, or programs, created by programmers or users to tell the computer system what to do. AS summarized in table -1, managers and users are affected directly or indirectly by four types of software: applications software, end- user software, system development software, and system software. Although these four categories overlap in practice, the categories help in visualizing the different functions of software.

Application software processes data to structure or automate specific business processes. For example, applications software in a sales department might include programs for forecasting sales, controlling purchase transactions, maintaining customer data, and sending bills for customers. This software may be built by firms programmers or may be purchased from an application software vendor. In either case, it is developed by analyzing specific work systems, deciding how they might be improved and writing programs that improve work system operation by structuring or automating part of the desired process or providing better information.

Of all the types of software, application software has the greatest potential for competitive impact. This software is more tightly linked to business processes that the organization hopes will differentiate it from the competitors. Application software makes this business strategy possible. Effective use of the other types of software is still important, how ever, because it supports the organization's internal effectiveness and efficiency.

End user software includes general -purpose tools such as spreadsheet programs, word processors, and DBMS.S for personal computers. These general-purpose tools are designed for use by end users with out programming assistance. They are used in two ways:(1) simply to get work done, such as writing a memos or performing a calculation and (2) to create personal systems for accomplishing particular business tasks repetitively.

End- user software is typically used to develop comparatively simple information systems that don't require a professional level of programming knowledge and expertise. It often permits and were to access and analyze data generated by large, complex systems developed by programmers.

Table 2 Four types of software

What it accomplishes	-Application software Tells the compute how to perform tasks that structure or automate specific steps in business processes that apply on specific settings.	- End -user software Tells the computer how to perform tasks that support general business processes that apply in many settings, such as writing memos or performing calculations.	- System develop - ment software Helps analysts and programmers build information systems.	systems software controls or supports the operations of the computer system 10 it can execute applications software or end-user software.
Example	Billing systems inventory system	word processor, spreadsheet	compiler, DBMS, CASE , system	operating system utility program
Effect on end user	Automates or structures specific steps in business processes.	Hands- on tools for the end user; may be used to develop small systems.	No direct effect: helps technical staff produce better information systems.	Utility program controls computer system operations so that the end user can use it
Generality	Used for a specific type of business process in a specific business or group of similar businesses.	Concerned with a general business process that could apply in many firms.	used to build a general class of systems , such as business. applications	concerned with how a compute operates, regardless of what business problem it is. solving

User and managers are affected personally by end user software because it is a fundamental tools for getting their work done efficiently. Firms that adopt this software especially well may enjoy some competitive advantage in internal efficiency.

Programmers and analysts use system development software in the process of building and enhancing information systems. Examples of system development software include compilers, database management systems, and computer aided software engineering (CASE) systems. Compilers translate programs written in languages such as COBOL or C^{++} in to instructions that can be executed by computers. System development software affects mangers and users in an important but indirect way because they can help programmers produce more benefits for an organization with the same level of effort. The ultimate impact is a combination of better information systems and lower costs.

System software, produced by programmers who are expert in a computer system's internal operation, controls the internal operations of a computer system. Examples of system software include operating systems and data communications software. An operating system controls the way programs are executed and the way computer system resources, such as disk space, are used. Examples for personal computers include windows 98 and the Macintosh operating system. Data communication software controls the transmission of data among devices and computer systems. Other system software includes utilities for sorting and merging filed and performing background functions related to maintaining computer systems.

Decisions about operating system software affect managers and users in several ways. Because programs are written to run under particular operating systems on a particular type of computer, the choice of an operating system affects the portability of programs and the ability to use purchased software. Operating systems also control the interface between users and computers. The popularity of graphical interfaces for personal computers demonstrates the importance of this aspect of operating systems.

So far, four types of software have been introduced, each of which plays a different role. Applications software and end-user software have the most direct impact on the firm's business operations. Some forms of system software, such as operating systems, have a direct impact on ease of use, but other forms of system software along with system development software are oriented toward the technical staff.

2.3.2. OPERATING SYSTEMS

Dear learners, Thus far, the chapter has focused on business applications and end- user software, both of which are designed to support the user's business processes. It has also covered the role of system development software in translating the ideas in to object code that a machine can execute. Before finishing the chapter with efforts to program intelligence in to computers, we will look at operating systems, a type of system software (rather than application software) that affects business professionals by controlling the computers they use.

Operating systems are complex programs that control the operation of computers and networks by controlling (1) execution of other programs running on the computer, (2)

communication with peripheral devices including terminals, and (3) use of disk space and other computer system resources. When centralized computing was the norm, it was easier to generalize about operating system functions.

Today, different operating system functions are required by different computing options. For example, the type of operating system that controls a client - server network has to deal with different issues than an operating system that controls a PC. To make things more complicated, operating systems are often intertwined with other layers of software including DBMSS, communication software, and middleware.

Operating systems differ in size and complexity. The first operating systems for personal computers, such as Ms-Dos and CPM, were written by just a few programmers. As operating systems took on new functions, the amount of development work multiplied. Microsoft's Windows NT, an operating system for networked computers, cost over $ 150 million to develop with a team of 200 programmers, contained 4.3 million lines of code when it was first released in 1993, and has been developed much further since that with the simplest case, personal computers.

2.3.3. OPERATING SYSTEMS FOR PERSONAL COMPUTERS

The purpose of the operating system for a pc is to make it possible for you to do work by using application programs such as spreadsheets, word processors, or drawing programs. It does this by performing a variety of functions related to controlling the user interface, controlling access to data, controlling jobs in progress, and allocation resources. Regardless of whether the PC operating system is Windows 3.1. Windows 95, Windows 98, or one of the versions of the Mac Os, here are some of the operating system functions that affect a pc user;

- Controlling the user interface: When you turn on a personal computer, the operating system displays start up information a long with menus, in cons, or other indications of the choices you can exercise. As you use the computer, the appearance of what you see on the screen is controlled by the operating system or by the interaction between the operating system and whatever applications program is being used.
- Controlling tasks in progress: When you select an application or document to open, the operating systems recognizes your inputs and takes the action you request. If you print something, the operating system controls the interface with the printer and reports problems, such as when the printer is out o paper. By supporting multitasking, operation systems permit the user to operate two or more programs concurrently on the same computer. For example, they permit a user to switch back and forth between a spreadsheet and a word processor with out turning off one application in order to use the other.
- Controlling access to data: When you access previously stored data through an application program, the operating systems uses internal directories and other internal information to find and

retrieve the data. Some operating systems can update one document automatically based on data changes in another document, for example, automatically updating a word-processed report when changes are made in a spreadsheet, part of which is included in the report. The operating system can also ask for a password before permitting use of a restricted file.

- Allocating resources: The operating system allocates memory while the computer is running. When you want to save a document or spreadsheet, the operating system decides where to store the data in the storage device. It makes sure that each file stored does not overlay files stored previously. If it is necessary to break the data in to several blocks in different places on the storage device, the operating system keeps track of the different blocks. When you delete files, the operating system frees up the space so that it can be used again.

2.3.4. OPERATING SYSTEMS OF MULTI- USER COMPUTER SYSTEMS

Operating systems for mainframe computers and servers with multiple processors perform the same functions in much more complex situations. Instead of taking care of a single user, they run many jobs simultaneously for different users, taking into account the priority of different jobs. Some of the jobs involve online interaction with users. Other jobs are run in a background mode with the user detached. These operating systems make sure that the users, their data, and their various jobs do not interfere with each other. They also maintain computer system security.

Operating systems for multi- user computer systems monitor the current status of the system and decide when to start jobs. This is necessary because computer systems have a finite computing capacity, a specific number of peripherals of each type, and a finite capacity for communicating with the peripherals. The operating system considers resource availability when it allocates resources to jobs. For example, before starting, a job that requires a tape drive, it allocates a specific tape drive to that job, and it delays the job if all tape drive are currently allocated to other jobs. Likewise, before permitting an online user to log on, it decides whether the capacity is available for that user. When multiple processors are involved, the operating system must also make sure that work binge done by one processor does not interfere with work being done by another.

In networked computer systems, the network operating system establishes the links between the nodes, monitors network operation, and controls recovery processes when nodes go down or the entire network goes down. The network operating system must work in conjunction with the operating systems for the individual workstations on the network. This adds to the complexity of establishing and maintaining computer networks because the two operating systems (for the workstation and for the network) and the application soft ware must all be compatible. It may also affect computer system performance by creating noticeable delays compared to doing individual work on a personal computer.

A number of different multi- user operating systems are used today. Older operating systems still used for mainframe and minicomputer applications from the 1970 s and 1980 s include IBM's MVS and Digital's VMS, both of which were upgraded substantially in 1995. Starting in the mid-1980 s there was a shift away from these mainframe operating systems and toward a widely used multi- user operating system called UNIX, which was developed at AT& T's Bell Labs before the time of Pcs. It was eventually given to universities for free because AT& T was not allowed to sell soft ware at that time. Based on this history, it is not surprising that the Internet uses UNIX, which was written in the programming language C^{++} and was designed as a portable operating system. Although UNIX is used widely in networks of up to 1,000 user, early hopes that it would become a universal operating system working uniformly on all computers have not been realized. Currently used dialects of UNIX include IBM's AIX, HP/UX, Sun's Solaris, Digital's UNIX, SCO's UNIX, and several others. In 1993 Microsoft sold the first release of the windows NT operating system, Which contains both server and client components. By 1997 it could support corporate networks with up to 200 users. It overlaps with Novell's Netware in the network operating system market and competes with the various forms of UNIX for new multi- User applications. Many observers be live that the client side of windows NT will eventually replace Microsoft's client /desk top operating systems windows 95 and windows 98.

2.3.5. WHY OPERATING SYSTEMS ARE IMPORTANT

Operating systems are a crucial component of any computer system because they can lock in some applications and lock out others. Current applications programs and end-user software are written to run under a particular operating system. A program written to run under one operating system may not run under another operating system. Any one who has attempted to switch between a Intel Pc (that uses windows on an Intel microprocessor) and an Apple Macintosh Pc understands that switching to a different operating system often entails the expense of abandoning or modifying much existing software.

CHAPTER CONCLUSION

Summary

Exercise 2.3

1. Why is an operating system necessary? That is, why can’t an end user just load an application program in a computer and start computing?
2. What are the different types of software.
3. Which application software packages are the most important for a managerial end user to know how to use? Explain the reasons for your choices.

CHAPTER SUMMARY

- Technology performance could be summarized in terms of just four performance variables. Functional capabilities and limitations, ease of use, compatibility, and maintainability.
  Notice that some of the terms uses for IT performance are also use at other times for process or product performance. It is also known security as a performance variable for the process rather than the technology even though it is sometimes directly related to the technology issue.
- A computer system consists of computers and computer- controlled devices that process data by executing programs. The physical devices in a computer system are its hardware, and the programs are its software. Aside from the computer itself, a computer system also includes peripherals for input, out put, and storage.
- Embedded computers are internal components of other machines. Categories of no embedded computers include personal computer, work stating, midrange computer, mainframe, and super computer. The newer category of server crosses many of the older classification.
- Keyboards are the dominant input device for business data processing but are used when a person has already captured (or just created) the data and is now entering the data into the computer as a separate.
- Step- Character recognition techniques such as optical character recognition and bar coding reduce the handling of data being entered in to a computer system. Scanners capture images. Voice recognition systems bypass keyboard input, but are not as accurate.
- The principal forms of data storage include paper, micrographic, magnetic storage, and optical storage. Micrographic devices reduce paper in to miniature pictures on microfilm. Magnetic tapes and disks store data through the magnetization and demagnetization of ting regions on an iron oxide surface. Magnetic tapes must be used sequentially, where as disks can be used for direct access. Optical disks come in a variety of read- only, write- once, or rewritable forms. Flash memories use chips that retain data when the computer is turned off.
- The most common device for interactive output on screens is the VDT monitor, although flat screens have been used for portable computers and factory applications. Many types of printers and plotters are used for paper outputs. Audio outputs are used both for prerecorded massages and for synthesized interaction with computer systems users.

- Application software processes data to structure and facilitate specific work practices. End-user software includes general - purpose tools (Such as spreadsheet programs and word processors) designed for use by end users with out programming assistance. System development software is used by programmers and analysts in the process of building and enhancing information systems. System software controls the internal operations of a computer systems. Applications software has the greatest potential for captivities impale because it is part of the specialized work systems that may differentiate an organization from its competitors.

- What are operating systems, and why should mangers and users care about them? Operating systems are Complex programs that control the operation of computers

and networks by controlling (1) execution of other programs running on the computer, (2) Communication with peripheral devices including terminals, and (3) use of disk space and other computer system resources. Operating systems matter to managers because they regulate the efficiency of the computer system and because the choice of an operating system can lock in some applications and lock out others.

REVIEW QUESTIONS

1. What do we mean performance of information technology?
2. What is the difference between compatibility and reliability?
3. How do you define maintainability?
4. What are the different types of software?
5. How do you define application software?
6. What is the importance of optical disks?
7. How do you define flash memory?
8. What do we mean operating systems?
9. Why operating systems are important?
10. What are the different types of computers?

SELF TEST –TWO

1. ---------- is the ease with which users or technical specialists can keep the technology running and upgrade it to so it the changing needs of the situation.
    A. Maintainability
    B. Modularity
    C. Scalability
    D. Flexibility
    E. None
2. ---------- is the extent to which the characteristics and features of particular technology fit with those of other aspects of the situation.
    A. Ease of use
    B. Maintainability
    C. Compatibility
    D. Scalability
    E. None
3. What application software accomplishes?
    A. Tells the computer how to perform tasks that structure or automate specific steps in business processes that apply on specific settings.
    B. Tells the computer how to perform tasks that support general business processes that apply in many settings, such as writing memos or performing calculations.
    C. Helps analysts and programmers build information systems.
    D. Controls or supports the operations of the computer system.
    E. None
4. Operating systems are complex programs that control the operation of computers and networks by controlling.
    A. Execution of other programs running on the computer
    B. Communication with peripheral devices including terminals
    C. Se of disk space and other computer system resources
    D. All
    E. None

5. Reliability means
    A. How much information can it store or process?
    B. How long will it likely continue operating with out
    C. How fast can it process data or instructions?
    D. How much space does it take up?
    E. None

CHAPTER - THREE

3. APPLICATION OF INFORMATION IN MANAGEMENT LEVELS AND FUNCTIONS

INTRODUCTION

Dear students, so far, you have learned about information systems, the role of systems with in organizations, the strategic uses of information systems, and the basic computer resources available to the manager. What you learned generally emphasized the organization as whole, rather than the major areas of decision making commonly found in organizations. Chapter 3 focuses on these areas. You will apply what you have learned about information systems and computer system resources to problems in managerial decision-making, marketing, manufacturing, and production, and human resources.

Management is traditionally described as a process of leadership involving the management functions of planning, organizing, directing, and controlling. These functions of management are based on those expounded in the early 1900's by Henri Fayol of France, a pioneer of management theory. They give us a valuable way to think about what managers do. A manager should plan the activities of his or her organization, organize its personnel and their activities, direct its operations, and control its direction by evaluating feedback and making necessary adjustments.

Information systems can assist managers by providing information needed to accomplish each of these managerial functions. Information system can also help managers organize and staff their organizations with human resources.

CHAPTER OBJECTIVES

- After reading and studying this chapter, you should be able to
- Give examples of how information can support the four functions of management, the ten roles of management, and the three levels of management activities.
- Give examples of how information can support each of the four stapes of the decision making process.
- Discuss the impact of information systems in Business
- Discuss how information systems applied in management
- Discuss manufacturing and production and human resource information systems.

3.1 INFORMATION TECHNOLOGY AND MANAGEMENT PROFESSIONS

Activity 3.1

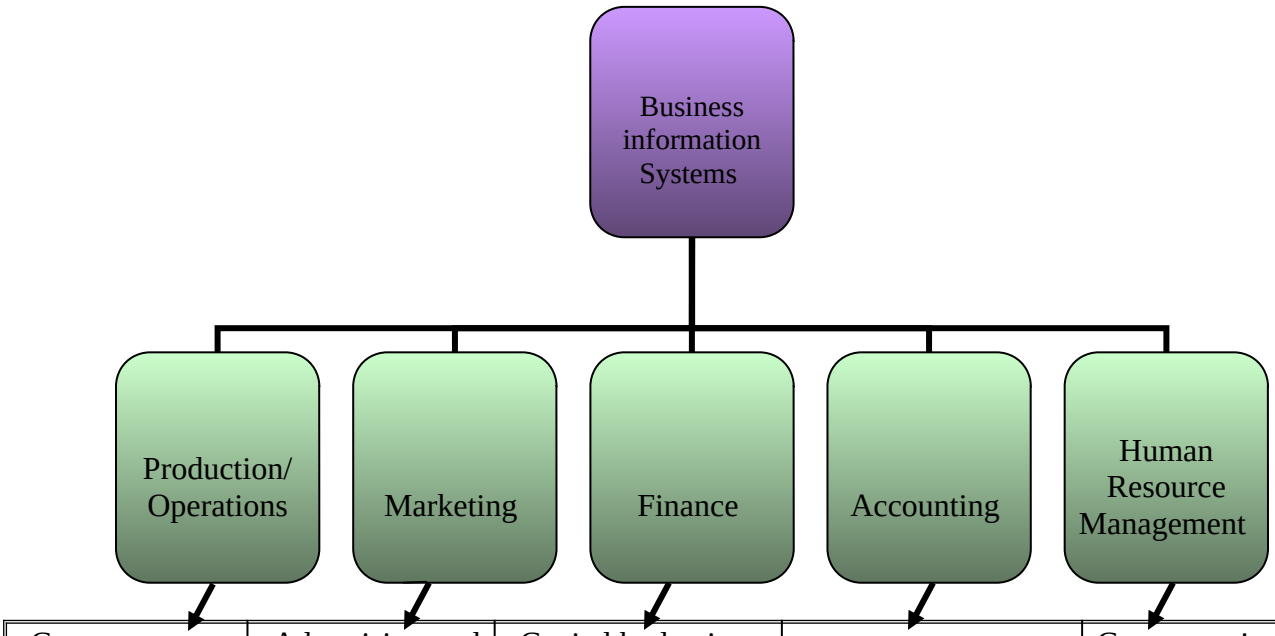
Dear distance learners, as a managerial end user, what do you think about the impact of information systems on a particular business function?

3.1.1 INFORMATION SYSTEMS IN BUSINESS

The are as many ways to use information systems in business as there are business activities to be performed, business problems to be solved, and business opportunities to be pursued. As a prospective managerial end user, you should have a general understanding of the major ways information systems are used to support each of the functions of business. We will use the term business information systems to describe a variety of types of information system (transaction processing, information reporting, decision support, etc) that support a business function such as accounting, financier, marketing, or human resource management. Thus, applications of information system in the functional areas of business are called accounting information systems, marketing information systems, human resource information systems, and so on.

As a managerial end user, you should also have a specific understanding of how information systems affect a particular business function (marketing, for example) or a particular industry (banking, for example) that is directly related to your career objectives. For example, some one whose career objective is a marketing position in banking should have a basic understanding of how information systems are used in banking and how they support the marketing activities of banks and other firms.

Figure:- 13. Illustrates how information systems can be grouped in to business function categories. Information systems in this section will be analyzed according to the business function they support to give you an appreciation of how much systems support a variety of managerial end users. How ever, you should remember that information systems in the real world are typically integrated combinations of functional information systems. There is a strong emphasis in many organizations to develop such composite or cross-functional information systems. These organizations view cross-functional information systems as strategies way to share information resources and improve the efficiency and effectiveness of a business, thus helping it attain its strategic objectives.



-Computer-aided engineering	-Advertising and promotion	-Capital budgeting	-Accounts payable	Compensation analysis
-Compute aided manufacturing	-Marketing management	-Cash management	- Auditing	-Employee skills inventory
-Inventory control	Market research	-Credit management	-Billing and accounts receivable	-Labor analysis
-Materials requirement planning	-product Management	-financial forecasting	- Budgeting	-Personnel record keeping
-Process control	-Sales forecasting	-Financing requirements analysis	-Cost accounting	-Personnel requirements forecasting
-Purchasing and receiving	-Sales management	- Portfolio	-Fixed asset accounting	-Training and development analysis
- Robotics	-Sales order processing			

Figure 13 Examples of business information systems. Note how they support the major functional areas of business.

Exercise 3.1

1. How information systems affect a particular business function?
2. How different organizations view cross-functional information systems?

3.2 INFORMATION SYSTEMS AND MANAGEMENT

Activity 3.2

Dear students,

How could a decision support system be used to support the planning, organizing, directing, and controlling functions of a department manager?

Dear learners,

As you know, the process of management involves planning, organizing, directing, and controlling people and activities. At each level of management, the responsibilities for handling these tasks differ. Top-level managers are responsible for establishing organizational objectives. Middle level managers organize and control the organization's resources to achieve these objectives; where as lower-level managers supervise day-to-day activities.

Each of these three levels of management has different information systems needs. First line supervisors require feed back about day -to-day activities. Middle- level managers need information that will enable them to reallocate resources to achieve objectives. Top level mangers use external information systems that support management decision making at the operational, tactical, and strategic planning levels. Knowledge of the nature of operational, tactical, and strategic planning information systems is necessary to understand the application of these information systems to the problems of managing the marketing, finance, accounting, production, and human resource functions.

The development of information systems with in organization has been characterized by a process of evaluation involving more than technology alone. This process requires planning, a balanced mix of application development, and leadership on the part of both management information systems (MIS) professionals and user managers. In this chapter, you will learn about the roles and responsibilities of user- managers in determining which types of data processing projects support business goals and in working with the MIS function to accomplish these projects.

3.2.1. THE FUNCTIONS OF MANAGEMENT

Management is the process of directing tasks and organizing resources to achieve organizational goals. The main functions of management are planning , organizing, leading, and controlling. Planning is deciding what to do. This function entails evaluating the organization's resources and environment and establishing a set of organizational goals. Once these goals are established, the manager must develop tactics to achieve these goals and create a decision making process that will monitor the results.

The Second managerial function is organizing. Organizing is the art of deciding how to achieve goals. This decision requires developing the best organizational structure, acquiring and training personnel, and establishing communications networks. The manager of the office equipment dealership will have to organize resources to achieve the objective. A computer department may be organized and staffed with sales people. Technical support representatives, training personnel, and systems analysts to help support the marketing effort. Communications channels between managers, customers, manufacturers, sales people, and technical specialists will all have to be established under this new plan.

Leading, the third managerial function, involves directing and motivating employees to achieve the organization's goals. The fourth managerial function, controlling, enables the manager to determine if the organizations performance is on target. He or she may develop and use performance standards to assess employee performance. Information systems can also provide feedback on how effectively financial and physical resources are being used to achieve business goals. Reports that summarize sales statistics and compare planned versus actual expenses provide information that can be used to control the use of the organization's resources.

Besides handling the basic managerial functions of planning, organizing, leading, and controlling, managers are also responsible for adapting the changes in the internal and external environment.

3.2.2 MANAGERIAL ROLES

Successful management also requires performing a variety of managerial roles. Mintzberg (1975) studied three different managerial roles: interpersonal, information, and decisional.

The manager's interpersonal roles include the figurehead role, the leader role, and the liaison role. In the figure head role, the manager performs ceremonial duties such as greeting job candidates and dignitaries. As much as 12 percent of the manager's time is spent in these roles. In the leadership role, the manager must hire, train, and motivate employees. Informal leadership is a good measure of real power. Finally, in the liaison role, the manager makes contacts outside the vertical chain of command. Most studies of managers show that they spend as much time with their peers and with people outside their unites as they do with their own subordinates.

The Second type of role Mintzberg depicts is the informational role. Managers have formal access to information form virtually every internal staff member as well as extensive external information. In Mintzberg's research, 70 percent of incoming mail was informational. Communications is a large part of the manager's job. In fact, monitoring or scanning the environment for information is one of the most important tasks of managers.

The manager is also disseminator of information. In this role, the manager may choose to pass certain information along to peers and to subordinates. In the spokesperson role, the

manager provides information to the external community: to suppliers, to the press, to lobbying organization, and to government officials.

The decisional roles of the manager are of primary importance. They include the entrepreneurial role, the disturbance handler role, the resource allocate role, and the negotiator role.

In an entrepreneurial role, the manager is constantly looking for new ideas. An effective chief executive may initiate and keep track of as many as 50 different projects. Some of these may involve new products, others may relate to organizational changes, and still others may attempt to identify new markets.

Sometimes the manager has to be a disturbance handler. When external or internal disputes affect the company's operations, a senior manager may have to respond to pressures. The manager must act when a strike occurs, When a major advertising account defaults, or when a supplier defaults on a contract.

Another decisional role is the resource allocate role. As a resource allocate, the manager determines who will get what. He or she may decide how much money to spend on recruiting and training new sales personnel and how much time to spend on developing an advertising program. In the role of resource allocate, executives face very complex choices. Yet, one common solution to selecting what projects will be supported is to pick the person, not the proposal. The manager tends to support the projects that are proposed by people he or she trusts.

The final decisional role is negotiator. The manager is responsible for representing the organization in bargaining with others- with customers, with shipping companies, and with manufacturers. Negotiating with equipment manufacturers for exclusive marketing and service rights for certain lines of equipment is an example of this role.

Although the basic tasks of planning organizing, leading, and controlling are significant activities, most managers are constantly responding to internal and external changes and are responsible for communicating information with in the firm and to external groups.

3.2.3 THE LEVELS OF MANAGEMENT

The levels of management consist of top, middle- level, and first line management. Members of top management are the organization's senior executives. Their most important role is establishing the goals of the organization. They are typically responsible for interacting with representatives of the external environment, such as financial institutions, political figures, and important suppliers and customers.

Middle - level managers are responsible for allocating resources so that the objectives of top management are accomplished. They do so by implementing plans and by supervising lower- level managers under their functional area of responsibility. A sale manager, for example, organizes resources salespeople's time, training budgets,

entertainment budgets- to achieve sales results that are consistent with the growth plans of senior management.

First -line supervisors are responsible for supervising day-to-day operations. They typically supervise functions such as order entry, credit checking, inventory control, and preventive maintenance.

3.2.4 THE ACTIVITIES OF THE ORGANIZATION

The activities of an organization are of three kinds: operational, tactical, and strategic planning. Operations are the day-to-day activities of the firm that involve acquiring and consuming resources. First -line supervisors must identify, collect, and register all transactions that result in acquiring or expending these resources. When sales are made or goods are shipped, a department manager needs to record these events. These day-to-day transactions produce data that are the basis for operational systems.

The tactical function of an organization is the responsibility of its middle- level managers. They review operational activities to make sure that the organizations meeting its goals and not wasting its resources. Managers responsible for control have to decide how to allocate resources to achieve business objectives. Data that can be used to predict future trends can be useful in helping managers make these resources allocation decisions.

Strategic planning is carried out by the top management of the organization. Though managers responsible for operational and tactical decision-making are primarily involved in reviewing internal data, the managers responsible for planning are also interested in external information.

3.2.5 A FRAMEWORK FOR INFORMATION SYSTEMS

Each of these levels-operational, tactical, and strategic planning requires different information systems.

Operational Systems
At the operational systems level the primary concern is to collect, validate, and record transactional data describing the acquisition or disbursement of corporate resources. Financial data on accounts receivable, accounts payable, payroll, and cash receipts must be recorded as they occur. When a sale is transacted, data on the items ordered are recorded, the inventory level for these items is adjusted, a shipping label and packing slip are prepared, and an invoice is generated. The original transaction the sales of the item - creates numerous transactions in order processing, inventory, and billing.

Operational -level information systems often have the following characteristics.

Repetitiveness:- The information operational -level information systems produce is usually generally repetitively at periodic intervals, such as daily, weekly, or monthly.

Predictability:- The information they produce usually does not contain any surprises or unexpected results for the manager or other users of the system. That is, people are paid what they were expected to be paid and customers are billed for what they purchased during the month.

Emphasis on the past:- The information produced usually describes past activities of the organization. For example, the output of a pay roll system describes employees' past work. The checks to vendors describe past purchases by the organization. Customer invoices describe past sales to them stock reports describe past changes in inventory.

Detailed nature:- The information produced is very detailed. That is, paychecks provide detailed information on the workweek of each employee and the specifics of each employee's gross and net pay. Customer invoices specify details regarding purchases made during the period, the terms under which the purchases must be repaid, and the total amount, including taxes and other charges, due.

Internal Origin:- The data for operational systems usually spring entirely from internal sources. That is, the data for paychecks come from internal documents such as time cards and employee master records. The data for customer invoices come from sales orders and shipping documents.

Structured form: - The form of the data used as input and the form of the information produced by operational -level systems are usually, very structured. That is, the data on time cords are carefully formatted in identical fashion on earth. Or the data on each customer invoice are carefully formatted in identical fashion. In short, the form and format of the data input and the information output of the systems are highly structured.

Great accuracy:- The accuracy of the data used as input to such systems and of the output produced by such systems is usually very high. The data input and information output are carefully checked in a variety of ways.

Tactical systems

The second level in the framework consists of tactical systems. Tactical systems provide middle - level managers with the information they need to monitor and control operations and to allocate their resources more effectively. In tactical systems, transactions data are summarized, aggregated, or analyzed. Tactical systems are designed to generate a variety of reports, including summary reports, exception reports, and ad hoc reports.

Summary reports:- provide management with important totals, averages, key data, and abstracts on the activities of the organization. An example of a summary report might be a list of the total regular and overtime hours earned at each plant for the week by job classification. Another example is a list of total weekly sales, by salesperson, by product, and by sales region.

Exception reports:- Warn managers when results from a particular operation have exceeded or not met the expected standard for the organization. An example of an

exception report is a list of all plants that have logged more overtime hours than expected for the week. Another example is a list of those sales personnel whose sales fall in the top and bottom 10 percent of the organization.

Ad hoc reports: - are reports that managers need, usually quickly, that may never be needed again. Ad hoc reports present information that the manager needs to solve a unique problem. An examples of this type of report might be a list of the total number of employees absent during the week arranged by plant and by job title along with the hours or days missed.

Tactical information systems differ from operational information systems in their basic purpose: Their purpose is not to support the execution of operational tasks but to help the manager control these operations. As a result, the types of data used as inputs and the information produced as outputs also differ. Tactical information systems often have these characteristics.

Periodic nature:- The information from a tactical system is sometimes produced periodically. For example, a branch credit manger for an organization may receive a weekly report showing the total dollar amount of accounts that are more then 60 days overdue, 90 days overdue, and in the hands of a collection agency.

Unexpected findings:- The information produced by a tactical information system may not be the information that was expected to be produced. For example, in querying the accounting system database, the credit manager may find that the major customer characteristic correlating with credit difficulty is the relationship between type of position and type of employer.

Comparative nature:- The information produced is usually comparative in nature rather than merely descriptive. Tactical information systems should provide managers with information that alerts them to variances from accepted standards or results that are not within the normal range so that remedial action can be taken swiftly. This type of tactical information system is analogous to process control systems that output constantly and provide feed back when output parameters are at variance with accepted standards.

An example drawn from the home would be the heating system. As long as the temperature of the air in the house falls with in the range specified on the thermostat, no action on the part of the beating system is required. When the air temperature falls below the thermostat setting, however, the thermostat sends a signal to the furnace to turn on. When the air reaches the temperature on the thermostat, it sends a signal to the furnace to turn off.

Summary Form:- The information produced is usually not detailed but in summary form. The credit manager is not interested in a detailed listing of each customer account and its balance. In large organization, that would be an enormous quantity of data and would not, therefore, be information to the manager. What the manager needs is summary information relating to credit performance or balances of accounts that are overdue or in collection.

Both internal and external Sources:- The data used for input to the system may not be confined to sources internal to the organization. In our example, the credit manager compared the information pertaining to problem customers to other branches, to other periods from the same organization, or to a goal set by top management.

Thus, tactical information system differ from operational information system not only in their intended purpose but also in the regularity with which information is produced, the predictability of the results, the comparative nature of the information, the amount of detail produced, and the rigidity of the structure of the information.

Strategic Planning Systems

The third level in the framework for information systems is strategic planning. Strategic planning level information systems are designed to provide top management with information that assists them in making long range planning decisions for the organization. The distinction between strategic planning information systems and tactical information systems may use some of the same data. For example, when budgeting information is used to help middle- level managers allocate resources to best meet organizational goals, budgeting becomes a tactical decision activity. When budgeting information is used by top management to plan the long term activities of an organization, budgeting becomes a strategic planning activity. In either case, accurate budget information delivered in a timely fashion to managers is an important function of the financial information system of the organization. How ever, the key differences between the systems have to do with who uses the data and what they are using it for.

Strategic planning information systems are ordinarily used by top management for setting long term organizational goals. Tactical information systems are typically used by middle managers to control their areas of supervision and to allocate resources to meet organizational goals set by top management. Though the data used in tactical and strategic planning information systems sometimes overlap, typically there are differences in the data used by the two information systems. Strategic planning information systems often have these characteristics.

Adhoc basic:- The information may be produced either regularity or periodically. For example, top management uses periodic accounting system reports such as the income statement, balance sheet , statement of sources and uses of funds, and capital statement in its planning function. However, strategic planning information is more often produced when it is needed, on an ad hoc basis. For example, marketing analysis information pertaining to a new product or to a new cluster of stores may be requested when organization planners are considering the addition of several new stores in a new region.

Unexpected Information:- The information produced by the system may not be the information that was anticipated. For instance, economic forecast information may be requested for the economy as a whole and for the industry in particular. The results of the economic forecast may be a surprise to organization planners. Or, the results of a

marketing survey of potential customers to be served by the new stores described above may produced store location that had not been predicted or expected by planners.

Predictive nature:- The information produced is usually predictive of future events rather than descriptive of past events. Long range planners try to set a course for an organization through an uncharted future. Their primary task is to choose a route that will improve the organizations level of success. The information that the strategic planning system provides should help these planners reduce the risks involved in their chaise of routes.

Because organizational long - range planning groups make decisions that will affect the organization for some time in the future, much of the information used in the system is future oriented and predictive in nature. For example, forecasts of future economic conditions, projections of new product sales, and forecasts of the changing demographic characteristics of target customer groups are all forms of information that may be used in strategic planning information systems to help planners make decisions.

Summary form:- The information produced is usually not detailed but in summary form. Long - range planners are not usually interested in detailed information: they are usually concerned with more global data. For instance, long- range planners are not ordinarily concerned a bout the details of customer invoices. They are more likely to be interested in the overall buying trends reflected in the summaries of sales by product group. And they are not usually interested in the specific demographic characteristics of a particular customer. They are more likely to be concerned with the overall demographic characteristics of groups of customers.

External data:- A large part of the data used for input to the system may be acquired from sources external to the organization. For example, information pertaining to investment opportunities, rates of borrowed capital, demographic characteristics of a market group, and economic conditions must be obtained from data maintained outside the organization.

To assist long- range planners, MIS personnel may help them select a variety of on -line external databases to provide them with the information they need quickly and in a form that can be manipulated further. Long range planners may wish to obtain access to databases containing economic data from which demographic trends and forecasts can be drawn.

Unstructured format:- The data used for input to the system may contain data that are unstructured in format. For instance, forecasts of future market trends may use the opinions of store buyers, sales people, or market analysts obtained in casual conversations.

Subjectivity:- The data used for input to the systems may be highly subjective and their accuracy may be suspect. For example, forecasts of future stock market trends may be based partly on rumors reported by brokers. Forecasts of the expected market share of your organization within the industry might use the opinions of industry observers who

are basing their information on rumors and on conversations held with a variety of industry personnel.

A summary of the characteristic of information system at the operational, tactical, and strategic planning levels is shown in table -1. As you can see from this chart, first line supervisors use operational information systems and middle - level managers use tactical information systems. Top executives of the organization use strategic planning systems.

3.2.6 SEQUENCE OF DEVELOPMENT OF MANAGEMENT INFORMATION SYSTEMS.

Experience has shown that the base of operational systems has to be in place before tactical systems can be built. This is because the data input into operational systems become the source of data for tactical system. For example, sales transactions must be captured at the operational level to summarize these data over a six- month or yearly time frame for use in summary reports. However, tactical systems do not necessarily have to be in place for strategic planning systems to be developed. The latter rely heartily on external data sources.

As you learned earlier, data and information differ. Data are the individual elements of a transaction, such as item number, item quantity, and price on sales order transaction.

Summary Classification of information Systems.

Characteristic	Operational	Tactical	Strategic Planning
Frequency	Regular, repetitive	Mostly regular	Often ad hoc
Dependability Of results	Expected results	some surprises May occur	Results often Contain surprises
Time period covered	The past	Comparative	Predictive of the future
Level of detail	Very detailed	summaries of data	Summaries of data
Sources of data	Internal	Internal and external	Mostly external
Nature of data	Highly Structured	Some unstructured data	Highly unstructured
Accuracy	Highly accurate data	Some subjective data used	Highly Subjective data
Typical user	First - line Supervisors	Middle managers	Top management
Level of decision	Tax oriented	Oriented toward control and resource allocation	Goal oriented

Table -3: A comparison of information Systems in operational, tactical, and strategic planning systems.

Information, on the other hand, is data with meaning for decision-making. An information system is a set of procedures organized to generate information that enables

managers to review operation, tactical, and strategic planning activities. A management information system, in particular, is designed to provide information for effective planning and tactical decision-making.

Data are often aggregated to provide the information needed for tactical information systems. Therefore, most management information systems need a foundation of operational level data systems.

Exercise 3.2

1. What do we mean a framework for information systems? Explain it in detail.
2. What are the different levels of management?
3. What are the main functions of management?
4. What do we mean sequence of development of MIS?

3.3 MARKETING INFORMATION SYSTEMS

Activity 3.3

Dear students, how does the focus of an operational- level marketing information system differ from a tactical – level marketing information system?

The business function of marketing is concerned with the planning, promotion, and sales of existing products in existing markets, and the development of new products and new markets to better serve present and potential customers. Thus, marketing performs a vital function in the operation of a business enterprise. Business firms have increasingly turned to computers to help them perform vital marketing functions in the face of the rapid changes of today's environment. Computers have been a catalyst in the development of marketing information systems, which integrate the information flows required by many marketing activities.

Figure-14. Illustrates how marketing information systems provide information for planning , control, and transaction processing in the marketing function. strategic, tactical, and operational information systems assist marketing managers to control the efficiency and effectiveness of the selling and distribution of products and services. Analytical reports provide information on a firm's actual performance versus
Planned marketing objectives. Figure-14. Summarizes several important ways that computer -based information systems support the marketing function.

3.3.1 SALES MANAGEMENT

Sales managers must plan, monitor, and support the performance of the Salespeople in their organizations. So in most firms, computer based systems produce sales analysis reports, which analyze sales by product, product line, help marketing managers monitor the sales performance of products and salespeople and help them develop sales support programs to improve sales results.

3.3.2 SALES FORCE AUTOMATION

However, sales analysis is only one aspect of the use of computers for sales management and support. Increasingly, computer based information systems are providing the basis for sales force automation. In many companies, the sales force is being with laptop computers, hand help Pcs, or even pen - based tablet computers. This not only increase the

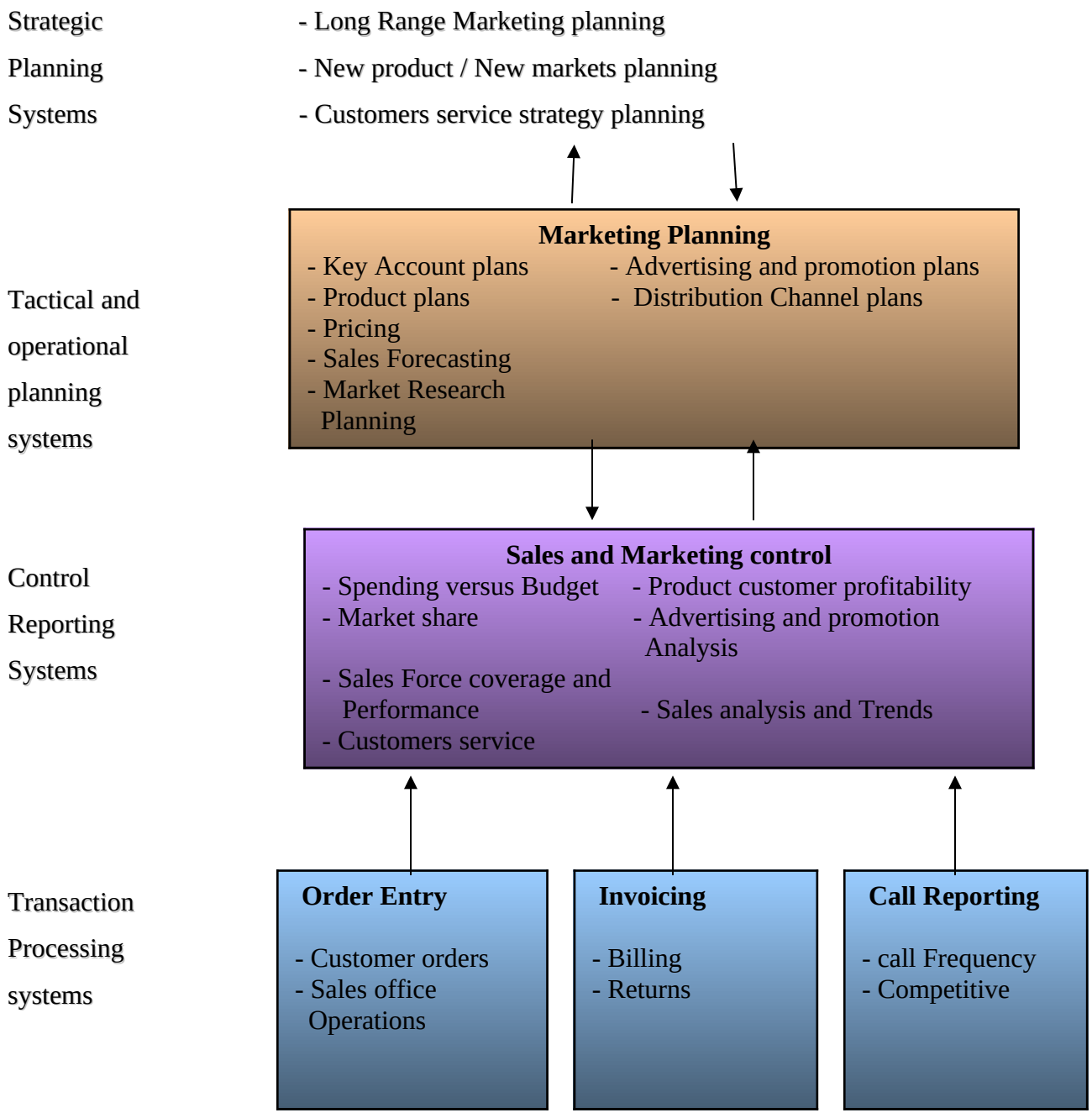


Figure14:- Marketing information systems provide information for the planning and control of major components of the marketing function.

Personal productivity of salespeople, but dramatically speedup the capture and analysis of sales data from the field to marketing managers at company headquarters. In return, it allows marketing and sales management to improve the support they provide to their salespeople. There fore, many companies are viewing sales force automation as a way to gain a strategic advantage in sales productivity and marketing responsiveness.

Sales Management
Plan, monitor, and support the performance of salespeople and sales of products and services.

Sales Force Automations
Automate the recording and reporting of sales activity by salespeople and the communications and sales support from sales management.

Product Management
plan, monitor, and support the performance of products, product lines, and brands.

Advertising and promotion
Help select media and promotional methods and control and evaluate advertising and promotion results.

Sales Forecasting
Product short and long-range sales forecasts.

Market Research
Collect and analyze internal and external data on market variables, developments, and trends.

Marketing Management
Develop marketing strategies and plans based on corporate goals and market research and sales activity data, and monitor and support marketing activities.

Table 4. Examples of important computer based information systems in marketing.

For example, salespeople use their Pcs to record sales data as they make their calls on customers and prospects during the day. Then each night sales reps in the field can connect their computers by modern and telephone links to the mainframe computer at company head quarters and upload information on sales orders, sales calls, and other sales statistics, as well as send electronic mail messages and other queries. In return, the host computer may down load product availability data, prospect lists of information on good sales prospects, E-mail messages, and other sales support information. Figure -15. Illustrates IBM'S sales force automation system.

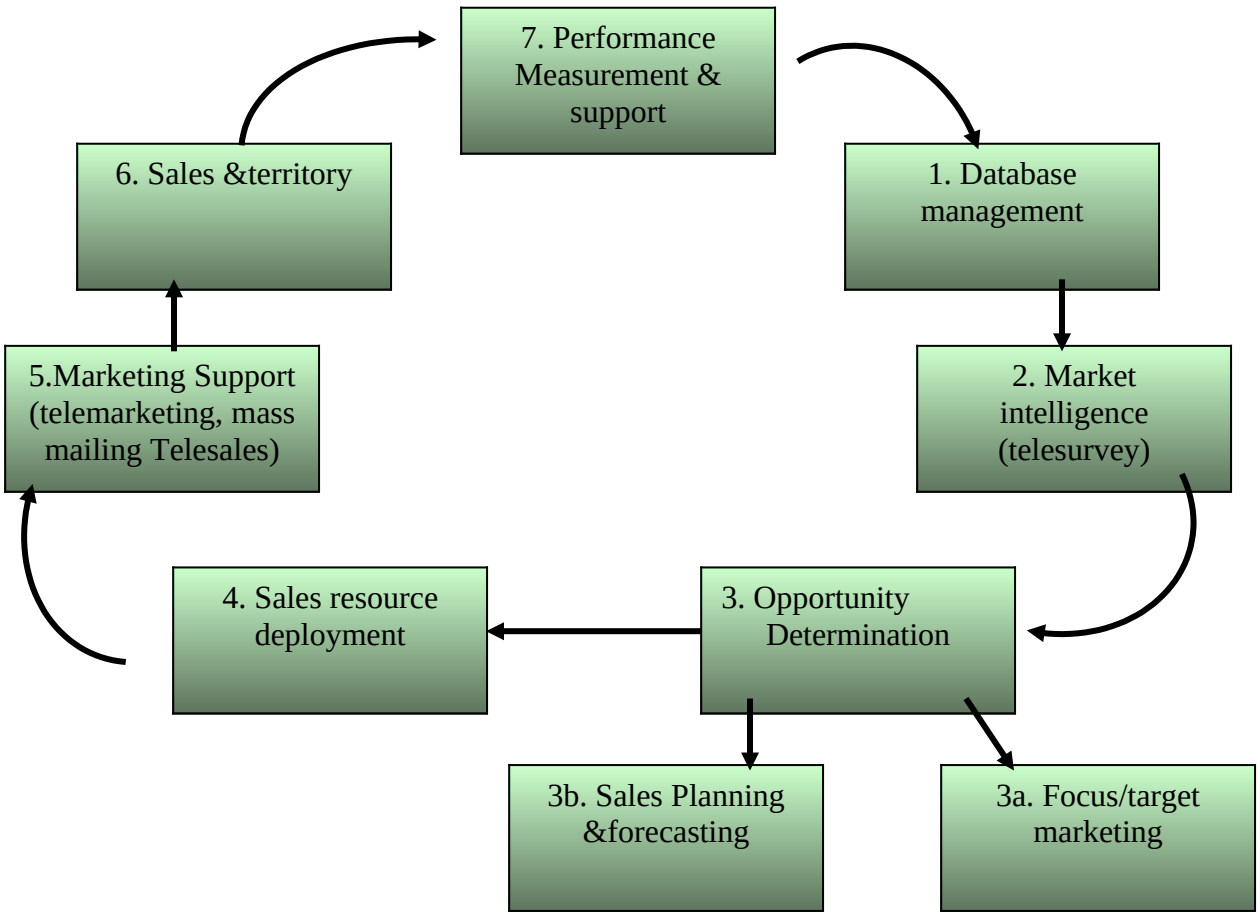


Figure -15. IBM'S Sales force Quotation system. Note the complete cycle of sales and marketing support activates.

3.3.3 PRODUCT MANAGMENT

Product managers and information to plan and control the performances of specific products, product lines, and brands. Computers can help provide price, revenue, cost, and growth information for existing products and new product development. Information and analysis for pricing decisions is a major function of this system. Information is also needed on the manufacturing and distribution resources proposed products will require computer based models may be used to evaluate the performances of current products and the prospects for success of proposed products.

3.3.4 ADVERTISIONG AND PROMOTION

Marketing managers need information to help them achieve sales objectives at the lowest possible costs for advertising and promotion. Computers use market research information and promotion models to help (1) select media and promotional methods, (2) allocate financial resources, and (3) control and evaluate results of various advertising and promotion campaigns. For examples, a marketing analyst may develop an electronic spreadsheet model to analyze the sales response of advertising placed in a variety of media.

3.3.5 SALES FORECASTING

The basic functions of sales forecasting can be grouped into the two categories of short range forecasting and long range forecasting. Short range forecasting deals with forecasts of sales for periods up to one year, where as long range forecasting is concerned with sales forecasts for a year or more into the future. Marketing managers use market research data, historical sales data, promotion plans, and statistical forecasting models to generate short range and long range sales forecasts.

3.3.6 MARKET RESEARCH

The market research information system provides marketing intelligence to help managers make more effective marketing decisions. It also provides marketing managers with information to help them plan and control the market research projects of the firm. Computers help the market research activity collect, analyze, and maintain an enormous amount of information on a wide variety of market variables that are subjects to continual change. This includes information on customers, prospects, consumers, and competitors. Market, economic, and demographic trends are also analyzed. Data can be purchased in computer- readable form from external sources, or computers can help gather data through telemarketing and computer- aided telephone interviewing techniques. Finally, statistical analysis software packages help managers analyze market research data and spot important marketing trends**.**

3.3.7 MARKETING MANAGEMENT

Marketing managers use computer- based information systems to develop short and long range plans outlining product sales, profit, and growth objectives. They also provide feedback and analysis concerning performance - versus - plan for each area of marketing. Computer- based marketing models in decision support systems and expert systems are

also being used to investigate the effects of alternative marketing plans. In addition, the fast capture of sales and marketing data by sales force automation systems helps marketing management respond faster to market shifts and sales performance trends and develop more timely marketing strategies.

Exercise 3.3

1. What is sales force automation? How does it affect sales person productivity, marketing management, and competitive advantage?
2. How marketing information systems provide information for the planning and control of major components of the marketing function.

3.4 MANUFACTURING AND PRODUCTION INFORMATION SYSTEMS

Activity 3.4

Dear learners, what is computer integrated manufacturing?
What is the role of computer-aided manufacturing, computer aided engineering, and robotics in CIM (computer integrated manufacturing)?

Introduction

Dear learners, in this section, we will concentrate on computer based manufacturing applications to illustrate information systems that support the production /operations function.

Manufacturing information systems support the production /operation function, which includes all activities concerned with the planning and control of the processes that produce goods or services. Thus, the production /operations function is concerned with the management of the operational systems of all business firms. However, such systems are needed by all firms that must plan, monitor, and control inventories, purchases, and the flow of goods and services. There fore, firms such as transportation companies, wholesalers, retailers, financial institutions, and service companies must use productions /operations information systems to plan and control their operations.

3.4.1 COMPUTER INTEGRATED MANUFACTURING

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

- Simplify production processes, product designs, and factory organization as a vital foundations to automation and integration.
- Automate production processes and the business functions that support them with computers and robots.
- Integrate all productions and support processes using computers and telecommunications networks.

Thus, computers are simplifying, automating, and integrating many of the activities needed to produce products of all kinds. For example, computers are used to help engineers design better production using both computer -aided engineering (CAE), and computer- aided design (CAD), and better production processes with computer aiding processing planning (CAPP). They are also used to help plan the types of materials needed in the production process, which is called material requirements planning (MRP), and to integrate MRP with production scheduling and shop floor control, which is known as manufacturing resources planning (MRPII). Computer- aided manufacturing (CAM) many be used to help manufacturing products. This could be accomplished by monitoring and controlling the production process in a factory (shop floor control) or by directly controlling a physical process (process control) a machine tool (machine control) or a machine with some human like capabilities (robots). See Table 5.

Computer - aided design

Creates designs for products and manufacturing processes

Computers - aided manufacturing

Fabricates metals, plastics, and other materials by molding, machining, welding, etc.

Assembly and packaging

Uses robots to put together parts fabricated on - site or purchased from outside

Logistics and storage.

Purchase and distribute materials, inventory control, removal of materials, and management of supplies.

Quality control

Tests incoming materials and outgoing products, tests of process in progress, quality assurance.

Factory management

Coordinates incoming orders, requests components and materials, planning and scheduling, overseeing cost control, arranges deliveries.

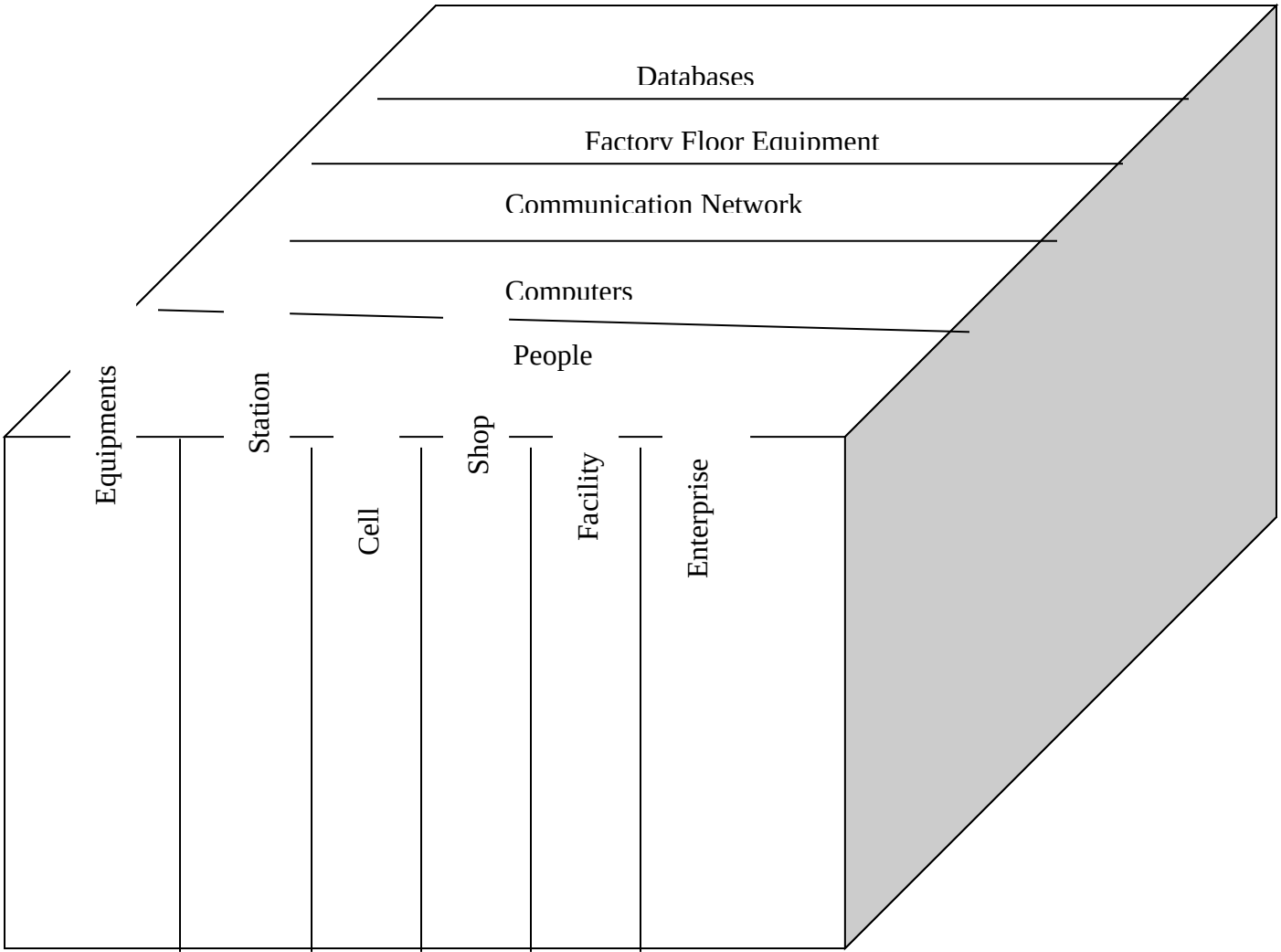
Table 5. Examples of computer - based systems in manufacturing

Figure -16. Illustrates the three major dimensions of computer-integrated manufacturing.

CIM focuses its simplifications, automation, and integration efforts on:

- The three basic manufacturing functions to be performed; engineering, manufacturing administration, and factory operations.
- The workplace environment, from the entire enterprise, factory facility, and shop floor to small work cells, individual workstations, and equipment.
- The manufacturing resources available, which are people, computers, telecommunications networks, factory floor equipment, and databases of manufacturing information.

FIGURE 16: The three major dimensions of computer-integrated manufacturing. CIM focuses on simplifying, automating, and integrating the major functions, environment, and resources of modern manufacturing.



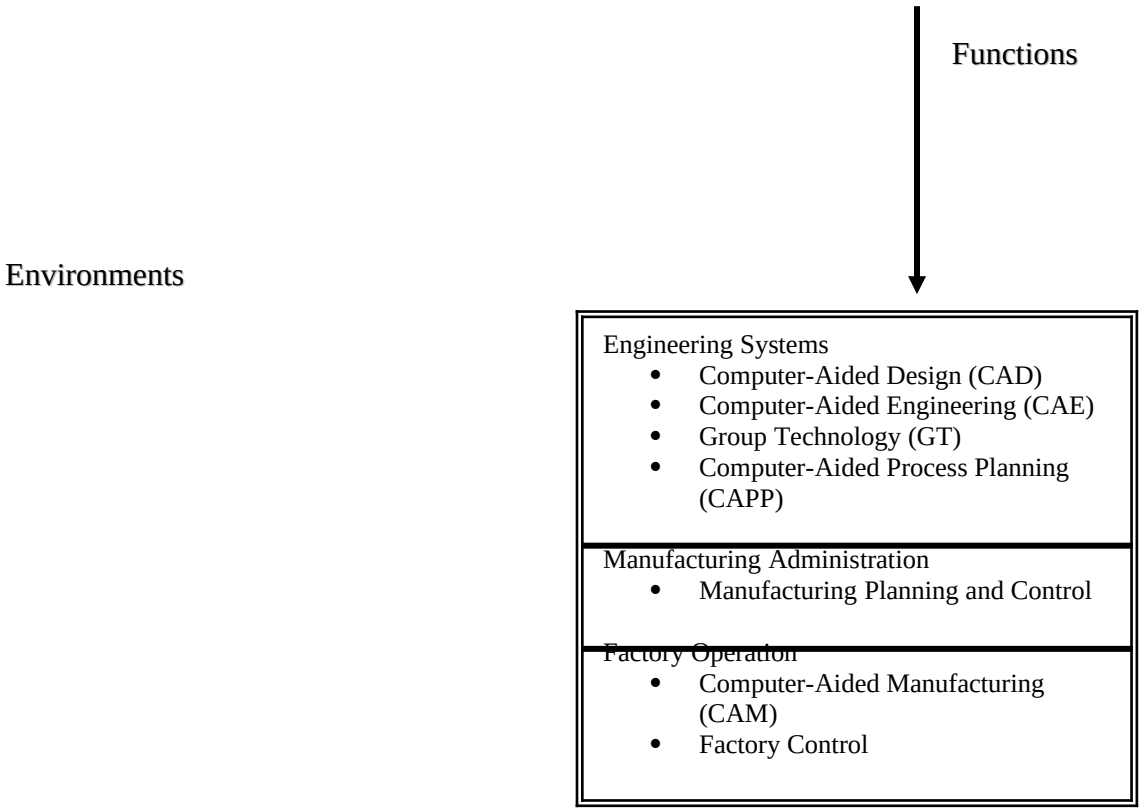


Figure-16. The three major dimensions of computer-integrated manufacturing. CIM focuses on simplifying, automating, and integrating the major functions, environment, and resources of modern manufacturing.

Some of the benefits of computer integrated manufacturing systems are:

- Increased efficiency through work simplifications and automation, better productions schedule planning, and better balancing of production work load to production capacity.
- Improved utilization of production facilities, higher productivity, and better quality control resulting from continuous monitoring, feedback, and control of factory operations, equipment, and robots.
- Reduced investment in production inventories and facilities through work simplification, just in time inventory policies, and better planning and control of production and finished goods requirements.
- Improved customer service by drastically reducing out of stock situations and producing high quality products that had better meet customer requirements.

3.4.2. 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 petroleum refineries, cement plant, steel mills, chemical plants, food product manufacturing plants, pulp and paper mills, electric power plants, and so on.

Many process control computers are special purpose microcomputer systems. A process control computer systems requires the use of special sensing devices that measure physical phenomena such as temperature or pressure changes. These continuous physical measurements are converted to digital form by analog- to - digital converters and relayed to computers for processing.

Process control software uses mathematical models to analyze the data generated by the on going process and compare them to standards or forecasts of required results. Then the computer directs the control of the process by adjusting control devices such as thermostats, valves, switches, and so on. The process control systems also provide messages and displays about the status of the process. So a human operator can take appropriate measures to control the process. In addition, periodic and on demand reports analyzing the performance of the production processes can be produced. Personal computers have become a popular method of analyzing and reporting process control data.

3.4.3 MACHING 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 atypical numerical control application, though it also refers to the control of typesetting machines, weaving machines, and other industrial machinery.

Numerical control computer programs for machine tools convert geometric data from engineering drawings and machining instructions from process planning in to a numerical code of commands that control the actions of a machine tool. Machine control may involve the use of special purpose microcomputers called programmable logic controllers (PLCS).
These devices operate one or more machines according to the directions of a numerical control program. Specially equipped personal computer that can withstand a factory environment are being used to analyze production data furnished by the PLCS. This analysis helps engineers fine tune machine performance.

3.4.4. ROBOTICS

As important development in machine control and computer aided manufacturing is the creation of smart machines and robots. These devices 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 human like physical capabilities (dexterity, movement, vision, and so on).

Robots are used as " Steel - collar " workers to increase productivity and cut costs. For example, one robot regularly assembles compressor valves with 12 parts at the rate of 320 units per hour, which is 10 times the rate of human workers. Robots are also particularly valuable for hazardous areas or work activities. Robots follow programs loaded in to separate or on -board special purpose microcomputers. Input is received from visual and /or tactile sensors, processed by microcomputer, and translated into movements of the robot. This typically involves moving its "arms" and "hands" to pick up and load items or perform some other work assignment such as pointing, drilling , or

welding. Robotics developments are expected to make robots more intelligent, flexible, and mobile by improving their competing, visual, tactile, and navigational capabilities.

3.4.5. COMPUTER - AIDED ENGINEERING

Manufacturing engineers use computer aided engineering to stimulate, analyze, and evaluate the models of product designs they have developed using computer- aided design methods. Powerful engineering workstations with enhanced graphics and computational capabilities are used to analyze and design products and manufacturing facilities. Products are designed according to product specifications determined in cooperation with the product design efforts of marketing research and product development specialists. One of the final outputs of this design process is the bill of materials (Specification of all required materials) used by the MRP application. The engineering subsystem is frequently responsible for determining standards for product quality (i.e. quality assurance). It also is responsible for the design of the production processes needed to manufacture the products it designs. This function depends heavily on the use of computers to perform the necessary analysis and design, and it is know as compute - aided process planning.

Computer- aided design packages and engineering workstations are the software and hardware resources that make computer- aided engineering possible. Engineers use these high- powered computing and advanced graphics workstations for the design and testing of products, facilities, and processes. Input is by light pen, joystick, or key board, with the CAD package refining an engineer's initial drawings. Output is in two - or three-dimensional graphics that can be rotated to display all sides of the object being designed. The engineer can 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. The design can them be converted into a finished mathematical model of the product. This is used as the basis for production specifications and machine tool programs.

Exercise 3.4

1. What do we mean computer integrated manufacturing?
2. What is process control?
3. Define Robotics

3.5 HUMAN RESOURCE INFORMATION SYSTEMS

Activity 3.5

Dear students,

How computer can based information systems support human resource management in a business? Give a few examples.

INTRODUCTION

The human resource management (or personnel) function involves the recruitment, placement, evaluation, compensation, and development of the employees of an organization. Originally, businesses used computer- based information systems to (1) produce paychecks and payroll reports, (2) maintain personnel records, and (3) analyze the use of personnel in business operations. Many firms have gone beyond these traditional functions and have developed human resources information systems (HRIS),

which also support (1) recruitment, selection, and hiring, (2) job placement, (3) Performance appraisals, (4) employee benefits analysis, (5) training and development, and (6) health, safety, and security. see Table 6.

	Staffing	*Training/ Development*	*Performance Review and Appraisal*	*Compensation Administration*
Strategic information systems	Manpower planning Labor force tracking	Succession planning	performance appraisal planning	Contract costing salary forecasting Benefits tracking
Tactical information Systems	Budget analysis Turnover cost Absenteeism/ performance	Training effectiveness career matching	performance/training correlation	Compensation effectiveness Benefit preference models
Operational information systems	Recruiting structured interview / assessment Workforce planning Scheduling Selection models	Skill assessment	Computer-based evaluation program	compensation equality

Table 6. Human resource information systems support the strategic, tactical, and operational used of the human resources of an organization.

Human resources information systems support the concept of human resource management. This business function emphasizes (1) planning to meet the personnel needs of the business, (2) development of employees to their full potential, and (3) control of all personnel policies and programs. The goal of human resource management is the effective and efficient use of the human resources of a company. Some of the major applications of information systems. that support human resource management are summarized in table 7.

Staffing
Record and track human resources through personnel record - keeping, skills inventories, and personnel requirement forecasting.
Training and Development
Plan and monitor employee recruitment, training, performance appraisals, and career development.
Compensation
Analyze, plan, and monitor policies for employee wages, salaries, incentive payments, and fringe benefits.
Governmental reporting

Reporting to government agencies concerning equal opportunity policies and statistics, employee health, work place accidents and hazards, safety procedures, and so on.

Table 7. Human resource information systems support the four major functions of human resource management.

3.5.1. STAFFING

These information systems record and track human resources within a company to maximize their use. For example, a personnel record -keeping system keeps track of additions, deletions, and other changes to the records in the personnel database. Changes in job assignments and compensation, or hirings and terminations, are examples of information that would be used to update the personnel database. Another example is an employee skills inventory system which 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.

A final example is doing personnel requirements forecasting to assure a business of an adequate supply of high- quality human resources. This application provides information required for forecasts of personnel requirements in each major employment category for various company departments or for new projects and other ventures being planned by management. Such long- range planning may use a computer- based simulation model to evaluate alternative plans for recruitment, reassignment, or retraining programs.

3.5.2. TRAINING AND DEVELOPMENT

Information systems help human resource managers plan and monitor employee recruitment, training, and development programs by analyzing the success history of present programs. They also analyze the career development status of each employee to determine whether development methods such as training programs and periodic performance appraisals should be recommended. Computer- based training programs, and appraisals of employee job performance are available to help support this area of human resource management.

3.5.3 COMPENSATIONS ANALYSIS

Information systems can help analyze the range and distribution of employee compensation (wages, salaries, incentive payments, and fringe benefits) with in a company and make comparisons with compensation paid by similar firms or with various economic indicators. This information is useful for planning changes in compensation, especially if negotiations with labor unions are involved. It helps keep the compensation of a company competitive and equitable, while controlling compensation costs.

3.5.4 GOVERNMENTAL REPORTING

Nowadays, reporting to government agencies is a major responsibility of human resource management. So organizations use computer- based information systems to keep track of the statistics and produce reports required by a variety of government laws and regulations. For example, in the united states, statistics on employee recruitment and hiring must be collected for possible use in Equal Employment opportunity commission hearings; statistics for employee health, workplace hazards, accidents, and safety procedures must be reported to the occupational safety Health Administration (OSHA); and statistics on the use of hazardous materials must be reported to the Environmental protection Agency (EPA). Software packages to collect and report such statistics are available from a variety of software vendors.

Exercise 3.5

1. How Human resource information systems support the four major functions of human resource management?
2. What is staffing?

CHAPTER SUMMARY

Dear distance Students,

In this chapter, you have learned about the functions of managers and how information systems support these functions. The activities of an organization include day-to-day operation systems are designed to support decisions at these three levels.

- Operational information systems process transactions describing the acquisition and disbursement of corporate resource. First line supervisors use operational systems to monitor day-to-day activities.
- Tactical information systems provide middle managers with the information they require to allocate resources needed to achieve organizational goals. Often, these tactical systems summarize or aggregate data generated from operational systems.
- Strategic planning systems help senior managers identify organizational goals. Information for strategic planning often comes from external sources such as demographic data and competitive industry statistics.
- Business information systems support the functional areas of business (Marketing, production/ Operations, accounting, finance, and human resource management) through a wide variety of computer based operational and management information systems.
- Marketing information systems provide information for the planning and control of the marketing function. Marketing planning information assists marketing managers in product planning, price decisions, planning advertising and sales promotion strategies and expenditures, fore casting the market potential for new and present products, sand determining channels of distribution. Marketing control information supports the efforts of management to control the efficiency and effectiveness of the selling and distribution of products and services.
- Computer – based manufacturing information systems use several major subsystems to achieve computer aided manufacturing (CAM) computers are automating many of the activities needed to produce products in manufacturing

industries. For example. Computers help engineers design products using computer-aided design (CAD). Then they help plan the types of material needed in the production process using material requirements planning (MRP). Finally, they may be used to directly manufacture the products on the factory floor by directly controlling a physical process (Process controls, a machine tool (numerical control). or machines with some human like physical capabilities (robotics).

- Human resource information systems support human resource management in organizations. They include information systems for staffing, training and development, compensation administration, and performance appraisal.

REVIEW QUESTIONS

1. What are the planning functions of the manager?
2. What are the organizing functions of the manager?
3. What informational roles does the manager have?
4. What interpersonal roles does the manager perform?
5. What are the characteristics of an operational information system?
6. What types of reports are generated from a tactical information system?
7. Why is tactical- level information so important to middle level managers?
8. What kind of strategic information would be useful to the top level managers?
9. What is the impact of information systems for product managers?

Self test – three

1. ---------- are typically responsible for interacting with representatives of the external environment, such as financial institutions, political figures, and important suppliers and customers.
    A. Top- level managers
    B. Middle- level managers
    C. First-line supervisors
    D. Tactical information systems
    E. None
2. ---------- are reports that managers need, usually quickly, that may never be needed a pain. It presents. Information that the manger needs to solve a unique problems.

    A. Exception reports
    B. Summary reports
    C. Adhoc reports
    D. None
3. ---------- Plan, monitor and support the performance of products product lines, and brands.
    A. Sales management
    B. Product Management
    C. Sales forecasting
    D. Marketing management

E. None

4. ---------- uses mathematical models to analyze the data generated by the ongoing process and compare them to standards or forecasts of required results.

    A. Process control
    B. Machine control
    C. Robotics
    D. Computer application
    E. None

5. ---------- The manager performs ceremonial duties such as greeting job candidates, and dignitaries.
    A. In the figure head role
    B. The leader role
    C. The liaison role
    D. None

CHAPTER – FOUR

4. INFORMATION SYSTEMS PLANNING

INTRODUCTION

Dear distance learners,

As a manager, you will make decisions on what type of information systems should be developed to support important business plans. The emergence of new technologies, such as office automation, expert systems, personal computers, and robotics, has created new opportunities for improving productivity. To take advantage of these opportunities, you must understand and be able to use appropriate information systems planning methods. Information systems planning methods help managers plan and organize information resources, including data processing systems, and new information technology.

Today's manager needs information to make decisions on pricing, product development, marketing strategy and resource allocation. But most managers do not know what information they need, and as a result, they put the systems analyst in the position of producing too much information there fore, it is relevant to identify the major problems involved in determining management information needs.

Chapter Objectives

- After reading and studying this chapter, you should be able to:
- Explain about information systems planning.
- Explain how information technology can be used to support business plans.
- Develop a better under standing of how information systems can be used to provide feedback on overall business performance.
- Discuss the role of planning in organizations.

4.1 PROBLEMS WITH DETERMINING INFORMATION REQUIREMENTS

Activity 4.1

Dear students, there are two important problems with determining information requirements. What are they?
Two important problems with information requirements definition are:-

1. Failure to understand information needs from a cross functional perspective. Companies should design a consolidated database that includes information which are from and to all functional units in the organization so that it reduces an exchange of much papers among these units of the organization. Every one in the organization who is in need of in formation to process his /her task may check the consolidated database.

To see more clearly, let us consider the following example. Let us say that OM EDAD, a distributor of electronics, has hundred of orders pending. The existing inventory is not sufficient to fulfill all orders. There fore, The manager must decide how to allocate existing inventory in the most effective way possible. The decision the warehouse manager (who is responsible to distribute the goods) needs to make is "which customer orders will we fill first?" one would think that inventory should be allocated to the "best" customers (e.g. those who do the most business with the company), to the customers who need prompt delivery, to those customers who can provide the greatest profit margin, and to those who are most likely to pay their bills on time. In order to make the decision on inventory allocation, the warehouse manager will require the following information:-

- How important is each customers to the business?
- Which customer accounts are most profitable?
- Which customers need prompt delivery on their orders?
- What is the credit status of the customers requiring shipment?

It is evident that the information the warehouse manger needs to allocate the existing inventory to the right customers comes from sources out side the warehouse. For example, information on customers importance and profitability would come from the sales and marketing function. Information on credit history would come form the accounting area, and Information on delivery requirements would come from customers service representatives.

Therefore, in developing information requirements for the warehouse, other functional areas must be taken in to account. Perhaps a cross functional database with information accessible to sales, accounting, customers service, and ware house personnel will have to be designed. Because information is needed for intelligent decision making with in many departments, the old concept of information "ownership" is out molded and counter productive. Without shared information, the organizations ends up in a situation where the right hand does not know what the left hand is doing.

2. Limited use of joint application design in interviewing and data collection.

The concept of shared information also applies to the importance of joint application design as a process for determining the information requirements of managers. Obtaining a cross-functional perspective in defining information needs requires input from managers in a number of departments. It is difficult to achieve an overall organizational perspective if each manger is interviewed individually. There fore in determining the information requirements, interviews and data gathering should bemoaned from all managers jointly.

Exercise 4.1

1. What kind of information will a warehouse manager require to make the decision on inventory allocation?

4.2 MANAGING BY WIRE IN A COMPLEX BUSINESS ENVIRONMENT

Activity 4.2
What does “managing by wire” mean?

In to day's complex business environment, flexibility, responsiveness, and sensibility to changing customer needs is critical for competitive survival." Managing by wire" is a concept forwarded by Stephen Naeckle and Richard Nolan, it says, a company must be able to respond to a turbulent business environment. The manage- by - wire environment means being able to modify business plans based up on changes in market conditions. It means using information as feed back by sensing environmental conditions, interpreting them , and selecting a plan of action that can be sent out to subsidiary units such as manufacturing and Sales.

An enterprise must create learning loops that enable it to sense changes in the external environment, to interpret them, to decide what to do to respond to them, and take action. Feedback from the external environment must provide measures of how well the business is performing. If market needs change, then the information systems must provide feedback to make appropriate changes in the internal mix of activities and in the out puts the systems generates.

Let's see how the concept of learning loops can be applied to a business situation. At Ethiopian Air lines, area managers enter projected sales information in to a microcomputer each morning. The software analyzes the data and responds with information on how many passengers are going to fly, how to schedule the flights and the like. Such decision support system provides a learning loop that is adaptive and changeable as the course of business activity unfolds.

The concept of learning loop is basic to identifying the information requirements of mangers. Managers need feed back from the external environment that provides data on changing sales and market trends so that they can react on a timely basis. The ability to define these feedback requirements is an essential elements in requirements definition.

Exercise 4.2

1. How the concept of learning loops can be applied to a business situation?
2. What is the concept of learning loop?

4.3 METHODS TO GATHER INFORMATION REQUIREMENTS.

ACTIVITY 4.3

Dear student,
As a manger, how to determine the information needs more effectively?

The three techniques the mangers can use to determine the information needs more effectively are critical success Factors, Business systems planning, and Ends/ Means Analysis. Each of these approaches is fundamental to the establishment of information systems plans that serve the needs of managers**.**

4.3.1 .CRITICAL SUCCESS FACTORS

Senior Managers usually frustrated with receiving dozens of computer- generated reports each month, but find little information of value in these reports. As a result of this frustration, many managers fail to use computer generated information to make decisions and search for another management reporting systems.

The Critical success factors (CSF) methods, developed by John Rockart of the Massachusetts Institute of Technology, attempts to overcome the limitations of by - product technique (using the information from past transaction processing systems), and other reporting methods by focusing on individual manager's information needs. The first step in the CSF approach is for the managers to identify his/her goals. The next question the manager must answer is "what are the critical success factors for these goals?" A critical success factor defines. " What has to go right " to achieve a business goal. An example of goals and critical success factors for three profit-making organizations is provided in the table below. Even though the business goals of these three organization are the same, the strategies that must be implemented effectively to achieve these goals vary.

Goals	Critical Success factor
- Earning pershare	* **Seminar company**
- Market share	- Mailing list size and quality
- New product success	- Identification of relevant topics
	- Effective speakers
	***Life Insurance**
	-Effective training of agency management
	- New product development
	- Productivity of clerical operations.
	***Food corporation**
	- Advertising effectiveness
	- Effective distribution
	- Product innovation

Some critical success factors determined by the nature of the industry. For example, the paper work intensive insurance business, in order to be successful, it requires cost effective office operations and clerical productivity. In the automobile business, manufacturing cost control is an important critical success factor.

Some critical success factors are determined by the competitive strategy of a particular business. For example, two department stores may have similar objectives but different strategies. One may view effective customer service, styling of merchandize, and quality control the key to its competitive. The other department success. The store would have different CSFS, Such as discount pricing, high turnover of seasonal merchandize and advertising effectiveness.

The critical success factors help managers define their information needs. Information that is valuable to the manager should support achievement of these critical success

factors by providing measures of how well they are achieved. As an example, the department store that has a strategy of price discount will have the following methods of measuring the CSFS in the table below.

Critical Success Factors	Measures
- Pricing	- Margin percentage for various product lines
- High turnover of seasonal merchandise	- Inventory turnover by product line
- Advertising effectiveness	- Change in market share, by product line.

Table – 7 CSFS and Measures

Each of these measures can be used to define an information systems requirement. After these needs are established, existing information systems can be analyzed to determine if reports providing the needed information currently exist or if they can be generated from existing databases. If the reports that are needed cannot be generated from existing information systems, the manager ***can identify "new"*** information requirements and may require full scale systems development projects.

Contributions and Limitations of CSFS Approach

Contributions

- It enable managers to determine their own CSFS and to develop good measures for these factors.
- The costly accumulation of unnecessary data is limited.
- The manager can develop an information system that is meaningful to his/her
- The focus of information systems developed to support CSFS is effective control and monitoring of existing operations.
- This approach accommodates changes in competitive strategy, and it enables managers to define information needs that can be supported by flexible inquiry and reporting systems. These systems, which use existing databases to generate variety of on demand reports, are commonly known as decision support systems.

Limitations

- It focuses on manager specific information needs, rather than on organization wide information requirements.
- It does not try to recommend a data architecture planning strategy to accompany the analysis of management information needs, and it does not address the MIS management responsibilities associated with implementing these system projects.

4.3.2. BUSINESS SYSTEMS PLANNING (BSP)

BSP is an approach use to assist a business in developing an information systems plan that supports both short and longterm information needs. The goal of the approach is to provide a formal, objective method for management to establish information systems priorities that support business needs. In the process of participating in BSP study, top management should improve its relationship with information systems professional and make a commitment to the development of high return information systems projects.

One of the underlying objectives of BSP is to develop a data architecture that support information systems development activities. In most organization, Information systems

are built one piece at a time. As each system is built, a new database is constructed to store data elements needed to generate reports. After dozens of systems are built, the organization has to grapple with the problems of maintaining dozens of databases. Many of these databases store the same data elements, contributing to problems of data redundancy and inconsistency. There fore the BSP approach attempts to over come this problems by analyzing data requirements for major business processes and proposing a data architecture that supports multiple applications.

The major activities that are involved in BSP study are these:

Make a commitment
Prepare for the study
Hold a kick off meeting
Define business processes
Define data classes
Determine executive perspective
Assess business problems
Define an information architecture
Determine priorities
Review information systems management
Develop recommendations and action plans
Report results.

At the beginning of the BSP study, a Study team is organized to participate in gathering data. The study team consists of managers from different functional areas to do the required interviewing. The first step is to identify the major business processes of the organization. A business process is an activity needed to manage the resources of the business.

Methods of Analysis

These business processes become the basis for understanding information systems needs and for identifying key data requirements. The BSP methodology utilizes a number of matrixes to establish relationships among the organization, its processes, and data requirements. The process organization matrix relates activities of the organization to those responsible for these activities. The data class process matrix enables the management to determine which data classes support multiple business processes. Identification of shared data creates a basis for developing a data architecture to support multiple applications.

A BSP Study also accomplished other types of analysis. One of the Objectives is to determine how effectively current information systems support major business processes. Another part of the analysis studies the data classes supporting various information systems. If common data support a variety of current information systems, opportunities for designing integrated data bases can be defined.

Once business / Systems relationships are established, the BSP study team undertakes in depth interviews with managers through out the organization to determine problems and

priorities. Managers are asked to identify their problems, possible solutions, value statements, process impacted, and processes causing the problems. Specific questions that address these issue include these:

- What major problems have you encountered that has made your job difficult?
- What is needed to solve this problems?
- What would be the value to your function or to the over all business if it were solved?
- How satisfied are your with the current level of information systems support?
- What additional information do you need to help you in doing your job?
- What would its value be?

After interviews are conducted, information is analyzed and consolidated in to a summary report. The interviews conducted during BSP study are critical in obtaining an executive perspective on information systems needs.

Major problems	Problem Solution	Statement	Information Needs	Affected Process
Lack of ability to identify qualified people	Better information on personnel resources	Retain good people; improve morale	Skills inventory systems	Human resource

An example of the results of all executive interview.

Based on this analysis, a number of systems development projects are identified. These projects need to be prioritized according to their benefit, impact, success, and demand.

Benefit:- Is measured interms of the expected financial returns that will occur if the project is implemented.

Cost- benefit analysis :- Using return on investment or net present value, can help to do determine the potential benefits of a project.

The impact of a project:- means the number of people affected, its qualitative effect, and its effect on accomplishing over all objectives.

Success: - refers to the probability of the projects being implemented successfully, given the risk and the resources available. Finally, demand measures the need for and the value of the proposed system.

Each of the proposed in formation systems projects is rated using these four factors, and all over all ranking of projects is developed. Projects with the highest ratings become Candidates for implementation and become part of the short-term information systems architecture plan.
An important step in planning is to review the capability of the existing information systems organizations to develop the proposed information systems. Since the BSP Study

identifies opportunities for the development of an integrated data base environment in which shared data support multiple applications, the information systems group will need to establish plans to move toward this kind of environment. New technology, new personnel, and new procedures may have to be introduced to make this transition.

The final step of a BSP study is to develop an action plan in which the first subsystem project is scheduled for development, appropriate MIS personnel are assigned, and the project justification is completed. Once this project is underway, longer- range plans for designing the information architecture of the firm can be developed.

Generally, the major thrust of BSP is data architecture planning. The method includes identifying business processes, listing information requirements, supporting each process, and establishing data element needs. From this analysis it is possible to define data elements that support multiple business processes and to develop an information architecture using a shared data base approach. The BSP approach ultimately defines away of achieving an integrated data base architecture by implementing one systems at a time.

Although the BSP methodology is one of the most comprehensive planning techniques, it can be time consuming and expensive to implement. It is designed to address data architecture by planning rather than other issues like information systems organization and project management control. Some criticisms of BSP include the fact that it does not identify opportunities for the effective use of new information technology and the integration of the technology with traditional data processing systems. Managers who want to use BSP need specialized training in the technique.

4.3.3 ENDS /MEANS (E/M) ANALYSIS

The purpose of E/M Analysis, developed by wetherbe and Davis at the University of Minnesota, is to determine effectiveness criteria for out puts and to specify efficiency criteria for processes used to generate outputs.

The first questions in E/M Analysis is “What is the end or good or service provided by the business process?" As it Can be seen from the below table, the end might be to fill customer orders.

Ends	Effective	Information
Fill customer orders	Customer orders delivered when expected, and as soon as or sooner than the competition's	Summary and exception reports on customer deliveries; comparative statistics on delivery Service VS, competition's
Provide Customer service	promptly provide credit to qualified customers. Quick response to and reduction of customer complaints	Customer credit status and payment history Report of number and type of complaints by customers and average time to resolve complaint

Table Ends means analysis.

The next question is "What makes these goods or services effective to the recipients or customers?" The effectiveness criteria is that these orders be delivered when expected, and if possibly as soon as or sooner than the competition.

The final question is "What information is needed to evaluate that effectiveness". In this case, information about customer deliveries and comparative statistics on delivery service versus the competition's will provide the feed back management needs to determine how effectively they have achieved their result.

In the other parts of E/M Analysis, the manager needs to specify efficiency criteria for processes used to generate outputs. This analysis asks three questions. First is "What are the key means or processes used to generate or provide good or services?" A key process might be process orders, as you can see from the below table. Second, “What constitutes efficiency in providing these goods or services?" Efficiency for processing orders might mean lowering transactions costs for orders and minimizing shipping costs. Third, "What information is needed to evaluate that efficiency?” Information needed to assess efficiency might include cost per transaction, cost per credit transition, and shipment costs.

Means	Efficiency	Information
Process orders	Low transaction cost	Cost Per transaction with historical trends.
Process credit requests	Low transaction cost	Cost Per transaction with historical trends.
Make shipment	Minimize shipment costs.	Shipping cost categorized by orders, customer, and region.

Table. Ends / Means analysis.

Exercise 4.3

1. What does business systems planning mean?
2. What contributions and limitations does critical success factors have?
3. What is the purpose of End/Means analysis?

4.4 INFORMATION SYSTEMS PLANNING AT THE ORGANIZATIONAL LEVEL.

Activity 4.4

How information systems plans are developed at the organization wide level?

Dear learners, previously we have already discussed how managers can use planning approaches such as BSP and CSF to define their information needs. These approaches can also be applied at organization wide level. To understand how information systems plans are developed at the organization wide level, it is important to first understand the connection between information technology plans and business Plans.

4.4.1 HOW INFORMATION TECHNOLOGY SUPPORTS BUSINESS STRATEGY

The information planning quid developed by MC Farlan and Mc Kenney at Harvard Business school, as shown in the below table, will help you understand the connection between information technology and business strategy.

Strategic Quadrant. In the strategic quadrant of the information planning grid, you will find companies that are critically dependent on the smooth functioning of information technology for their competitive success. Both existing applications that are under development are closely linked with business plans. Information technology is closely linked with corporate planning.
Strategic impact of application development Portfolio.

Strategic impact of existing systems.	**Low**		**High**
	Low	Support	Turn around
	High	Factory	Strategic

Table: - Information planning grid

An example of a firm in the strategic quadrant is a financial services company that uses information processing to manage its loan portfolios, including loan application screening, payment processing, and account management. With out information technology, the firm would literally drawn in a sea of paperwork.

In organization in the strategic quadrant, it would make sense for the information technology manager to have a higher status and to actively participate in the corporate strategic planning process. The manager of information technology should be involved in the strategic planning process.

Turnaround quadrant: Companies in this quadrant need substantial information technology planning effort because the impact of applications under development is critical to their ability to achieve strategic business plans. Although information systems plans have not been closely linked with business plans in the past, future uses of information technology are “Strategic". The change from using technology to support administrative information systems to using technology to achieve strategic objectives places the firm in the turn around quadrant.
Factory quadrant:- Factory firms are in the situation in which existing applications of information systems have strategic impact, but future application are not critical to their ability to achieve strategic business plans. In other words, strategic systems have already been built.

Support quadrant: - In the support quadrant are firms in which the uses of information technology are not connected with competitive success. This is true of past systems as well as future information systems plans. A firm in this quadrant is a soft drink distributor. Although the distributor uses information systems to support back office administrative functions such as inventory control, accounts receivable, and accounts payable, it does not see information technology as strategic. Investments in marketing,

advertising, and promotion are more closely linked with its ability to achieve sales goals, as compared with investments in additional use of information technology.

4.4.2 INFORMATION TECHNOLOGY AND COMPETITIVE STRATEGY

In general, competitive uses of information technology must support the strategic goals and objectives of all organization. In porter's analysis, there are three generic competitive strategies: low - cost leadership, product differentiation and market specialization. Technology can be used to support each of these strategies. In other words, a firm that is a low- cost leader should use technology to support its low - cost leadership strategy. Similarly, a firm that uses a product differentiation strategy should use technology to reinforce it. Let's review each of the competitive strategies and learn how information technology can be used to support these strategies.

Low cost producer:- One of the most basic competitive strategies is low - cost leadership. For instance, the computer industries like Gateway 2000 strive to provide its products at an economical price. Gateway 2000 relies up on rigorous inventory management practices assisted by information technology so that it can avoid the costs of excess inventory. To interact with its customers, Gateway 2000 relies up on electronic bulletin board systems that provides information on service and maintenance. These strategies cut the costs of inventory, and administration and support a low - cost strategy.

Product Differentiation: This strategy involves adding value to a product or service. To see how to use technology to support its product differentiation, as one example, IBM maintains large customer databases that include industry characteristics, sales forecasts, and equipment purchasing histories. Using these databases, IBM marketing personnel can search for certain customer attributes and identify high- potential prospects for hard ware upgrades.

Market specialization: An organization with this strategy attempts to serve the needs of a specialized market niche more effectively than any of its competitors. Here too, information technology can be used. Fore example, information technology can be used to support the market specialization strategy through use of specialized customer and industry sales databases to identify the buying behavior of a particular market segment, a vender can design products and services that meet their needs most effectively.

Information System architecture

The term architecture is also used in IS planning. A firm's information systems architecture is the basic blue print showing how the firms data processing systems, telecommunications net works, and data are integrated. A firms information architecture is a highly summarized answer to the following questions.

- What data are collected?
- Where and how are the data collected?
- How are the data transmitted?
- Where are the data stored?

- What applications use the data, and how are these applications related as an overall system?

Although IS architecture may seem like a technical issue, it should reflect a strategic, managerial view of how an organization operates. IS architecture may be a constraint to a firm's business strategy because it determines the practical range of business and product strategies the firm can employ. Consider a bank whose new business strategy is based on combining checking accounts, saving accounts, credit cards, and loans in to a simplified account relationship. This strategy can be used only if customer IDS for each of the separate products can be grouped in to single combined accounts. In addition, the bank can provide a 24 hour response to customer queries only if all the data is in an intermediately accessible data base rather than on paper files at branches. The wrong IS architecture would doom the business strategy.

Centralization versus Decentralization

A primary issue in any IS architecture is the balance between centralizations and decentralization. As with many other organizational endeavors over centralization results in overly rigid systems that cannot handle local variations, Similarly, excessive decentralization creates systems that may solve local problems but may not conform or interface well enough to solve problems that cross departments. Decisions involving centralization and decentralization often hinge on debates about efficiency (using the least resource to produce a given output) and effectiveness (Producing the right out put). Centralizations is often more efficient because it eliminates redundant resources and effort. Assuming that decentralization is technically feasible, it is often more effective because it allows people to make the right decisions for their own local situations. Key factors in centralization and decentralization include location of the hard ware location of data, standards and ownership and management control.

	Highly centralized	**Intermediate**	**Highly decentralized**
- Hard ware configuration	central computer, remote terminals	Distributed net work linking local data centers	Independent local data centers, personal computers.
- Data Location	Centralized data base	Central databases plus local data bases	Local databases.
Hard ware and software choices	central decisions	central quid lines, local choices	Local choices
ownership and control	Central information systems group.	Central services, system ownership by user departments	User departments
Organizational affiliation of Is staff	Central Is group	Highly technical Is roles affiliated with central group, less technical roles in user organization	Most roles affiliated with user organization (except) infrastructure and planning)

Table Centralization decentralization Location Hard ware and Data

Exercise 4.4

1. What does product differentiation mean?
2. How information technology supports competitive strategies?
3. What is information system architecture?

CHAPTER SUMMARY

Dear students, in this chapter, you have learned about information systems planning methods with different objectives, techniques, and out comes.

- The critical success factors approach is a planning method directed at helping senior managers define their information needs. In this approach, executives are asked to define their CSFs (e.g. what has to go right) and to develop measures of how well these CSFs are being achieved. If reports satisfying these needs are not currently available, then new information systems are developed.
- IBM's Business systems planning methodology helps MIS management develop a data architecture that supports information systems needs. In the BSP approach, a study team identifies the key data classes supporting business processes and recommends a data architecture that supports high – priority applications
- In Ends/ means (E/M) analysis, information systems planners define the ends, effectiveness criteria, and information requirements needed to achieve business objectives.
- Defining how to use information technology to gain a competitive edge is a major business planning challenge. Information technology strategy must support business strategy. That means that a firm with an underlying business strategy of product differentiation should use technology as a way to add value to existing products and services. For example, new information technology such as computer- aided design systems enables show manufacturers to capture a competitive edge by offering better designed products to their customers.

In time when the competitive environment is very dynamic and competitive strategy is changing, an organization needs to rely up on planning strategies that are flexible and adaptable. Managers of information technology need to be able to "plan by wire". That is, they need to rely up on the information systems plans to identify the feedback mechanisms they need to survive in rapidly changing business environment.

REVIEW QUESTIONS

1. What are the objectives of the business systems planning methodology?
2. Explain what critical success factor means?
3. What factors are used to rack potential BSP projects?
4. How are critical success factors used to determine information systems opportunities?

5. What questions are asked during an interview using Ends/means Analysis?
6. How can an automobile manufacturer differentiate its products by using information technology?
7. Identify some differences between the management strategies used in firms in the strategic quadrant as compared with firms in the support quadrant of the information-planning grid?
8. What are characteristics of organizations in the support quadrant of McFarlane's information planning grid?

SELF – TEST –FOUR

1. ---------- is an approach use to assist a business in developing an information systems plan that supports both short and long term information needs.
   A. Business systems planning
   B. Ends/Means analysis
   C. Managing by wire
   D. Data base
   E. None

2. ---------- Refers to the probability of the projects being implemented successfully, given the risk and the resources available.
   A. Cost- benefit analysis
   B. Benefit
   C. Success
   D. Demand
   E. None

3. Factory firms are in the situation in which existing applications of information systems have strategic impact, but future application are not critical to their ability to achieve strategic business plans.
   A. Factory quadrant
   B. Support quadrant
   C. Turnaround quadrant
   D. Strategic quadrant
   E. None

4. An organization with this strategy attempts to serve the needs of a specialized market niche more effectively than any of its competitors.
   A. Product differentiation
   B. Market specialization
   C. Low cost producer
   D. Information system architecture
   E. None

5. A firms information architecture is a highly summarized answer to the following question. Except

A. What data and collected?
B. Where and how are the data collected?
C. How are the data transmitted?
D. Where are the data stored>
E. None

CHAPTER –FIVE

MANAGEMENT OF INFORMATION SYSTEMS

INTRODUCTION

Dear distance learners,

Managing the investigation, analysis, design, implementation and maintenance of information systems with in computer using organizations is a big responsibility. Information system operations management is concerned with the use of hardware, software, and personnel resources in the corporate or business unit data centers (computer centers) of an organizations. Operational activities that must be managed include data entry, equipment operations, production control and production support. For example, data entry operators convert input source documents in to machine sensible form using a variety of data entry devices. This requires continual checking and monitory of input data and output reports to ensure their accuracy, completeness and timeliness. The activities of computer operations, who are responsible for the operation of large computer systems, also need supervision.

Many operations management activities are being automated by the use of software packages for computer system performance management. These system performance monitors the process of computer jobs, help develop a planned schedule of computer operations that can optimize computer system performance, and produce detailed statistics that are invaluable for effective planning and control of computing capacity. Such information is used to evaluate computer system utilization, costs and performance. This evaluation provides information for capacity planning, production planning and control, and hardware/software acquisition planning. It is also used in quality assurance programs, which stress quality control of services to end users.

CHAPTER OBJECTIVES

After reading and studying this chapter, you should be able to:

- Discuss organization of information system and end user computing
- Identify components of an end user computing systems
- Explain management implications of end user computing
- Discuss Ethical and security issues of information systems

5.1 ORGANIZATION OF INFORMATION SYSTEM AND END USER COMPUTING

Activity 5.1

Why treat end user computing as such a major development in information systems?

The days of relying primarily on information systems professionals to meet our information processing needs are over. Most organizations can not keep up with the information demands of their end users. So, more and more people are learning to use microcomputers as professional workstations to get the information they need to accomplish their jobs successfully. That is what end user computing is all about. It is the direct hands - on use of computers by end users instead of the indirect use provided by the hardware, software and professional resources of an organization's information services department. This doesn't mean that end users don't rely on IS resources. However, in end user computing an information services department plays only a supportive role to an end user's own computing resources and efforts.

5.1.1 *THE GROWTH OF END USER COMPUTING*

Why treat end user computing as such a major development in information systems? Because it is a revolutionary change in how computer based information, processing is accomplished in most organization. End user computing began in the 1970's and is expected to continue to accelerate during the 1990's. Various studies have tried to estimate the growth of end user computing by estimating its share of:-

1. the total number of machine cycles of central processing units
2. Information processing budgets, and
3. Keyboards installed.

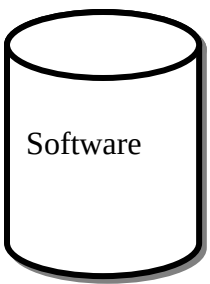
These results are compared to the share of traditional data processing groups in an organization. Such studies Show end user computing growing from about 25 percent in the early 1980's to at least 40 percent in the mid -1980s.

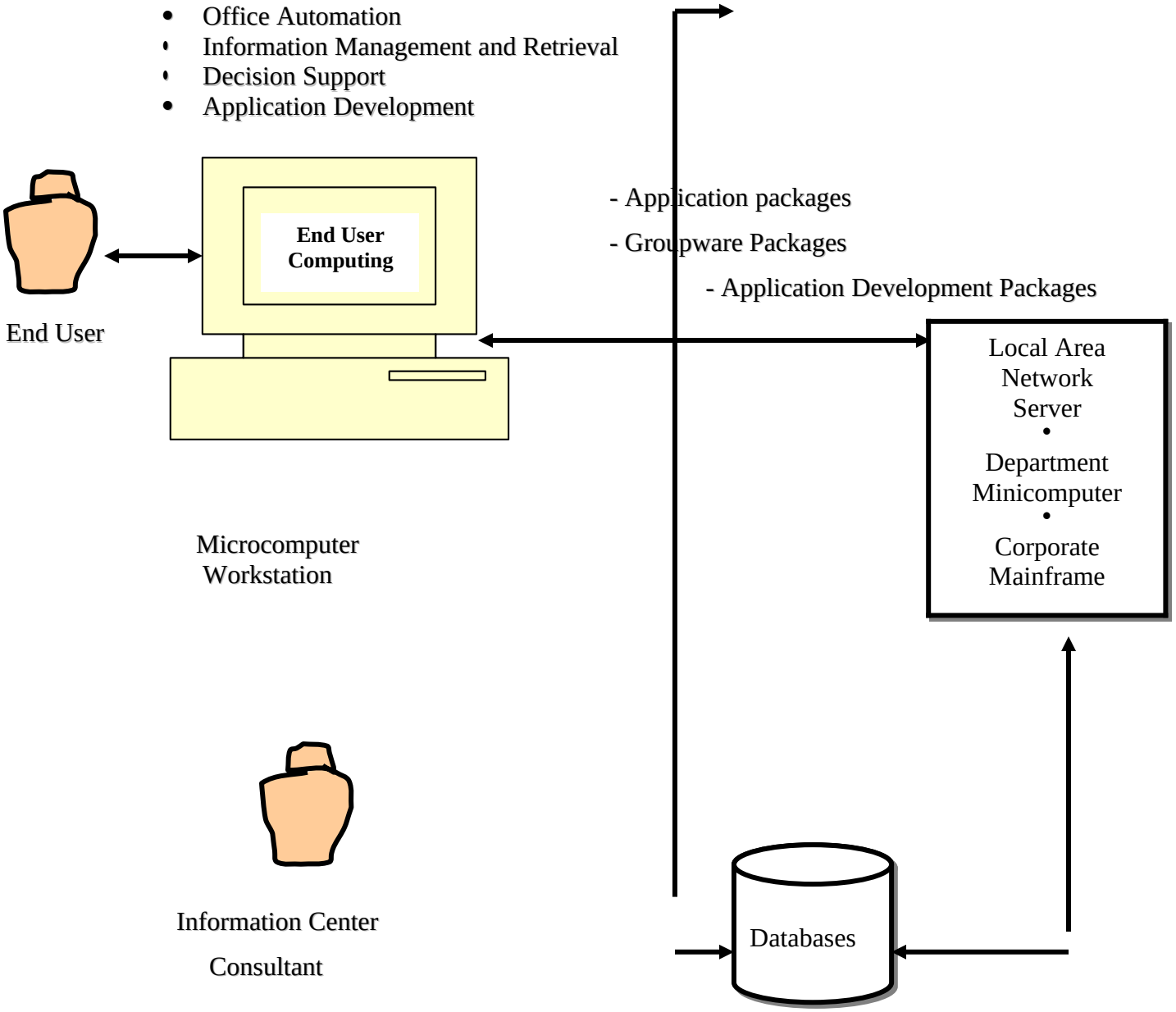
5.1.2 *COMPONENTS OF AN END USER COMPUTING SYSTEMS*

It is important to think of end user computing in an information system context. Figure 17. Shows the resource components and applications outputs of an end user computing system. It illustrates the major categories of end user computing applications, and the hard ware, software, people and data resources required. As you can see, end user computing systems are microcomputer based information systems that directly support both operational and managerial applications of end users.

Figure 17. Also shows that many end users do not rely solely on their own microcomputer workstations, software packages, databases and computer systems at the work group, departmental and corporate levels. In addition, many organizations provide information centers as another source of support for end user computing. Information center specialists serve as consultants to users who need assistance in their computing effort improve. In this way, organizations hope to improve the efficiency and effectiveness of end user computing.

Applications





Note: - The major categories of end user computing applications and the hardware, software, people, and data resources required.

End user Computing application

The four major categories of end user computing applications:

1. Office automation

2. Information management and retrieval
3. Decisional support, and
4. Application development.

These categories define what end users do when they do their own computing.

Office Automation:-

Office automation application are a major category of end user computing, since much end user and work group computing takes place in office settings. Office automation applications enhance end user productivity and communications with in work groups, organization, and with external contacts such as customers and suppliers. This typically involves applications such as word processing, electronic mail, desktop publishing and presentation graphics.

Information management and retrieval application:-

End users are inundated with data and information that must be organized, stored and retrieved. Thus, one major application of end user computing is the use of database management packages to manage the creation, access, and maintenance of databases and files. Data base management system (DBMS) packages help end users create data files and databases to store data and retrieve information. The query languages and report generators of such packages allow end users to retrieve information from personal, workgroup, corporate and external databases. Query languages allow simple inquiries to be made quickly and easily by end users. Report generators help end users prepare reports that extract, manipulate, and display information in a variety of formats.

Another software package used for information management and retrieval is the personal information manager (PIM). These packages help end users store, organize and retrieve text and numerical data in the form of notes, lists, clippings, tables, memos, letters, reports and soon.

Decision Support Application:-

Software packages such as electronic spreadsheets, integrated packages, and other decision support system (DSS) software allow end users to build and manipulate analytical models of business activities. End users can thus create their own decision support systems with the use of such tools and the variety of databases.

End user Application Development:-

Another major category of end user computing is the development of new or improved applications by users. That is, end users can develop new or improved ways to perform their jobs without the direct involvement of professional systems analysts. Users themselves can accomplish the steps of the traditional or prototyping methods of information systems development. The primary reasons for this phenomenon are the growing capabilities and availabilities of microcomputer workstations and a variety of end user application development tools. The application generation capabilities of electronic spreadsheet and database management packages and fourth generation language have been a driving force for end user development. These hardware and software resources make it easier for end users to develop their own limited, but highly functional computer based information systems.

5.1.3 *MANAGEMENT IMPLICATIONS OF END USER COMPUTING*

Managers face significant challenges in managing end user computing in their organization. Managing the hardware, software people on data resources of end user computing systems is a major challenge. Workstation, computers, telecommunication networks and software packages must be evaluated and acquired. End users must be properly trained and assisted.

The integrity and security of the databases that are created and available to end users must be ensured. Finally, the applications end users develop and implement and must be evaluated for their efficiency and effectiveness in using organizational resources and helping to meet organization objectives.

There is no question that end user computing has improved the development and use of computer- based information systems for the end users of an organization. It has also relieved the burden of end user demands on information services departments. However, end user computing can also pose major problems and risks to an organization. The development and use of applications by end users instead of by professional systems analysts is seen as a major risk factor in today's organization. Inadequate analysis, poor design, improper implementation and lack of controls can easily result from an end users rush to develop and implement new applications.

There are many specific managerial solutions to the potential risks of end user computing. The challenge to end user managers is to developed and enforce the policies and procedures needed to implement appropriate solutions to the problems of end user computing. So, managing end user computing is not an easy job. However, it is a responsibility shared by every managerial end user, as well as by the management of an organizations information systems function.

Exercise 5.1

1. How to estimate the growth of end user computing?
2. What are the major categories of end user computing applications?
3. What does effect automation mean?

5.2 ETHICAL AND SECURITY ISSUES OF INFORMATION SYSTEMS

Activity 5.2

Dear students, in making ethical choices, it might be helpful to keep in mind four ethical principles that can serve as guidelines in the implementation of any form of technology. What are those principles?

The use of information technology in business has major impacts on society and thus raises serious ethical considerations in areas such as privacy, crime, health, working

conditions, individuality, employment and the search for societal solution through IT. How ever we should realize that information technology could have a beneficial effect as well as a negative effect in each of these areas. For example, computerizing a production process may have the adverse effect of eliminating jobs, and the beneficial effect of improving the working conditions and job satisfaction of employees that remain, while producing, products of higher quality at less cost. So, our job as a managerial end user should involve managing your work activities and those of others to try to minimize the negative effects of IT and maximize its beneficial effects. That would represent an ethically responsible use of information technology.

In making such ethical choices, it might be helpful to keep in mind four ethical principles that can serve as guidelines in the implementation of any form of technology.

1. **Proportionality: -** The good achieved by the technology must outweigh the harm or risk. Moreover, there must be no alternative that achieves the same or comparable benefits with less harm or risk.
2. **Informed Consent: -** Those affected by the technology should understand and accept the risks.
3. **Justice:-** The benefits and burdens of the technology should be distributed fairly. Those who benefit should bear their fair share of the risks, and those who do not benefit should not suffer a significant increase in risk.
4. **Minimized Risk**: - Even if judged acceptable by the other three guidelines, the technology must be implemented so as to avoid all unnecessary risk.

5.2.1 IT AND EMPLOYMENT

The impact of information technology on employment is a major ethical concern and is directly related to the use of computers to achieve automation. There can be no doubt that the use of information technology has created new jobs and increased productivity, while also causing a significant reduction in some types of job opportunities. Computers used for office information processing or for the numerical control of machine tools are accomplishing tasks formerly performed by many clerks and machinists. Also, jobs created by information technology with in a computer using organization require different types of skills and education than do the jobs eliminated by computers. Therefore, individuals may become unemployed unless they can be retrained for new positions or new responsibilities.

However, there can be no doubt that information technology has created a host of new job opportunities for the manufacture, sale, and maintenance of computer hardware and software, and for other information system services. Many new jobs, such as systems analysts, computer programmers, and computer operators have been created in computer using firms. Additional jobs have been created because information technology makes possible the production of complex industrial and technical goods and services that would otherwise be impossible to produce. Thus, jobs have been created by activities that are heavily dependent on information technology, in such areas as space exploration, micro electronic technology and scientific research.

5.2.2 IT AND INDIVIDUALITY

A frequent criticism of information technology concerns its negative effect on the individuality of people. Computer based systems are criticized as impersonal systems that dehumanize and depersonalize activities that have been computerized, since they eliminate the human relationships present in non computer systems. Although it is more efficient for an information system to deal with an individual as a number than as a name, many people feel a loss of identity when they seem to be "Just another number.

Another aspect of the loss of individuality is the regimentation of the individual that seems to be required by some, computer based systems. These systems do not seem to possess any flexibility. They demand strict adherence to detailed procedures if the system is to work. The negative impact of IT on individuality is reinforced by "horror stories" that describe how inflexible and uncaring computer based systems are when it comes to rectifying their own mistakes. Many of us are familiar with stories of how computerized customer billing and accounting system continued to demand payment and send warning notices to a customer whose account has already been paid despite repeated attempts by the customer to have the error corrected.

5.2.3 IT AND WORKING CONDITIONS

Information technology has eliminated monotonous tasks in the office and the factory that formerly had to be performed by people. For example work processing and desktop publishing make producing office documents a lot easier to do, while robots have taken over repetitive welding and spray painting jobs in the automotive industry. In many instances, this allows people to concentrate on more challenging and interesting assignments, upgrades the skill levels of the work to be performed, and creates challenging jobs requiring highly developed skills in the computer industry and with in computer- using organizations. Thus, information technology can be said to upgrade the quality of work because it can upgrade the quality of working conditions and the content of work activities.

5.2.4 PRIVACY ISSUES

Information technology makes 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. However, the power of information technology to store and retrieve information can have a negative effect on the right to privacy of every individual. Confidential information on individuals contained in centralized computer databases by credit bureaus, government agencies, and private firms has been stolen or misused, resulting in the invasion of privacy, fraud and other injustices. The unauthorized use of such information has seriously damaged the privacy of individuals. Errors in such databases could seriously hurt the credit standing or reputation of an individual.

5.2.5 HEALTH ISSUES

The use of information technology in the workplace raises a variety of health issues. Heavy use of computers is reportedly coursing health problems like job stress, damaged arm and neck muscles, eyestrain, radiation exposure, and even death by computer caused accidents.

Solutions to some of these health problems are based on the science of ergonomics, sometimes called human factors engineering. The goal of ergonomics is to design healthy work environments that are safe, comfortable, and pleasant for people to work in, thus increasing employee morals and productivity. Ergonomics stresses the healthy design of the workplace, workstations, computers and other machines, and even software packages.

5.2.6 SOCIETAL SOLUTIONS

Information technology can have many beneficial effects on society. Information technology can be used to solve human and social problems through societal applications such as medical diagnosis, computer assisted instruction, governmental program planning, environmental quality control and law enforcement. For example, computers can be used to help diagnose an illness, prescribe necessary treatment, and monitor the progress of hospital patients. Computer - assisted instruction (CAI) allows a computer to serve as "tutor", Since it uses conversational computing to tailor instruction to the needs of a particular student. This is a tremendous benefit to students, especially those with learning disabilities.

Information technology can be used for crime control through various law enforcement application. For example, a computerized alarm system allows police to identify and respond quickly to evidences of criminal activities.

As a managerial end user one should insist that the ethical and societal dimensions of information technology be considered when computer based information systems are being developed and used. For example, a major design objective should be to develop systems that can be easily and effectively used by people. The objectives of the system must also include protection of the privacy of the individuals and the defense of the systems against computer crime. Control hardware, software and procedures must be included in the systems design. The potential for misuse and malfunction of a proposed system must be analyzed and controlled with respect to all of an organizations present and potential stakeholders, individuals and society as a whole.

It should be obvious that many of the detrimental effects of information technology are caused by individuals or organization who are not accepting the ethical responsibility for their actions. like other powerful technologies, information technology possesses the potential for great harm or great good for all humankind. If managers, end users, and Is professional accept their ethical responsibilities, then information technology can help make this world in a better position.

Exercise 5.2

1. What does ergonomics mean?
2. How did you see the impact of it on individuality?

CHAPTER SUMMARY

Dear distance learners,

In this chapter you have learned that the issue of how to organize information systems activities in a major business.

- End- user computing began in the 1970's and is expected to continue to accelerate during the 1990's. Most organizations cannot keep up with the information demands of their end users. So, more and more people are learning to use microcomputers as professional workstations to get the information they need to accomplish their jobs successfully.
- The ethical foundations of It. Business and IT activities involve many ethical considerations. Various ethical philosophies and models of ethical behavior may be used by people in forming ethical judgments. These serve as a foundation for ethical principles and codes which can serve as guidelines for dealing with ethical business issues that may arise in the use of information technology.
- Ethical and societal dimensions of IT. Information technology raises serious ethical and societal issues in terms of the impact of IT on employment, individuality, working conditions, computer monitoring, privacy, computer matching, health, and computer crime. Managerial end users and IS professionals 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 technology in our society.

REVIEW QUESTIONS

1. What does end user computing mean?
2. Is there an ethical crisis in business today? What role does IT play in unethical business practices?
3. What business decision will you have to make as a manger that have both an ethical and IT dimension?
4. List and describe the four ethical principles.
5. What is the impact of information technology on employment?
6. What do we mean privacy issues in information technology?
7. List and describe the major categories of end user computing applications.

SELF TEST –FIVE

1. ---------- the good achieved by the technology must out weigh the harm or risk . It implies
    A. Informed consent principle
    B. Proportionality principle
    C. Justice principle
    D. Minimized risk principle
    E. None

2. ---------- Information technology can be used to solve human and social problems through
    A. Medical diagnosis
    B. Computer assisted instruction
    C. Governmental program planning
    D. Environmental quality control
    E. All
    F. None

3. ---------- are a major category end user computing, since much end user and workgroup computing takes place in office settings.
    A. Office automation application
    B. Decision support Application
    C. End – user application development
    D. Information management and retrieval application
    E. None

4. ---------- is the direct hands – on use of computers by end users instead of the indirect use provided by the hardware, soft ware, and professional resources of an organization's information services department.
    A. End-user computing
    B. Modularity
    C. Cohesion
    D. Decomposition
    E. None

5. The benefits and borders of the technology should be distributed fairly. Those who benefit should bear their fair share of the risks, and those who do not benefit should not suffer a significant increase in risk.

    A. Justice principle

B. Informed concert principle
C. Proportionality principle
D. Minimized risk principle
E. None