Computer Applications In Business

Dr. Shawki El-Ghitany
Business Administration Dept.
Faculty of Commerce
Ain Shams University

Dr. Khaled Elsayed
Business Administration Dept.
Faculty of Commerce
Ain Shams University

Reviewed by
Prof. Dr. Amr Hassan Khir-El-Din
Faculty of Commerce
Ain Shams University

PREFACE

When powerful forces come together, change is inevitable. Nowadays, we are standing at the conjunction of three powerful technological forces: computers, telecommunications and electronic entertainment. The computer's digital technology is showing up in everything from telephones to televisions, and the lines that separate these machines are eroding. The digital convergence is rapidly and radically altering the world's economic landscape. Startup companies and industries are emerging to ride the waves of change, while older organizations reorganize, regroup and redefine themselves to keep from being washed away.

Smaller computers, faster processors, smarter software, larger networks, new communication media are emerging to reshape continuously the new world of information technology. It seems that change is the only constant. In less than a human lifetime, this technological cascade has transformed virtually every facet of our society; and the transformation is just beginning. As old technologies merge and new technologies emerge, the future becomes qualitatively different lying the realm of a

high-tech world. This qualitative leap into the domain of the high-tech world poses a challenge for all of us. This book aims at helping you familiarize yourself with computers and computer applications.

Dr. Khaled Elsayed gives an overview of the topic by introducing computer from various perspectives and exemplifying essential compute applications such as word-processing, spreadsheets, databases and other fundamental applications.

On the other hand, Dr. Shawki El-Ghitany covers the management applications of computers in many management fields: marketing, production, human resource management, financial management and purchasing.

Part I

Chapter (1)

Introduction To Computer

Chapter (1)
Introduction to Computer

1.1. Importance of Computer in Business Life

1.2. Computer System: An Internal Look

1.2.1. Motherboard

1.2.2. CPU

1.2.3. RAM

1.2.4. Hard Disk

1.2.5. Floppy Disk Drive

1.2.6. Graphics Card

1.3. Basic Concepts

1.3.1. Hardware and Software

1.3.2. System Software and Application Software

1.3.3. Data and Information

1.3.4. Files, Records and Fields

1.3.5. File Name Extensions

1.3.6. Measuring Data Storage

1.4. Computer in the Era of Information Technology

1.4.1 Advantages of Computer in the Era of Information Technology

1.4.1.1 Globalization

1.4.1.2. Communication

1.4.1.3. Cost Effectiveness

1.4.1.4. Bridging the Cultural Gap

1.4.1.5. More Time

1.4.1.6. Creation of New Jobs

1.4.2. Disadvantages of Computer in the Era of Information Technology

1.4.2.1. Unemployment

1.4.2.2. Privacy

1.4.2.3. Lack of Job Security

1.4.2.4. Dominant Culture

Chapter (1)
Introduction to Computer

1.1. Importance of Computer in Business Life

Today, computers are no longer specialized tools used only by scientists or engineers. Computer systems are everywhere—in places you cannot see or would not expect to find them. They are a fact of life, a common thread that ties together our education, work, and home life.

It is a binding fact that are computers are very productive, efficient and make our personal and professional lives more rewarding. These 'magical' machines can do just about anything imaginable, moreover they really excel in certain areas. Computer has various applications in business today. For example, businessmen make bar graphs and pie charts from tedious figures to convey information with far more impact than numbers alone can covey. Furthermore, computers help businesses to predict their future sales, profits, costs etc. making companies more accurate in their accounts. Computers may also play a vital role in aiding thousands of organizations to make judgmental and hard-provoking

decisions concerning financial problems and prospective trends.

Furthermore, products from meats to magazines are packed with zebra-striped bar codes that can be read by the computer scanners at supermarket checkout stands to determine prices and help manage inventory. Thus, a detailed receipt of the groceries can be made, which is useful for both the customer and the retail store, especially for the stock control system. This is referred as POS (Point of Sale) transaction where a precise account of all the stocks available is recorded and manipulated.

Computers speed up record keeping and allow banks to offer same-day services and even do-it yourself banking over the phone and internet. Computers have helped fuel the cashless economy, enabling the widespread use of credit cards, debit cards and instantaneous credit checks by banks and retailers. There is also a level of greater security when computers are involved in money transactions as there is a better chance of detecting forged cheques and using credit/debit cards illegally etc.

In manufacturing industries, computers have made their way towards jobs that were unpleasant or too dangerous for humans to do, such as working hundreds of feet below the earth or opening a package that might contain an explosive device. In other industries, computers are used to control the production of resources very precisely. All robots and machinery are now controlled by various computers, making the production process faster and cheaper. All the stages of manufacturing, from designing to production, can be done with the use of computer technology with greater diversity.

With regard to communication, computes are most popular for their uses to connect with others on the World Wide Web. Therefore, communication between two or more parties is possible which is relatively cheap considering the old fashioned methods. Emailing, teleconferencing and the use of voice messages are very fast, effective and surprisingly cheaper as well. When connected to the Internet, people can gain various amounts of knowledge, and know about world events as they occur. Purchasing on the Internet is also becoming

very popular, and has numerous advantages over the traditional shopping methods.

Computer can also be used in training. It is much cheaper and effective, for instance, to teach pilots how to fly in a computerized simulator, than is real airplanes. This is because the learning pilots will feel much more relaxed and confident due to the fact that no life is at risk at that moment. Railway engineers can also be given some kind of training on how to run a train with the help of a computerized system. Training simulations are relatively cheaper and are always available on one-to-one basis making way for personal training.

In addition, computer systems will increasingly cut down the paperwork that is involved in millions of industries around the world. If a business is run on a manual system, then the amount of papers or registers involved is a great deal, making the administration process more tedious and error prone. If it is replaced by a computer system, then all the necessary data and information is transferred into the memory of the computer. This makes managing various tasks easier, faster and more effective than the manual system.

Organizations that involve administrative tasks such as a hotel, school, hospitals, clubs, libraries etc. will become more efficient if a computer system is implemented.

Computers are effective in real time systems. Many computers provide an environment, which is completely based on real time. This means processing of one entity is done so quickly and effectively, that another entity is not affected. For example Airline systems and banking systems will come under this category. These systems are immensely huge because they interact with all other airlines or baking systems in the world. A computer system, therefore, becomes more than just necessary in daily uses.

1.2. Computer System: An Internal Look

A computer can be defined as an electronic data processing device, capable of accepting data, applying a prescribed set of instructions to the data, and displaying in some manner or form. Any configuration of the devices that are interconnected and are programmed to operate as a computer system. Table (1-1) introduces the four generations of computer and Table (1-2) provides a summary of some common types of computer.

Table (1-1): The Four Generations of Computer

Generations	Time Frame	Descriptive Term	Type of Computer	Inventor
1st Generation	1946-1956	Vacuum Tubes	Mainframes	Lee De Forest
2nd Generation	1956-1964	Transistor	Mainframes	William Shockley
3rd Generation	1964-1970	Integrated Circuit	Mainframes – Minicomputers	Jack Kilby, Robert Noyce
4th Generation	1970-Today	Microprocessor	Mainframes – Minicomputer – Microcomputer	Ted Hoff

Table (1-2): Common Types of Computer

Workstation	Severs	Minicomputers	Mainframe Computers	Supercomputers
- PC (Personal computer). - Most common type of computer	- Provide or manage network resources. - They have large storage capacity and are not always more powerful than workstations. - They are usually dedicated to one task. -Three sever examples: *File server (Files shared over network) *Printer server (Allows sharing of printers) *Mail servers (Gather & distributes E-mail)	- Midsize computers - Typically more powerful than workstations. - Perform many tasks at once for a group of users. - Few to 100 users. - Use dumb terminals- just keyboard and monitor.	- Called Mainframes. - Large & high capacity. - Operates like minicomputer (It uses Terminals) - 100 to 1000's of same time users. - Used in large corporations and/ or agencies	- Most expensive, largest and fastest. - Used to solve mathematically intensive problems - Used for scientific analysis such as weather predictions and astrological calculations. - Have hundreds or even thousands of computers working together on the same problem.

All **computer systems**, no matter how small or large, have the same fundamental capabilities: processing, storage, input and output. **Input** unit includes devices like keyboard and mouse, which are used by the user to give some data to the computer. **Processing** unit is where these data are processed and turned into meaningful information. Processing unit also includes **temporary storage** (RAM) in which the data currently being processed are stored temporarily. To show the result of processes, to the user, **output** devices like monitors and printers are used.

The output on a monitor is usually called softcopy and the output on a printer is usually called hardcopy. Sometimes we may want to store our data and information permanently so that we can refer to them again, later. For this purpose, **interchangeable devices** like floppy disk drives and CD-ROM drives, or **permanently installed devices** like hard disks are used as **permanent storage** mediums.

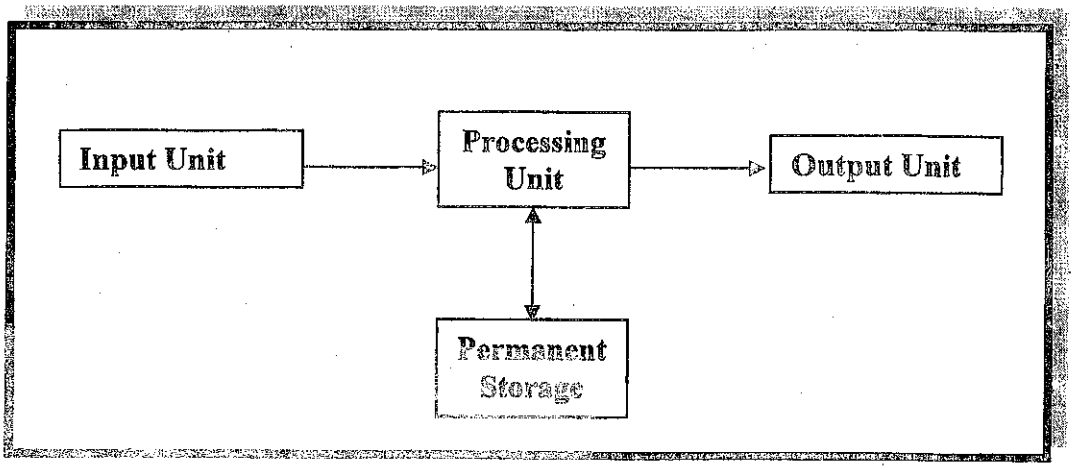


Figure (1-1): Key Components of a Computer

The following are the hardware components that exist almost in all computers.

1.2.1. Motherboard

It is a microcomputer circuit board that contains slots for connecting peripherals like RAM modules, CPU and adapter cards. Motherboards also have electronic circuitry for handling such tasks as I/O signals from those peripheral devices. A motherboard is the backbone of a computer system: The power of a computer highly depends on the peripherals that its motherboard supports.

1.2.2. CPU

Central processing unit (CPU) is the brain of a computer system. It is the component, which controls what's going on in the system at any moment. Other components act according to the orders of the CPU. All the current inputs and any previously stored data are processed by the CPU to obtain meaningful information.

1.2.3. RAM

Read access memory (RAM) is the primary memory of a computer. Anything in a secondary storage device (permanent storage) that has to be processed by the CPU, must first be loaded to RAM, because there are no machine instructions to directly access and use any data which is stored in a secondary storage medium. RAM is a volatile memory, therefore if an electricity cut or a reset should occur, all the data in RAM are lost.

1.2.4. Hard Disk

It is one of the most popular secondary storage devices. It is a magnetic medium that stores its contents permanently, even in the absence of electricity power.

You store your documents, pictures, photos, songs, etc in Hard disks.

1.2.5. Floppy Disk Drive

Floppy disk drive (FDD) is a device into which you insert interchangeable floppy disks. Floppy disks are also magnetic storage mediums. FDD works much slower than Hard disks and floppy disks have much smaller storage capacities. Floppy disks are usually used to copy some files from your computer to another computer and vice versa.

1.2.6. Graphics Card

This circuit board is responsible for the visual outputs that will be displayed on the monitor. Nowadays, graphics cards have their own memory modules and processor chips, by which they lessen the load of CPU and RAM, hence enabling us to see very detailed graphics and high quality animations and videos.

Computers are general-purpose devices that can be used in many areas of interest, and of course there exists many other hardware components that can be added to them to increase their functionalities. These include CD-

ROM drives, sound cards, radio cards, TV cards, modem cards, etc.

1.3. Basic Concepts

1.3.1. Hardware and Software

Hardware consists of the physical components of the computer system such as the CPU, disk drives, monitor, keyboard, mouse, wires, speakers, and other things that you can see or touch. Hardware is tangible. On the other hand, you cannot touch software. Software is merely a set of instructions (a "program" or "program code") used by the computer system to accomplish some tasks. Although you can see and touch a floppy disk (or compact disc, or some other types of media) on which software is stored, and you can see and touch the paper on which program code is printed, the software itself is intangible.

1.3.2. System Software and Application Software

There are two main kinds of software. System software (the "operating system") is a program, or collection of programs, that run the computer system itself. System software manages the details of running the

computer so that you can concentrate on performing productive tasks and accomplishing real work. On the other hand, programs that you run to help you doing productive work are called "application software" Examples of operating system software include Windows 98, 2000 and xp. Examples of application software incorporate Microsoft Word, Excel, Power Point, Access, and Outlook.

1.3.3. Data and Information

We might have used the word "information" to define data and distinguish it from executable code. However, strictly speaking we like to draw a distinction between data (sometimes called "raw data") and information. Raw data may merely be a collection of stored transactions or details. But, the term information implies that data has been organized in some way to make it meaningful or useful for decision making.

1.3.4. Files, Records and Fields

A file is a collection of related information. A file is made up of records. A record is a collection of related data items treated as a unit. The data items that make up a

record are called **fields**. For example, you could store a personal address book in a file. The listing for your dentist would be one record; the listing for your grandmother would be another record. Each record (i.e., each person listed in your address book) might contain several fields (name, telephone number, address ...etc).

1.3.5. File Name Extensions

The "extension" or "file type" is the part of the file name that comes after the "dot". For example, NAMES.TXT is a .TXT file; the extension is "TXT" which means Text. Windows uses the extension to associate a file with an application. If you double-click a .TXT file Windows will try to open it with the Notepad application. If you double-click a .DOC file Windows will try to open it with Microsoft Word.

You can configure Windows to show file extensions by pulling down the **View** menu and selecting **Folder Options**. Then on the **View** tab uncheck the box for "Hide File extensions for known file types".

1.3.6. Measuring Data Storage

In a computer, electrical signals that are either on or off are used to represent data. This is done by grouping of the ones and zeros (called bits) into a group. The most common type of grouping of "bits" is in groups of eight bits, called a "byte". A byte is important because each byte is capable of storing one character, such as a letter, number, or symbol (8 bit = one byte). Storage devices are measured by the number of bytes they can store as it is explained in Table (1-3).

Table (1-3): Measuring Data Storage in Computer

Unit	Common abbreviation	Approximate Byte	Actual number of Bytes
Kilobyte	KB	Thousand	1,024
Megabyte	MB	Million	1048576
Gigabyte	GB	Billion	1073741824
Terabyte	TB	Trillion	1099511627776

1.4. Computer in the Era of Information Technology

We use the term information technology or IT to refer to an entire industry. In reality, information technology is the use of computers and software to manage information.

In some companies, this is referred to as Management Information Services (or MIS) or simply as Information Services (or IS). The information technology department of a large company would be responsible for storing information, protecting information, processing information, transmitting information as necessary, and later retrieving information as necessary.

1.4.1 Advantages of Computer in the Era of Information Technology

1.4.1.1 Globalization

IT has not only brought the world closer together, but it has allowed the world's economy to become a single interdependent system. This means that we can not only share information quickly and efficiently, but we can also bring down barriers of linguistic and geographic boundaries. The world has developed into a global village due to the help of information technology, allowing countries like Egypt and Japan, for instance, who are not only separated by distance but also by language to share ideas and information with each other.

1.4.1.2. Communication

With the help of information technology, communication has also become cheaper, quicker, and more efficient. We can now communicate with anyone around the globe by simply text messaging them, or sending them an email, for an almost instantaneous response. The internet has also opened up face-to-face direct communication from different parts of the world by using of video-conferencing.

1.4.1.3. Cost Effectiveness

Information technology has helped to computerize the business process, thus streamlining businesses to make them extremely cost effective money-making machines. This, in turn, increases productivity, which ultimately gives rise to profits; that means better pay and less strenuous working conditions.

1.4.1.4. Bridging the Cultural Gap

Information technology has helped to bridge the cultural gap by helping people from different cultures to communicate with one another, and allow for the

exchange of views and ideas, thus increasing awareness and reducing prejudice.

1.4.1.5. More Time

IT has made it possible for businesses to be open 24 hours per day all over the globe. This means that a business can be open anytime, anywhere, making purchases from different countries easier and more convenient. It also means that you can have your goods delivered right to your doorstep without having to move a single muscle.

1.4.1.6. Creation of New Jobs

Probably, the best advantage of information technology is the creation of new and interesting jobs. Computer programmers, Systems analyzers, Hardware and Software developers and Web designers are just some of the many new employment opportunities created with the help of IT.

1.4.2. Disadvantages of Computer in the Era of Information Technology

1.4.2.1. Unemployment

While information technology may have streamlined the business process, it has also crated job redundancies, downsizing and outsourcing. This means that a lot of lower and middle level jobs have been done away, causing more people to become unemployed.

1.4.2.2. Privacy

Though information technology may have made communication quicker, easier and more convenient, it has also brought along privacy issues. From cell phone signal interceptions to e-mail hacking, people are now worried about their own private information becoming public knowledge.

1.4.2.3. Lack of Job Security

Industry experts believe that the internet has made job security a big issue, since technology keeps on changing with each day. This means that one has to be in

a constant learning mode, if he or she wishes for their job to be secure.

1.4.2.4. Dominant Culture

While information technology may have made the world a global village, it has also contributed to one culture dominating another weaker one. For example, it is now argued that US influences how most young teenagers all over the world now act, dress and behave. Languages also have become overshadowed, with English becoming the primary mode of communication for business and everything else.

Review Questions

(I)- Write a short essay about each of the followings

1- Importance of computer in our business life nowadays.
2- Computer generations.
3- Main types of computer.
4- Key components of a computer.
5- Advantages and disadvantages of computer in the era of information technology

(II)- Determine which of the following statements are true and which are false.

1- Computers today are no longer specialized tools used only by scientists or engineers.
2- Computers are not very productive, and do not make our personal and professional lives more rewarding.
3- Computer has various applications in business today.
4- Computers help businesses to predict their future sales, profits and costs.
5- Computers speed up record keeping and allow banks to offer same-day services and even do-it yourself banking over the phone and internet.

6- All the stages of manufacturing, from designing to production, can be done with the use of computer technology with greater diversity.

7- Computer made communication between two or more parties is possible which is relatively cheap considering the old fashioned methods.

8- Computer can not be used in training as it is more expensive to teach pilots how to fly in a computerized simulator, than is real airplanes.

9- Training simulations are relatively cheaper and are always available on one-to-one basis making way for personal training.

10- Computer systems will increasingly cut down the paperwork that is involved in millions of industries around the world.

11- Organizations that involve administrative tasks such as a hotel, school, hospitals, clubs, libraries etc. will become more efficient if a computer system is implemented.

12- Computer is not effective in real time systems.

13- A computer can be defined as an electronic data processing device, capable of accepting data, applying a prescribed set of instructions to the data, and displaying in some manner or form.

14- Computer development has passed by three generations.

15- Work stations and servers are the only main types of computer today.

16- All computer systems, no matter how small or large, have the same fundamental capabilities

(III)- Choose the correct answer.

1- It is a microcomputer circuit board that contains slots for connecting peripherals.

A- Motherboard

B- RAM

C- Mouse

D- CPU

2- It is the brain of a computer system. It is the component, which controls what's going on in the system at any moment.

A- Motherboard

B- RAM

C- Mouse

D- CPU

3- It is the primary memory of a computer.

A- Motherboard

B- RAM

C- Mouse

D- CPU

4- It is a magnetic medium that stores its contents permanently, even in the absence of electricity power.

A- RAM

B- CPU

C- Hard disk/floppy disk

D- Floppy drive

5- It is a circuit board that is responsible for the visual outputs that will be displayed on the monitor.

A- RAM

B- Graphic card

C- Hard disk/floppy disk

D- Floppy drive

6- It consists of the physical components of the computer system.

A- Floppy disk

B- Floppy drive

C- Hardware

D- Software

7- Windows 98, 2000 and xp are examples of

A- Hardware

B- Software

C- Operating software

D- Application software

8- Microsoft Word, Excel, Power Point, Access, and Outlook are examples of

A- Hardware

B- Software

C- Operating software

D- Application software

9- It is a collection of related information.

E- File

F- Record

G- Field

H- Application

10- It is the part of the file name that comes after the dot.

A- File extension

B- File place

C- File size

D- File key

11- The actual number of bytes in one gigabyte is

A- 1024

B- 1048576

C- 1073741824

D- 1099511627776

12- .....refers to the use of computers and software to manage information.

A- Computer application

B- Information management

C- Information technology

D- Information transformation

Chapter (2)

Working with Computer Applications

Chapter (2)
Working with Computer Applications

2.1. Working with Office Applications

2.1.1. Microsoft Office (MS-Office)

2.1.1.1. MS Word (Word Processing)

2.1.1.2. MS Excel (Spreadsheets)

2.1.1.3. MS Access (Databases)

2.1.1.4. MS Outlook (Email)

2.1.1.5. MS PowerPoint (Presentations)

2.1.1.6. MS FrontPage (HTML Editor - web design)

2.1.2. MS Word (Word processing)

2.1.2.1. Starting MS Word

2.1.2.2. The Main Functions in MS Word

2.1.2.2.1. File

2.1.2.2.2. Edit

2.1.2.2.3. View

2.1.2.2.4. Insert

2.1.2.2.5. Format

2.1.2.2.6. Tools

2.1.2.2.7. Table

2.1.2.3. Using the Formatting Toolbar

2.1.2.3.1. Changing Font Size and Type

2.1.2.3.2. Bold, Italic and Underlined Texts:

2.1.2.3.3. Paragraph Alignment

2.1.2.4. Moving and Copying Text

2.1.2.5. Shortcuts

2.1.3. MS Excel (Spreadsheets)

2.1.3.1. What Are Spreadsheets?

2.1.3.2. Starting Up MS Excel

2.1.3.3. The Grid and the Cells

2.1.3.4. Doing Some Operations in Excel

2.1.3.4.1. Selecting a Cell

2.1.3.4.2. Entering Data in a Selected Cell

2.1.3.4.3. Selecting a Range (Group) of Cells

2.1.3.4.4. Selecting an Entire Row or an Entire Column

2.1.3.5. Mathematical Functions in Excel

2.1.3.6. Creating a Graph in Excel

2.1.4. Working with MS Access

2.1.4.1. What is a Database?

2.1.4.2. Steps in Designing and Building a Database

2.1.4.3. What is a Table?

2.1.4.4. What is a Query?

2.1.4.5. What is a Form?

2.1.4.6. What is a Record?

2.1.4.7. What is a Field?

2.2. Working with Other Computer Applications

2.2.1. Computer Aided Design (CAD)

2.2.2. Computer Aided Manufacturing (CAM)

2.2.3. Computer Integrated Manufacturing (CIM)

2.2.4. Graphical Information System (GIS)

2.2.5. Electronic Data Interchange (EDI)

2.2.6. Computer Numerical Control (CNC)

2.2.7. Computer Simulation

2.2.8. Materials Requirements Planning (MRP)

2.2.9. E-Commerce

Chapter (2)
Working with Computer Applications

2.1. Working with Office Applications

2.1.1. Microsoft Office (MS-Office)

Microsoft Office is a series of programs developed by Microsoft to take advantage of computing power in the office. MS Office contains (some of or all):

- MS Word (Word Processing)
- MS Excel (Spreadsheets)
- MS Access (Databases)
- MS Outlook (Email)
- MS PowerPoint (Slideshow presentations)
- MS FrontPage (HTML Editor - web design software)

2.1.1.1. MS Word (Word Processing)

MS Word is what you use to compose letters, reports, essays, etc. It also contains many templates for creating documents from CVs to envelope labels. It allows you to change the font size, font type, font color, etc of text and alter the formatting of the paragraph you are working on - all with an inbuilt and automatic spell

checker. There are many more advanced features, but these are the most common uses.

2.1.1.2. MS Excel (Spreadsheets)

You can use MS Excel to create spreadsheets which are used primarily for storing and manipulating numerical data - for example you could create the company balance sheet on a spreadsheet and set the totals to automatically add up.

2.1.1.3. MS Access (Databases)

A database is used to store records - an electronic filing cabinet. With MS Access you can create your own database and perform tasks such as editing fields (e.g., name, address, phone, etc) to outputting reports (e.g., a list of all names). Therefore, you could use this to create a client database of all your companies clients and store all their details, then create lists (printouts) of the information in any format you like (e.g., one client per sheet or paper, or one per line).

2.1.1.4. MS Outlook (Email)

MS Outlook is an email program. You use it to compose, send and receive emails. It is pretty simple.

2.1.1.5. MS PowerPoint (Presentations)

MS PowerPoint is used to create slide show presentations (you can hook up certain projectors to a PC to display the presentation on a white screen).

2.1.1.6. MS FrontPage (HTML Editor - web design)

You can use MS FrontPage to create websites. It basically gives you the ability to design a site. You draw it rather than code it.

The best thing about MS Office applications is that it is very easy to transfer data from one to another. For example, you can have a database of names and addresses in MS Access and transfer it to a MS Word letter you wrote, and then merge them. This will print out a copy of your letter for everyone on your database (with names and addresses changed appropriately). Another great thing is that they all share a similar interface. Thus, by learning

how to use one, you are already started off learning the rest.

2.1.2. MS Word (Word processing)

Microsoft Word (MS) is a powerful word processing program you can use to produce professional-looking documents. It enables you to create, edit, print and save documents for future retrieval and reference. Creating a document involves typing by using a keyboard and saving it. Editing a document involves correcting the spelling mistakes, if any, deleting or moving words sentences or paragraphs.

One of the main advantages of a word processor over a conventional typewriter is that a word processor enables you to make changes to a document without retyping the entire document. Some of the important features of Ms-Word are listed below:

- By using MS word, you can create the documents and edit them later, as and when required, by adding more text, modifying the existing text, deleting/moving some part of it.

- Changing the size of the margins can reformat complete document or part of text.
- Font size and type of fonts can also be changed. Page numbers and Header and Footer can be included.
- Spelling can be checked and correction can be made automatically in the entire document. Word count and other statistics can be generated.
- Text can be formatted in columnar-style as we see in the newspaper. Text boxes can be made.
- Tables can be made and included in the text.
- Word also allows the user to mix the graphical pictures with the text. Graphical pictures can either be created in word itself or can be imported from outside like from Clip Art Gallery.
- Word also provides the mail-merge facility.
- It also provides online help of any option.

2.1.2.1. Starting MS Word

To start your MS word you have two options:

- First: Double click on the Microsoft Word icon on the desktop.

- Second: Click on Start ⇒ Programs ⇒ Microsoft Word as it is shown in Figure (2-1)

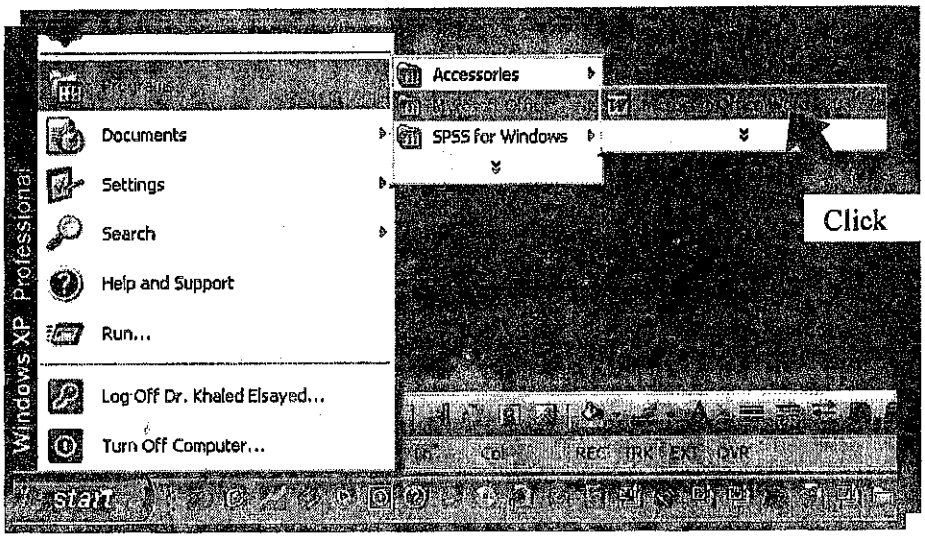


Figure (2-1): Opening a New MS Word File

When you start Word, a new, empty document file is automatically created, so you face an empty page. You can start typing anything you like. They will be seen on the screen. Use the Enter key **only** at the end of Paragraphs! (Not at the end of each sentence or line.)

2.1.2.2. The Main Functions in MS Word

The overall functions of all the items of main menu in MS Word are explained below (Review Figure 2-2).

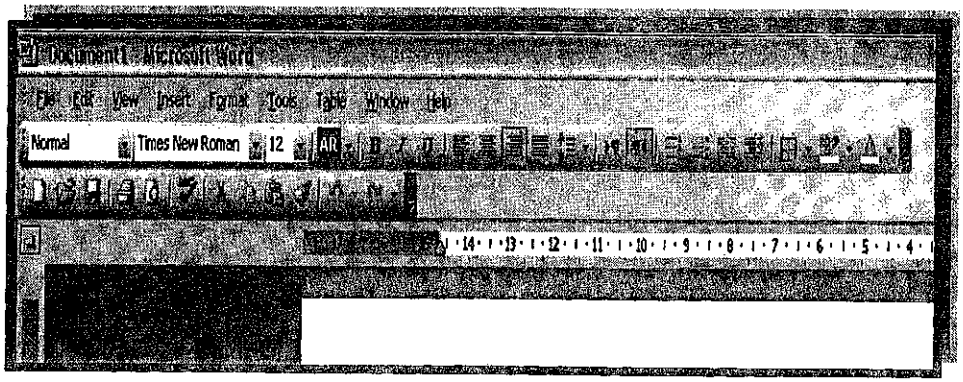


Figure (2-2): Items of Main Menu in MS Word

2.1.2.2.1. File

You can perform file management operations by using these options such as opening, closing, saving, printing, exiting etc. It displays the following sub menu. **New** creates a new, empty document, **Open** opens a document which was created and saved before, **Save** saves the document to a disk (permanent storage device), **Save as** is used to save another (one more) copy of a file, with a different name, **Print** is used to take a print-out of the document, **Close** closes the currently open, active document, **Exit** is used to quit from Word.

2.1.2.2.2. Edit

By using this option you can perform editing functions such as cut, copy, paste, find and replace etc. It displays the following sub menu. **Undo** is used to cancel

the last action (operation) you have made, **Repeat** is used to do a cancelled action once again, **Find** is used to search for some word or sentence in your document. **Cut** and **Copy** should be used together with **Paste**. Cut / Paste combination is used to change the place of a selected text by moving it into another part of your document. Copy / Paste is used to put an extra copy of a selected text into another part of the document.

2.1.2.2.3. View

Word document can be of many pages. The different pages may have different modes. Each mode has its limitations. For example in "normal mode" the graphical picture cannot be displayed. They can only be displayed in "page layout mode". By using the option "View" you can switch over from one mode to other.

2.1.2.2.4. Insert

By using this menu, you can insert various objects such as page numbers, footnotes, picture frames etc. in your document.

2.1.2.2.5. Format

By using this menu, you can perform various type of formatting operations, such as fonts can be changed, borders can be framed etc.

2.1.2.2.6. Tools

Through this menu, you can have access to various utilities/tools of Word, such as spell check, macros, mail merge, words count etc.

2.1.2.2.7. Table

This menu deals with tables. Using this menu enables you to perform various types of operations on the table such as creating table, adding new column or new row, deleting column or row, sorting items in tables, converting table into text and vise versa etc.

2.1.2.3. Using the Formatting Toolbar

2.1.2.3.1. Changing Font Size and Type

By default, the font size is usually "12". You can select any other value from the corresponding combo box:

the larger the value, the larger the size of the font. By default, the font type is usually "**Times New Roman**" You can select any other type.

2.1.2.3.2. Bold, Italic and Under 

You can find the buttons for these three styles (**B** *I* U) on top of your screen. You can use any combination of them to write **Bold**, *Italic* and Underlined texts. *This is an italic sentence.* **This is a bold sentence.** This is an underlined sentence.

2.1.2.3.3. Paragraph Alignment 

You can arrange the paragraphs as **left aligned**, **right aligned**, **centered** and **justified** (i.e. aligned from both left and right margins) by clicking one of the corresponding buttons shown above.

2.1.2.4. Moving and Copying Text

To move text, select and highlight the section you want to move. Then from the **Edit** menu, choose **Cut**. Move the cursor to the place you would like the text to be inserted. Click in the document to place the cursor there. From the **Edit** menu, choose **Paste**.

To copy text, select and highlight the section you want to copy. Then from the **Edit** menu, and choose **Copy**. Move the cursor to the place you want the copied text to be inserted. From the **Edit** menu, and choose **Paste**.

2.1.2.5. Shortcuts

Word provides you with shortcut keys which are a combination of letters and symbols that act as codes that allow you to accomplish frequently executed tasks. For example, if you would like to move text, you can highlight the selection and press the **CNTL + X** keys instead of selecting **Cut** from the **Edit** menu. Here are some other commonly used shortcuts:

- Open new document: **CTRL + N**
- Open existing document: **CTRL + O**
- Save document: **CTRL + S**
- Print document: **CTRL + P**
- Select All: **CTRL + A**
- Copy: **CTRL + C**
- Cut: **CTRL + X**
- Paste: **CTRL + V**
- Undo: **CTRL + Z**

- Find a word/number: **CTRL + F**
- Font: **CTRL + D**
- Replace a word: **CTRL + H**
- Bold: **CTRL + B**
- Italic: **CTRL + I**
- Underline: **CTRL + U**
- Go to: **CTRL + G**

2.1.3. MS Excel (Spreadsheets)

2.1.3.1. What Are Spreadsheets?

Spreadsheets are programs designed to give us some control over the numbers we deal with. While more specialized programs are available for very specific tasks, such as keeping track of your home finances, spreadsheets offer unprecedented abilities to manipulate, extrapolate, and interpret numeric data. Most spreadsheet programs also include graphing facilities to help us in understanding complex data.

Spreadsheets grant you the ability to ask "What if..." questions - the ability to change one piece of data and see the changes cascade throughout the rest of the information. They also allow you to quickly and easily

look at several options and compare the results so you can make good decisions. Using a spreadsheet is not about doing arithmetic. It is about understanding your data, organizing it, and saving yourself time while you make better decisions.

2.1.3.2. Starting Up MS Excel

Begin by selecting Excel from the programs listed in Windows. When the Excel program comes up on the screen, it will present a grid made up of many similar rectangles, with some menu options at the top (**File, Edit, View, Insert, Format, Tools, Data, Windows, Help**)

Underneath the word File at the top left there are a number squares with symbols on them; this part of the screen is called the Toolbar (the buttons included may vary considerably from one machine to another, depending upon how the program options have been selected). At the bottom of the screen there is horizontal row of rectangles labeled Sheet 1, Sheet 2, Sheet 3, and so on (Review Figure 2-4).

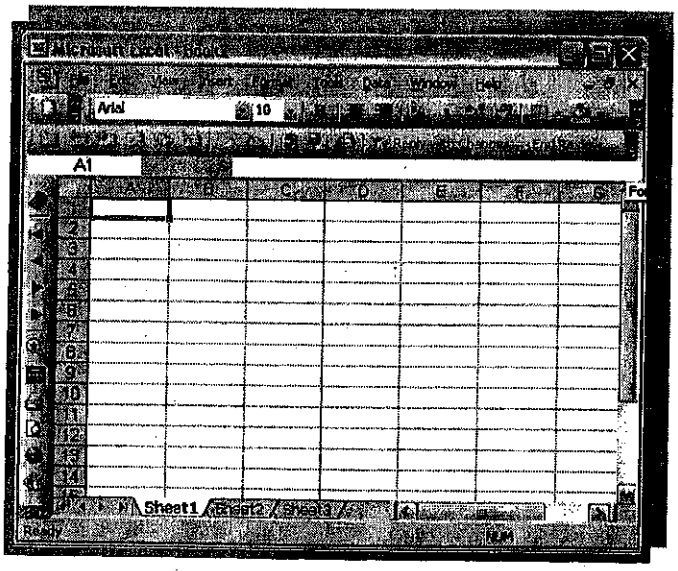


Figure (2-3): MS Excel Worksheet

This entire set up is called a Worksheet. Notice that just above the top left corner of the grid, there is a label: Sheet 1. Sheet 1 is the name of the worksheet you begin working with. It will keep that name until you change it to a name you have selected.

2.1.3.3. The Grid and the Cells

The grid is made up of columns, each one with an alphabetical letter on the top. There are 156 of these columns, from A to IV. The horizontal rows have numbers from 1 to 65563. The intersections of the horizontal and vertical lines create the grid. Each

rectangular space defined by these intersections is called a **cell**. The full worksheet thus has a large number of cells (about 10227828 cells).

A cell is defined or named by the column letter and row number which locate it in the grid: e.g., the top left cell is A1; the second vertical row of cells is B1, B2, B3, B4, and so on. The vertical ranks of cells are called columns; the horizontal ranks of cells are called rows. Cells in the same column thus all have the same letter (A, B, C, D, and so on) and different numbers; cells in the same row all have the same number, but with different letters.

2.1.3.4. Doing Some Operations in Excel

2.1.3.4.1. Selecting a Cell

When you first call up the Excel grid, you are presented with a blank Worksheet. You will notice that the worksheet is empty and that cell A1 is highlighted, with a dark line around its perimeter. This dark perimeter means that cell A1 has been selected to receive some data.

You can also move from one cell to another with the move arrows on the keyboard. As you press the arrow

key, the selected cell moves one cell in the relevant direction (up, down, left, or right).

2.1.3.4.2. Entering Data in a Selected Cell

Once a cell has been selected, you can enter information in it. In most procedures, you will enter one of three kinds of data: (a) text (especially for headings), (b) numbers, and (c) formulas.

2.1.3.4.3. Selecting a Range (Group) of Cells

It is possible to select more than one cell at a time (a very common procedure). For instance, if you want to select cells A1, A2, A3, and A4 (the first four cells in Column A), move the mouse pointer to cell A1, push down the left mouse button and hold it down. Then drag the mouse (still holding the left mouse button down) from cell A1 straight down to cell A4. Release the left mouse button when you have selected the range of cells you want. Notice that when you do this the first cell (A1) is white, and the other selected cells are darkened, with a highlight around all the selected cells. If you make a mistake, select a cell outside the range, and then start again to select the range you want. You can select cells

horizontally as well by the same method (e.g., A2, B2, C2, D2, E2, and so on).

2.1.3.4.4. Selecting an Entire Row or an Entire Column

To select a column or row move the mouse arrow to the alphabetical letter or the number which identifies that row or column (at the top or on the left of the worksheet—the letter or number in the gray area). Click the left mouse button on the letter or number. Notice that the entire row or column turns dark.

2.1.3.5. Mathematical Functions in Excel

Whenever you enter a formula into a cell, you must begin with the equal sign (=) before the details of the mathematical formula. Otherwise Excel will simply put into the cell what you have typed. The equal sign tells Excel to perform the calculation and not just to put the figures you have typed into the cell.

The keyboard symbols for mathematical operations in Excel are as follows (locate these keys on the keyboard):

Add	+
Subtract	-
Divide	/
Multiply	*

To indicate a mathematical operation (Review Figure 2-4):

- Make sure you put in the equal sign.
- Indicate the number, the symbol for the operation, and the second number (without any spaces).
- Thus, =8*4 tells Excel to multiply 8 by.
- Then press **"ENTER"** Key.
- Note that there are no spaces between any of the parts of such a formula.

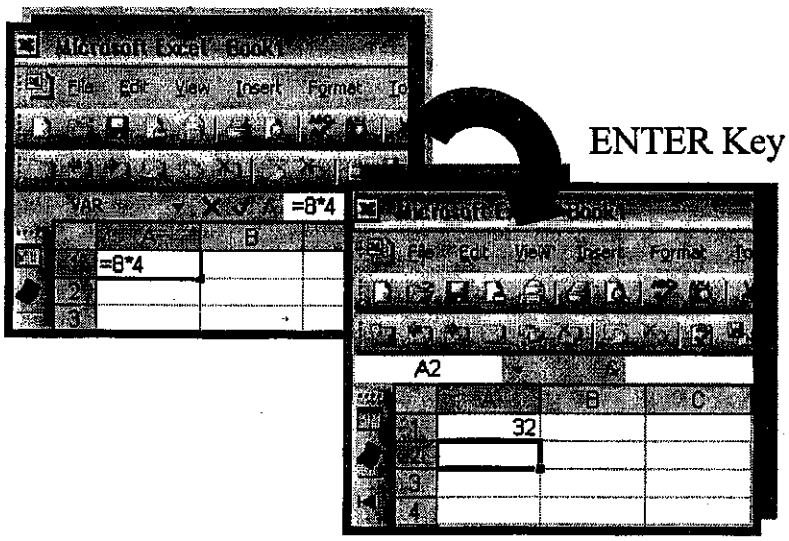


Figure (2-4): Mathematical Operation in Excel

Note carefully that in multiple operations Excel performs calculations in the usual mathematical way: first, it completes all operations in brackets, then it multiplies and divides, and finally it adds and subtracts. In other words, it does not necessarily complete operations in the sequence from left to right.

So, for example, the calculation =2+4*5 produces the result 22. The multiplication is done first (4*5 = 20), and then the addition (2 + 20 = 22). If we went strictly from left to right, we would do the addition first (2 + 4 = 6) and then the multiplication (6*5 = 30). This latter procedure would be incorrect.

A formula in a cell indicates that you want Excel to carry out a calculation of some sort and to enter the results into a particular cell. Learning to use formulas will enable you to use Excel to carry out all sorts of complex mathematical functions quickly.

For instance, if you have exam marks for ten students (As in Figure 2-5) and you need to compute the average of these marks, then you need to do the following:

- Select cell B12. In this cell you want the average of all the marks in the list.
- You can ask Excel to do this in a formula. To insert the formula, type in cell B12 the following formula **=Average(B2:B11)**
- Press "ENTER" Key
- You will get an average of 12.8

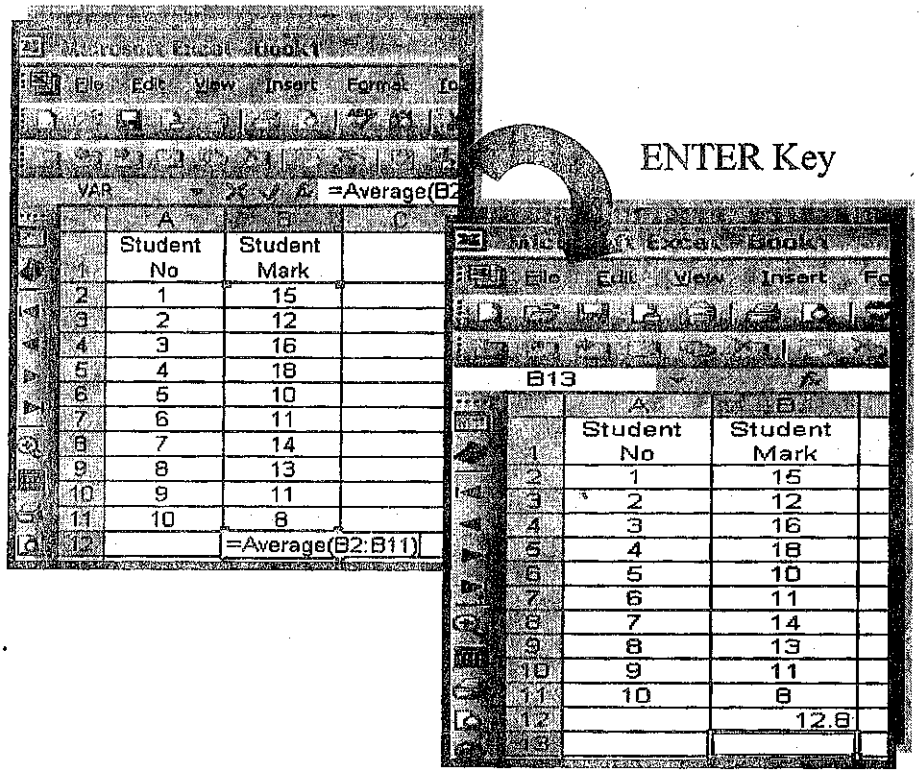


Figure (2-5): Mathematical Function in Excel

Excel has a wide range of functions available and you do not need to remember them all because there is a

function wizard. If you click on (*fx*) as in Figure 2-6, you will get a window with all these functions.

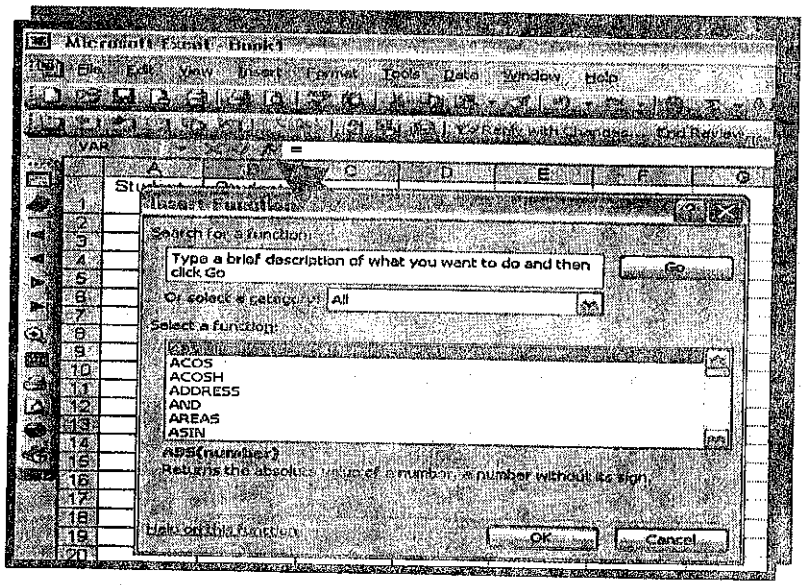


Figure (2-6): Functions Wizard in Excel

2.1.3.6. Creating a Graph in Excel

To be able to produce a graph using MS Excel, you need to apply the following steps:

Step 1: Click on a blank cell on the spreadsheet and press from "Chart Wizard" button on the menu bar as in Figure 2-7.

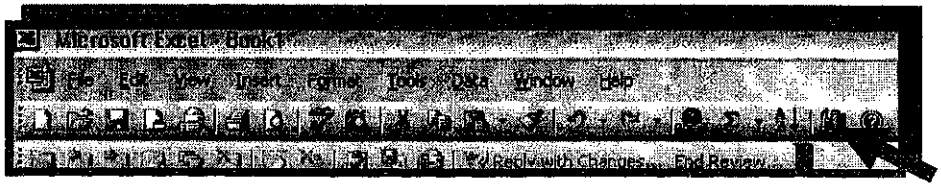


Figure (2-7): Chart Wizard in Excel

Step 2: Choose the type that you need to create (For instance you may choose to create XY (Scatter) sub-type without lines from the "Chart Type" menu on the right hand side as in Figure 2-8).

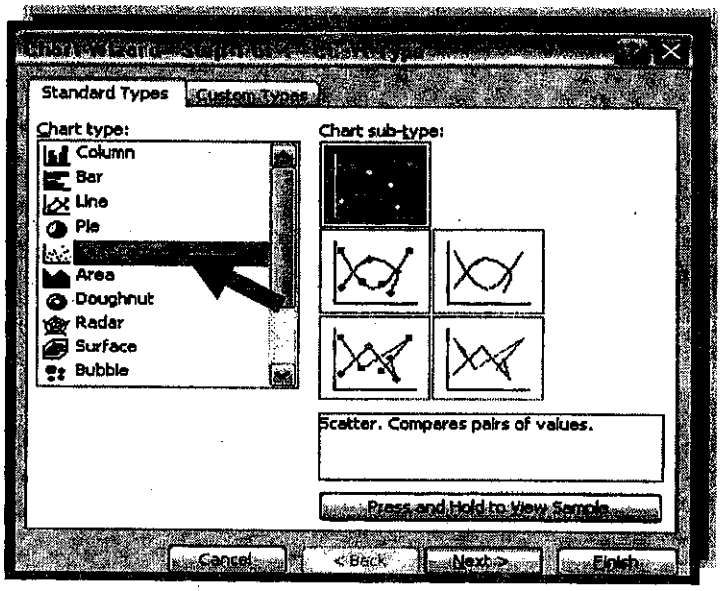


Figure (2-8): Chart Types in Excel

2.1.4. Working with MS Access

2.1.4.1. What is a Database?

A database is simply a collection of related information. For example, if you gathered together all your photographs, you would have a database of photographs. If you collected all your photographs that included your family, you would have either a more targeted database or a subset of your larger database.

If your database is small (for example, your firm insurance policies), you can probably manage the information manually. In such instances, you might use a traditional management method such as a card file or a simple list on a piece of paper. However, as the database becomes larger, your management task becomes more difficult. For example, it would be virtually impossible to manually manage the customer database of a large corporation. This is where your computer and a database management system (DBMS) come in handy. DBMS software (such as Access) lets you manage large amounts of information quickly and easily.

In Access, a database consists not just of information, but also the tables into which the information is organized. Access databases also contain related queries, forms, reports, and programming instructions. Because these terms deserve further definition, they are covered in the following sections.

2.1.4.2. Steps in Designing and Building a Database

- Define the problem.
- Decide what real world things (*entities*) you need to store information about. For example Employees, Products, Customers, Orders. Entities are represented by *tables* in the database.
- Decide what facts (*attributes*) you need to know about each *entity*, e.g. an Employee's date of birth, salary. *Attributes* are represented by *fields* in the *tables*.
- Decide on the *relationships* between the *entities* in the database; i.e. what *attributes* do they have in common. *Relationships* are formed in the database between *entities* that have common *attributes*. They have common fields in the related tables. For example, *customer* 'Sayed Said' can place an *order*

for *product* 'TVs". Thus, the Orders table has relationships with Customers table and Products table.

- Decide what information you need to extract from your data. This will allow you to design the *queries*.
- Design *Forms* that will allow users to enter data values for running queries or entering data.
- Design *Reports* that will print information extracted from the database.

2.1.4.3. What is a Table?

In Access, *tables* contain the actual information in your database. There can be more than one table in a database. The information in each table can relate to information in other tables in your database. For example, you might have one table that contains a record of all the door locks in your building. In the same database, another table might have a list of all the keys for those locks. Still another table might contain the names of all the people who have the keys. All three tables contain related information, so they belong to the same database. Figure 2.9 depicts the relationship between the tables and this database.

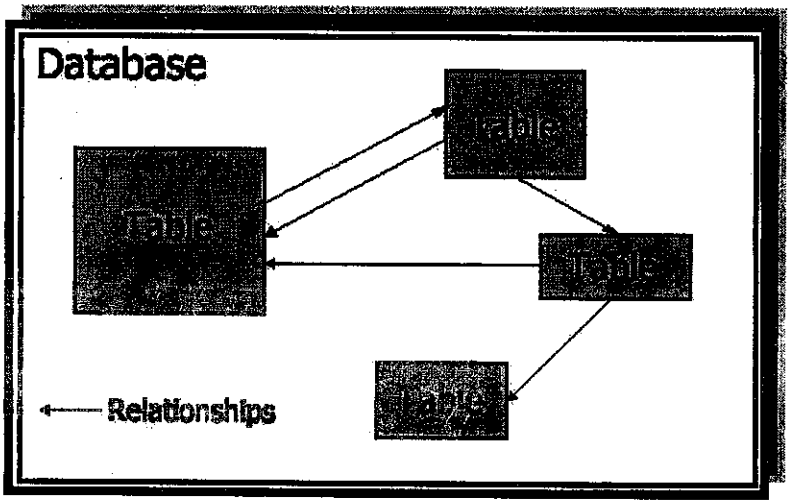


Figure (2-9): How Access Relates Tables and Databases

2.1.4.4. What is a Query?

When you work with large databases, there will be times when you will want to work with specific pieces of your data. For example, if you have a company database, you may want to view the names of all your customers who reside in Cairo. On such occasions, you would form a query. Then a *query* defines which database information you want to view. Think of a query as a question you ask the database, such as "Who are the customers that reside in Cairo?"

For example, if your database contains the names of all your customers who have purchased a particular product, your query might request a list of only those customers that made over a certain income. Another query might request only those customers with children. Essentially, a query limits or *filters* the information in a database. When you use a query as a filter, Access displays only information that satisfies the query.

Why would you use queries? Specifically, because you want to work with only a part of your database. Queries make it easy for you to work with only those records that fit a particular criterion. Access lets you get as broad or as specific or as complex as you want in the queries you develop.

2.1.4.5. What is a Form?

A database exists to store information. After you determine the information your database will contain, you will need to enter the data. Later, you may want to examine, add to, or change that data. Although you can use the Datasheet view to accomplish each of these tasks, you may want instead to create a custom display screen that lets you enter, view, and edit information.

Within Access, custom display screens are called *forms*. Using forms, you can both display the information in a table and add buttons, text boxes, labels, and other objects that make data entry much easier.

2.1.4.6. What is a Record?

A *record* is a single block of information, such as employee or customer data. A table is made up of many records. For example, if you have a table that contains information about your customers, a record is the specific information about a single customer. Sometimes, records are referred to as *rows* because, within a table, Access represents individual records as rows.

2.1.4.7. What is a Field?

Just as tables are made up of records, records are made up of fields. A *field* is the smallest piece of information in a database. For example, if you have a table containing your phone list, each record represents a different person or business in that list. In turn, those records are made up of individual fields (names, addresses, or phone numbers). Figure 2-10 shows the relationship of fields, records, tables, and databases.

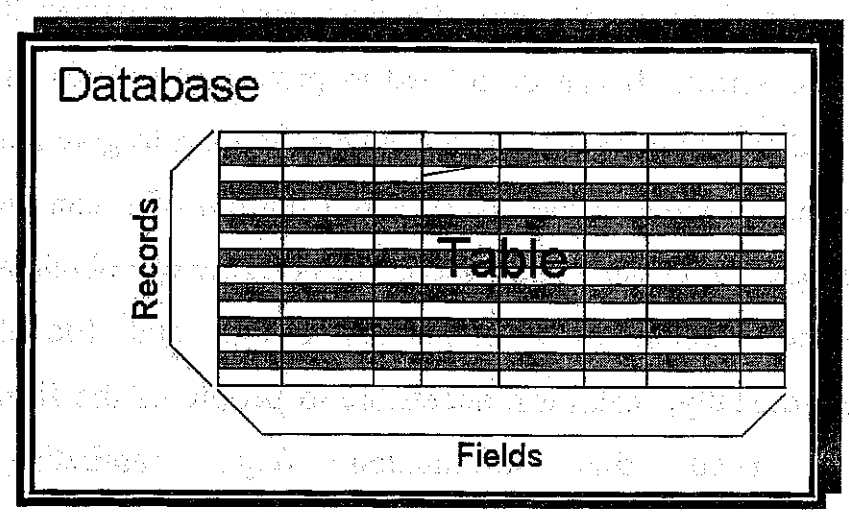


Figure (2-10): How Fields, Records, Tables, and Databases are related

You may also hear fields referred to as *columns.* Within tables, Access represents fields as columns when you look at data in Datasheet view (refer back to Figure 2-10).

2.2. Working with Other Computer Applications

2.2.1. Computer Aided Design (CAD)

Computer aided design uses computer graphics for product design. The designer can modify an existing design or create a new one by means of a light pen, a keyboard, a joystick, or a similar device. Once the design

is entered into the computer, the designer can maneuver it on the screen: It can be rotated to provide the designer with different perspectives, it can be split apart to give the designer a view of the inside, and a portion of it can be enlarged for closer examination. The designer can obtain a printed version of a completed design and file it electronically, making it accessible to people of the firm who need this information (e.g., marketing, operations...etc).

A growing number of products are being designed in this way, including transformers, automobile parts, aircraft parts, integrated circuits and electric motors. A major benefit of CAD is the increased productivity of designers. No longer it is necessary to laboriously prepare mechanical drawings of products or parts and revise them repeatedly to correct errors or incorporate revisions. A rough estimate is that CAD increases the productivity of designers from 3 to 10 times. A second major benefit of CAD is the creation of a database for manufacturing that can supply needed information on product geometry and dimensions, tolerances, material specifications, and so on. It should be noted, however, that CAD needs this database

to function and that this entails a considerable amount of effort.

Some CAD systems allow the designer to perform engineering and cost analyses on proposed designs. For instance, the computer can determine the weight and volume of a part and do stress analysis as well. When there are a number of alternative designs, the computer can quickly go through the possibilities and identify the best one, given the designer's criteria.

2.2.2. Computer Aided Manufacturing (CAM)

Since the age of the Industrial Revolution, the manufacturing process has undergone many dramatic changes. One of the most dramatic of these changes is the introduction of Computer Aided Manufacturing (CAM), a system of using computer technology to assist the manufacturing process.

Through the use of CAM, a factory can become highly automated, through systems such as real-time control and robotics. A CAM system usually seeks to control the production process through varying degrees of automation. Because each of the many manufacturing

processes in a CAM system is computer controlled, a high degree of precision can be achieved that is not possible with a human interface.

The CAM system, for example, sets the tool path and executes precision machine operations based on the imported design. Some CAM systems bring in additional automation by also keeping track of materials and automating the ordering process, as well as tasks such as tool replacement.

Computer Aided Manufacturing is commonly linked to Computer Aided Design (CAD) systems. The resulting integrated CAD/CAM system then takes the computer-generated design, and feeds it directly into the manufacturing system; the design is then converted into multiple computer-controlled processes, such as drilling or turning.

Another advantage of CAM is that it can be used to facilitate mass customization: the process of creating small batches of products that are custom designed to suit each particular client. Without CAM, and the CAD process that precedes it, customization would be a time-consuming, manual and costly process. However, CAD

software allows for easy customization and rapid design changes: the automatic controls of the CAM system make it possible to adjust the machinery automatically for each different order.

2.2.3. Computer Integrated Manufacturing (CIM)

Computer Integrated Manufacturing, known as CIM, is the phrase used to describe the complete automation of a manufacturing plant, with all processes functioning under computer control and digital information tying them together. It includes computer-aided design/computer-aided manufacturing (CAD/CAM), computer-aided process planning (CAPP), computer numerical control machine tools (CNC), direct numerical control machine tools (DNC), flexible machining systems (FMS), automated storage and retrieval systems (ASRS), automated guided vehicles (AGV), use of robotics and automated conveyance, computerized scheduling and production control, and a business system integrated by a common data base.

One of the key issues regarding CIM is equipment incompatibility and difficulty of integration of protocols. Integrating different brand equipment controllers with

robots, conveyors and supervisory controllers is a time-consuming task with a lot of pitfalls. Quite often, the large investment and time required for software, hardware, communications, and integration cannot be financially justified easily.

Another key issue is data integrity. Machines react clumsily to bad data and the costs of data upkeep as well as general information systems departmental costs are higher than in a non-CIM facility.

Another issue is the attempt to program extensive logic to produce schedules and optimize part sequence. There is no substitute for the human mind in reacting to a dynamic day-to-day manufacturing schedule and changing priorities.

Just like anything else, computer integrated manufacturing is no panacea, nor should it be embraced as a religion. It is an operational tool that, if implemented properly, will provide a new dimension to competing: quickly introducing new customized high quality products and delivering them with unprecedented lead times, swift decisions, and manufacturing products with high velocity. In short, CIM has the following benefits:

- Optimizes data flow in company
- Simplifies sharing and translation of information
- Reduces careless errors in data
- Allows checking of data against standards
- Promotes use of standards

2.2.4. Graphical Information System (GIS)

A geographic information system (GIS) integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared. GIS technology can be integrated into any enterprise information system framework.

A GIS is most often associated with a map. A map, however, is only one way you can work with geographic data in a GIS, and only one type of product generated by a

GIS. A GIS can provide a great deal more problem-solving capabilities than using a simple mapping program or adding data to an online mapping tool (creating a "mash-up").

2.2.5. Electronic Data Interchange (EDI)

Electronic Data Interchange (EDI) may be most easily understood as the replacement of paper-based purchase orders with electronic equivalents. It is actually much broader in its application than the procurement process, and its impacts are far greater than mere automation. EDI offers the prospect of easy and cheap communication of structured information throughout the corporate community, and is capable of facilitating much closer integration among hitherto remote organizations.

A more careful definition of EDI is 'the exchange of documents in standardized electronic form, between organizations, in an automated manner, directly from a computer application in one organization to an application in another.

EDI can be compared and contrasted with electronic mail (email). Email enables free-format, textual

messages to be electronically transmitted from one person to another. EDI, on the other hand, supports structured business messages (those which are expressed in hard-copy, pre-printed forms or business documents), and transmits them electronically between computer applications, rather than between people. The essential elements of EDI are:

- The use of an electronic transmission medium (originally a value-added network, but increasingly the open, public Internet) rather than the dispatch of physical storage media such as magnetic disks.
- The use of structured, formatted messages based on agreed standards (such that messages can be translated, interpreted and checked for compliance with an explicit set of rules).
- Relatively fast delivery of electronic documents from sender to receiver (generally implying receipt within hours, or even minutes).
- Direct communication between applications (rather than merely between computers).

EDI depends on a moderately sophisticated information technology infrastructure. This must include

data processing, data management and networking capabilities, to enable the efficient capture of data into electronic form, the processing and retention of data, controlled access to it, and efficient and reliable data transmission between remote sites.

A common connection point is needed for all participants, together with a set of electronic mailboxes (so that the organizations' computers are not interrupted by one another), and security and communications management features. It is entirely feasible for organizations to implement EDI directly with one another, but it generally proves advantageous to use a third-party network services provider.

EDI saves unnecessary re-capture of data. This leads to faster transfer of data, far fewer errors, less time wasted on exception-handling, and hence a more streamlined business process. Benefits can be achieved in such areas as inventory management, transport and distribution, administration and cash management. EDI offers the prospect of easy and cheap communication of structured information throughout the government community, and

between government agencies and their suppliers and clients.

EDI can be used to automate existing processes. In addition, the opportunity can be taken to rationalize procedures, and thereby reduce costs, and improve the speed and quality of services. Because EDI necessarily involves business partners, it can be used as a catalyst for gaining efficiencies across organizational boundaries. This strategic potential inherent in EDI is expected to be, in the medium term, even more significant that the short-term cost, speed and quality benefits.

2.2.6. Computer Numerical Control (CNC)

Computer Numerical Control (CNC) has been around since the early 1970's. Prior to this, it was called NC, for Numerical Control (in the early 1970's computers were introduced .to these controls, hence the name changed). While people in most walks of life have never heard of this term, CNC has touched almost every form of manufacturing process in one way or another. If you will be working in manufacturing, it is likely that you will be dealing with CNC on a regular basis.

Everything that an operator would be required to do with conventional machine tools is programmable with CNC machines. Once the machine is setup and running, a CNC machine is quite simple to *keep* running. In fact CNC operators tend to get quite bored during lengthy production runs because there is so little to do. With some CNC machines, even the work piece loading process has been automated. CNC operators are commonly required to do other things related to the CNC operation like measuring work pieces and making adjustments to keep the CNC machine running good work pieces.

The introduction of CNC machines radically changed the manufacturing industry. Curves are as easy to cut as straight lines, complex 3-D structures are relatively easy to produce, and the number of machining steps that required human action has been dramatically reduced.

With the increased automation of manufacturing processes with CNC machining, considerable improvements in consistency and quality have been achieved with no strain on the operator. CNC automation reduced the frequency of errors and provided CNC operators with time to perform additional tasks. CNC

automation also allows for more flexibility in the way parts are held in the manufacturing process and the time required changing the machine to produce different components.

2.2.7. Computer Simulation

Simulation in general terms can be defined as the representation or imitation of a system in its realistic form. When a computer program is used to create a model to mimic a real world system, then the term "computer simulation" comes into action. Such models are called computer simulated models. Computer simulation is of two types. One is called "*discrete simulation*", in which, a system is observed only at some fixed regular time points, an example of which is the queuing system. It is a system where the events or jobs arrive at a time and wait in the queue to be processed. Generally the queue operates in a "First in First Out" fashion. Some real time examples for this case can be customers waiting in the queue in banks or to buy groceries in departmental stores. The involvement of the computer here is to maintain the queue according to the arrival time of the event, in this case the

customers, and process each event one after the other according to their arrival time.

The other type is called "*analogue simulation*", which involves traditional mathematics. This is applied to a system whose state varies continuously in time. In this technique, sets of differential equations were used to describe a system. Since computers have the ability to solve equations, using various algorithms in minimal time, its usage was very much relevant here. Some examples of this type are cosmology systems and chemical applications, which involve a large number of equations and require huge computing power.

2.2.8. Materials Requirements Planning (MRP)

Material requirements planning (MRP) is a computer-based inventory management system designed to assist production managers in scheduling and placing orders for dependent demand items. Dependent demand items are components of finished goods—such as raw materials, component parts, and subassemblies—for which the amount of inventory needed depends on the level of production of the final product. For example, in a plant that manufactured bicycles, dependent demand

inventory items might include aluminum, tires, seats, and derailleurs.

The first MRP systems of inventory management evolved in the 1940s and 1950s. They used mainframe computers to explode information from a bill of materials for a certain finished product into a production and purchasing plan for components. Before long, MRP was expanded to include information feedback loops so that production personnel could change and update the inputs into the system as needed. The next generation of MRP, known as manufacturing resources planning or MRP II, also incorporated marketing, finance, accounting, engineering, and human resources aspects into the planning process. A related concept that expands on MRP is enterprise resources planning (ERP), which uses computer technology to link the various functional areas across an entire business enterprise.

MRP works backward from a production plan for finished goods to develop requirements for components and raw materials. MRP begins with a schedule for finished goods that is converted into a schedule of requirements for the subassemblies, component parts, and

raw materials needed to produce the finished items in the specified time frame.

MRP breaks down inventory requirements into planning periods so that production can be completed in a timely manner while inventory levels—and related carrying costs—are kept to a minimum. Implemented and used properly, it can help production managers plan for capacity needs and allocate production time. But MRP systems can be time consuming and costly to implement, which may put them out of range for some small businesses. In addition, the information that comes out of an MRP system is only as good as the information that goes into it. Companies must maintain current and accurate bills of materials, part numbers, and inventory records if they are to realize the potential benefits of MRP.

2.2.9. E-Commerce

E-commerce (electronic commerce or EC) is the buying and selling of goods and services on the Internet, especially the World Wide Web. In practice, this term and a newer term e-business are often used interchangeably.

For online retail selling, the term e-tailing is sometimes used. E-commerce can be divided into:

- E-tailing or "virtual storefronts" on Web sites with online catalogs, sometimes gathered into a "virtual mall".
- The gathering and use of demographic data through Web contacts.
- Electronic Data Interchange (EDI), the business-to-business exchange of data.
- E-mail and fax and their use as media for reaching prospects and established customers (for example, with newsletters).
- Business-to-business buying and selling.
- The security of business transactions.

Review Questions

(I)- Write a short essay about each of the followings

1- The main applications in MS Office.
2- Key features of MS-Word.
3- The main functions in MS-Word.
4- Steps of creating a graph in MS-Excel.
5- Steps in designing and building databases.
6- The relationship between fields, records and tables in databases structure.
7- How CAD, CAM and CIM are related.
8- The essential elements of EDI.
9- The difference between "analog simulation" and "discrete simulation"
10- The various types of E-commerce.

(II)- Determine which of the following statements are true and which are false

1- MS Excel is what you use to compose letters, reports, essays, etc.
2- You can use MS Word to create spreadsheets which are used primarily for storing and manipulating numerical data.

3- A database is used to store records - an electronic filing cabinet.

4- With MS Excel you can create your own database and perform tasks such as editing fields to outputting reports.

5- MS Outlook is an email program.

6- MS Access is used to create slide show presentations.

7- You can use MS FrontPage to create websites.

8- The worst thing about MS Office applications is that it is very hard to transfer data from one application to another.

9- One main advantage of MS Office applications is that they all share a similar interface.

10- In MS-Office, the appropriate shortcut to open a new file is "Control + S".

11- In MS-Office, the appropriate shortcut to cut a paragraph is "Control + P"

12- To change font in MS-Word you need to use "Control + D" shortcut.

13- In MS-Word, by using view menu, you can insert various objects such as page numbers.

14- Spreadsheets are programs designed to give us some control over the numbers we deal with.

15- Spreadsheets grant you the ability to ask "What if..." questions.

16- In MS-Excel, intersections of the horizontal and vertical lines create the grid.

17- A query limits or filters the information in a database.

18- If you have a table that contains information about your customers, a record is the specific information about a single customer.

19- Records are made up of individual fields.

20- Access represents fields as rows.

21- Some CAM systems allow the designer to perform engineering and cost analyses on proposed designs

22- CAD is a system of using computer technology to assist the manufacturing process.

(III)- Choose the correct answer

1- Which of the following software will be used if you want to type a long book report?

A- Spreadsheet software

B- Electronic mail software

C- Database management software

D- Word processing software

2- Which of the following software is most appropriate to keep all the student record of a university?

A- Spreadsheet software

B- Electronic mail software

C- Database management software

D- Word processing software

3- Which of the following software will you suggest the librarian to use if he/she wants to record the information (e.g., titles, author names, publishers, borrowers, due dates) of all the books in the library?

A- Spreadsheet software

B- Electronic mail software

C- Database management software

D- Word processing software

4- Which of the following tasks is a common application of spreadsheet software?

A- Financial analysis

B- Records keeping

C- Report writing

D- Newsletter editing

5- Which of the following software will you use if you want to inform all of your classmates the venue, date and time of the coming meeting?

A- Spreadsheet software

B- Electronic mail software

C- Database management software

D- Word processing software

6- In MS-Excel, whenever you enter a formula into a cell, you must begin with.

A- Equal sign

B- Add sign

C- Subtract sign

D- Multiply sign

7- In Access, a database consists not just of information, but also the …….. into which the information is organized.

A- Tables

B- Forms

C- Queries

D- Records

8- In Access,……contain the actual information in your database.

A- Tables

B- Forms

C- Queries

D- Records

9- In Access, a…… defines which database information you want to view.

A- Table

B- Form

C- Query

D- Record

10- Within Access, custom display screens are called

A- Tables

B- Forms

C- Queries

D- Records

11- A ..... is a single block of information, such as employee or customer data.

A- Table

B- Field

C- Query

D- Record

12- A ..... is the smallest piece of information in a database

A- Table

B- Form

C- Field

D- Record

13- .....uses computer graphics for product design

A- CAM

B- CAD

C- CIM

D- CNC

14- Through the use of ....., a factory can become highly automated

A- CAM

B- CAD

C- CIM

D- GIS

15- ..... is the phrase used to describe the complete automation of a manufacturing plant, with all processes functioning under computer control.

A- CAM

B- CAD

C- CIM

D- GIS

16- ..... allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts.

A- CAM

B- CAD

C- CIM

D- GIS

17- .....is the replacement of paper-based purchase orders with electronic equivalents

A- CAM

B- EDI

C- CIM

D- GIS

18- .....can be defined as the representation or imitation of a system in its realistic form.

A- Simulation

B- EDI

C- CIM

D- GIS

19- In....., a system is observed only at some fixed regular time points.

A- Simulation

B- Discrete simulation

C- Analog simulation

D- GIS

20- .....is the buying and selling of goods and services on the Internet.

A- E-commerce

B- EDI

C- Analog simulation

D- GIS

Chapter (3)

Computer Applications (1)

3.1 Marketing Information System.

3.2 Manufacturing Information System.

3.3 Human Resources Information System.

Part II

Computer Applications In Specific Areas Of Business

3.1 Marketing Information System

3.1.1 Introduction:

In supplying the marketplace with its products – goods and services- a business firm performs several distinct functions. The principal business functions are:

- Purchasing Function – ensures that materials are available in the right quality, the right quantity, the right price, the right supplier, the right time, and the right service.
- Marketing and sales- ensure that the firm's products meet the needs of the marketplace, developing a market for these products, providing them at the right place at the right time and selling them.
- Production- Creating or adding values by producing goods or offering services. In firms that produce goods, the production function is known as manufacturing.
- Finance and accounting- managing the funds of the enterprise.
- Human resources- developing the personnel of the

firm.

As we know organizations have been traditionally structured along these functional lines, however, some of the leading companies organize themselves differently today. To compete effectively, many organizations are now subdivided into territorial (geographic), line- of-business, or other customer-oriented structures. The flatter organizations rely less on middle management as the backbone of separate functions and more on information technology for integrating these functions. In some companies, functional specialists are distributed among the units performing the firm's business process. Cross-functional teams, with the informational support have become the essential work units in a number of firms. Yet regardless of the organizational structure of the enterprise, information systems need to support the four principal business functions we illustrated in figure.

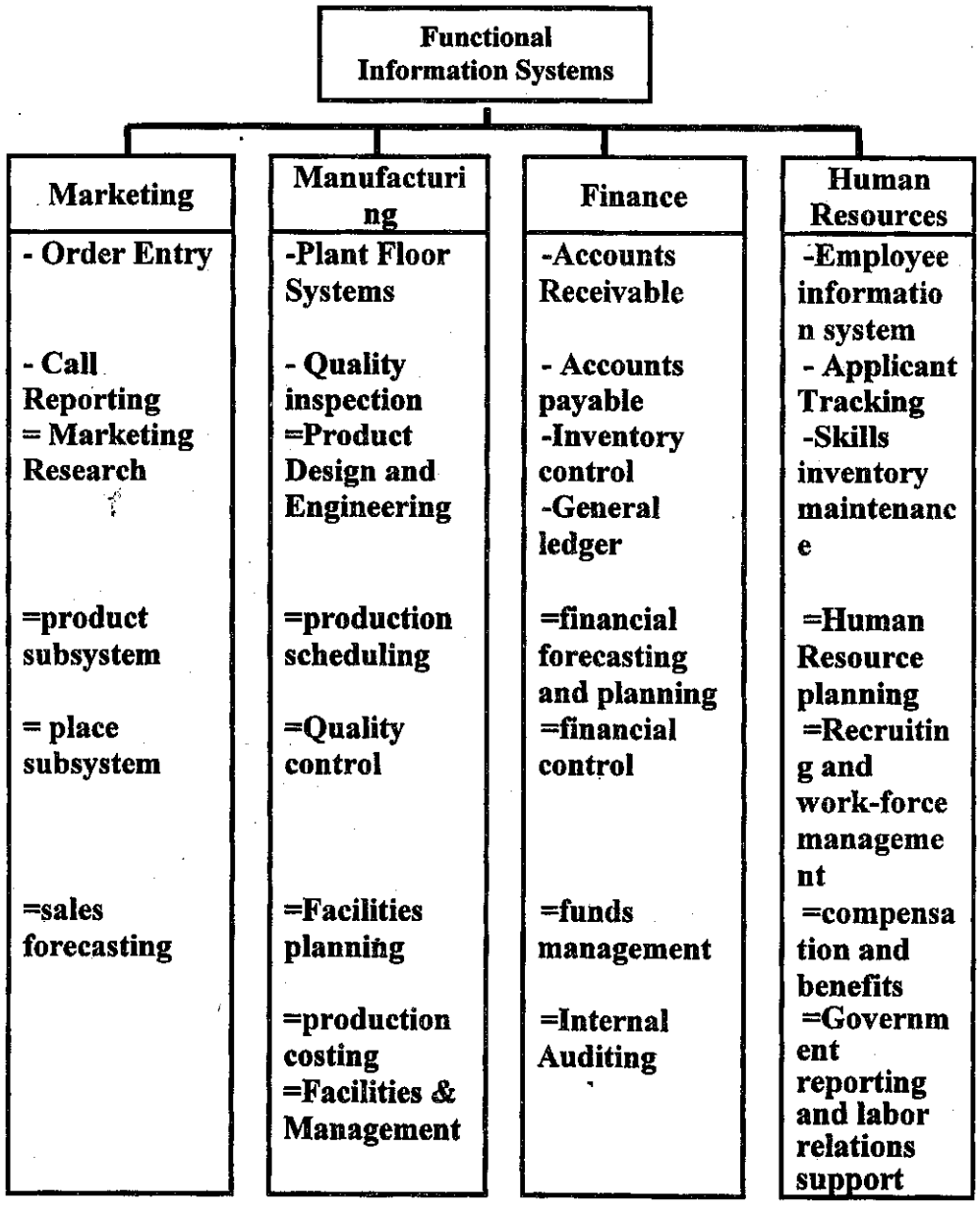
3.1.2 The concept of Marketing Information systems:

3.1.2.1 The Domain of Marketing Information System

Marketing activities are directed toward planning, promoting, and selling goods and services to satisfy the

Figure (3.1)

Information Systems for Business Functions



Legend :

- Transaction processing systems.

= Management and professional Support Systems.

needs of customers and the objectives of the organizations. In a business firm, the most important objective is realizing a profit. Nonprofit organizations, such as universities or charitable institutions, market their products as well, seeking to realize such objectives as graduating better-qualified students or raising more funds for their beneficiaries.

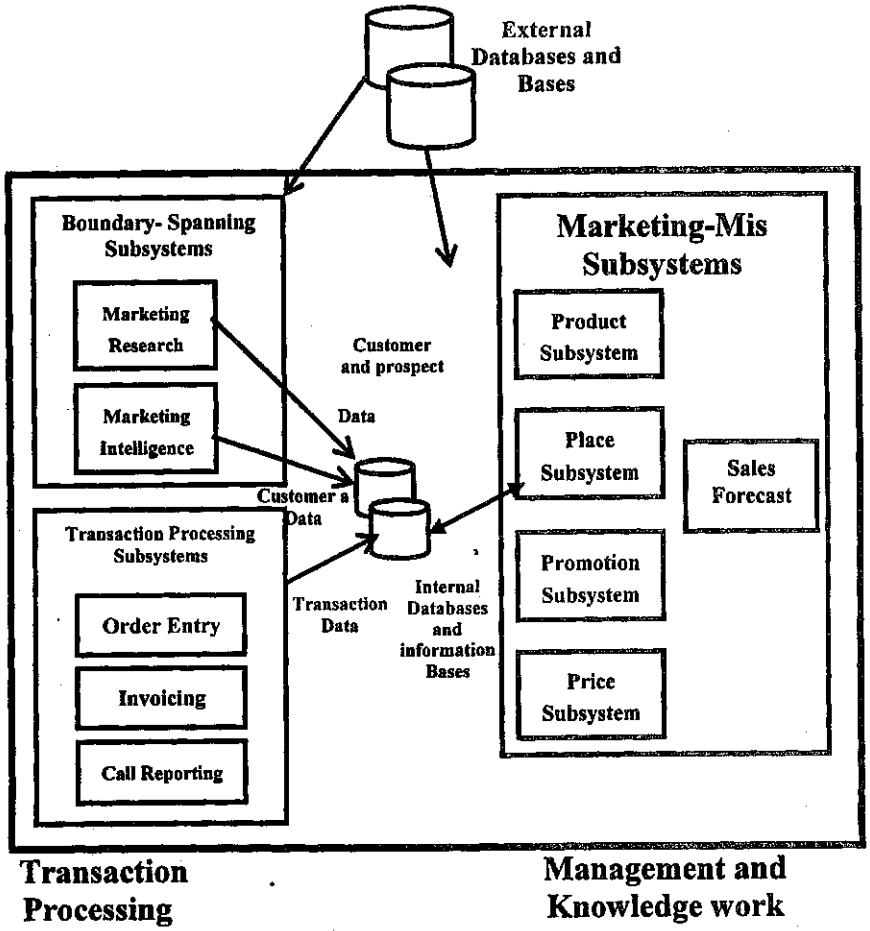
Marketing information systems support the decision making regarding the marketing mix, expressed as the so called four Ps:

1. What products (goods or services) should we offer?
2. At what place should we offer our products; that is, what should our distribution channel be?
3. What promotion (sales and advertising) should be conducted?
4. What should be the price of our products (with mark-ups and other terms of sale)?

The outcome of this decision making is integrated into a sale forecast. This forecast used to be made for a year ahead but in the environment of time-based competition; it is now often made for shorter periods.

The structure of the entire marketing information system is shown in figure 3.2.

Figure 3.2: Marketing Information System



As we see, in order to support decision making on the marketing mix, a marketing information system draws on several sources of data and information.

3.1.2.2 Sources of Data and information for Marketing:

By its very nature, a marketing information system relies on external information to a far greater degree than other organizational information systems. As we from the previous figure, it includes two subsystems expressly designed for boundary spanning bringing into the firm data and information about the marketplace.

The Objectives of marketing research is to collect data on the actual customers and the potential customers, known as prospects. The identifications of the needs of the customer is a fundamental starting point for total quality management (TOQ). These needs will be converted into quality targets for the products. It is of great importance to gather data on non-customers, in order to understand why they do not patronize the firm's products. In doing marketing research many firms gather their own data with surveys or interviews or by observing the actual buying behavior. The data gathered by observation are more reliable than the statements of intent or fact in surveys.

With the growth of the information economy, the availability of data from external sources has grown. Such

data can be obtained from on-line databases, such as those listed on magnetic or optical media (CD-ROM). Leading suppliers of data collected by point- of- sale (POS) scanners at supermarkets, pharmacies, and other mass merchandisers are information resources.

Marketing research software supports statistical analysis of data. It enables the firm to correlate buyer behavior with very detailed geographic variables (such as a small community or several urban blocks), Demographic variables (age, income, education, etc.,) and even psychographic variables (such as the degree of conservatism). Geographic information systems are particularly helpful in visualizing the distribution of customers and non-customers.

Marketing (competitive) intelligence is responsible for the gathering and interpretation of data regarding firm's competitors, and for dissemination of the competitive information the appropriate users. Most of the competitor information comes from corporate annual reports, media-tracking services (e.g., on-line databases or filtered news services that relay information based on client profiles), and reports purchased form external

providers, including on-line database services. It is a vital function of sales call reporting to provide competitive information as well. And the internet has become a major source of competitive intelligence.

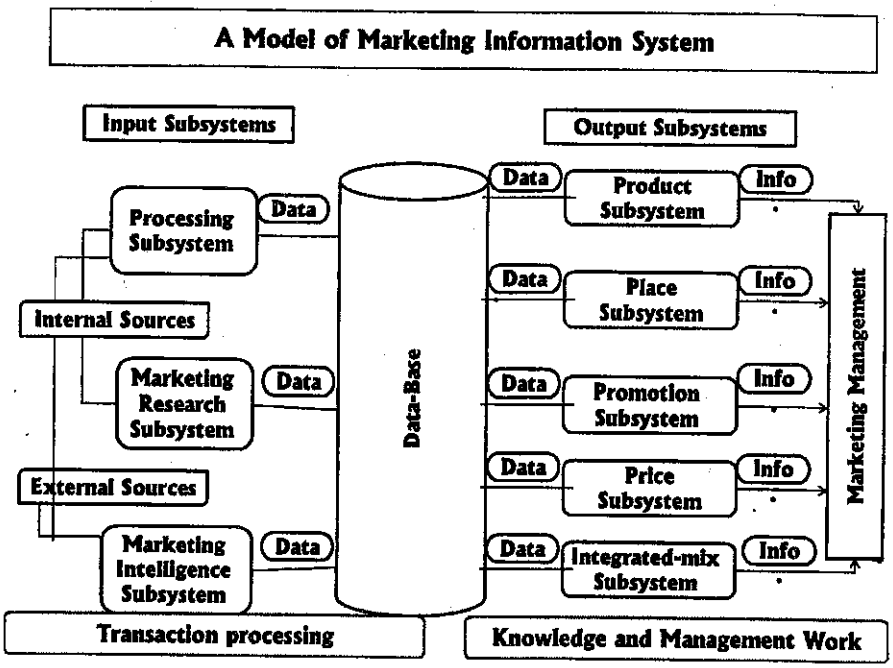
An important objective of transaction processing is to provide data for the higher-level information systems. Indeed, several transactions processing subsystems feed data into the marketing information system. These include primarily Order Entry, which provides data on customer orders, invoicing, providing the billing and return data, and Call Reporting, through which data on sales calls (including the competitive data collected by the salespeople) reaches, the system.

3.1.3 Marketing Subsystem :

A marketing information system is a subset of the management .information system, which provides information to be used in solving the firm's marketing problems.

Figure (3.3) is a model that shows the basic marketing information system.

Figure 3.3



The input structure of subsystems gather data and information that is entered in database. The output subsystems consist of computer programs that transform the data into information for the functional managers.

3.1.2.1 Marketing Input Subsystems:

Much of the marketing data and information is provided by the data processing subsystem. This data provides a historical record of sales activity that can be used in preparing periodic reports which is used as the basis for mathematical models.

The marketing research subsystem gathers data primarily concerning the firm's consumers and prospective customers. Mail and telephone surveys as well as personal interviews are used to gather the data.

The marketing intelligence subsystem gathers data and information concerning the firm's competitors. This system is usually very informal.

For example, the firm's marketing representatives will shop at competitor's stores and attend open houses of competitors' offices and factories. Marketing intelligence is an ethical activity. It is not to be confused with industrial espionage, which is a form of spying.

The data processing and marketing research subsystems gather data and information from both internal and environmental sources. The marketing intelligence subsystem gathers only environmental data and information.

3.1.2.2 Marketing Output Subsystem:

All the products and services that are offered by the marketing function are referred to as the marketing mix. This includes the product, the place where the product is

sold, promotion such as personal selling and advertising, and the product price.

The model uses the mix ingredients as a way to classify the output subsystems in the product subsystems. All software that describes to the customers is included in the place subsystem. Likewise, the software that keeps the manager posted concerning personal selling and advertising is in the promotion subsystem, and all information about pricing is provided by pricing subsystem. The manager can use these subsystems separately or in combination.

Periodic reports, programs that facilitate database queries, and programs that serve as mathematical modes.

3.1.4 Marketing Mix Subsystems:

The marketing mix subsystems support decision making regarding product introduction, pricing, promotion (advertising and personal selling), and distribution. These decisions are integrated into the sales forecast and marketing plan against which ongoing sales results are compared. The marketing mix subsystems.

3.1.4.1 Product Subsystem:

Product subsystem helps to plan the introduction of new products. Continually bringing new products to market is vital in today's competitive environment of rapid change. As one example. Nike places on the market an average of more than one shoe style every single day. New products differ in their degree of newness : They range from extensions to the current product lines and improvements to existing products to products that are new to the company or even new to the world. The higher the degree of newness, the higher the risk in introducing the product. The product subsystem should support balancing the degree of risk in the overall new-product portfolio with more aggressive competitors assuming higher degrees of risk for a potentially higher payoff.

Although decisions regarding the introduction of new products are unstructured, information, systems support this process in several ways. Professional support systems assist designers in their knowledge work. Decision support systems are used to evaluate proposed new products. With the use of a DSS, a marketing manger can score the desirability of a new product. To do this, he

can consider the attributes of the proposed product, such as the appeal to non-customers for the existing product, its fit with the firm's strengths, like core competence in manufacturing or post-sale service, and its fit with the existing product line, such as utilizing off-season production capacity or exploiting the customer database.

Electronic meeting systems help bring the expertise of people dispersed in space and time to bear on a problem. Information derived from marketing intelligence and research is vital in evaluating new product ideas.

3.1.4.2 Place Subsystem:

Place subsystem assists the decision-makers in making the product available to the customer at the right place at the right time. In other words, the place subsystem helps plan the distribution channels for the product and track their performance. Some products are sold through short channels: Machinery is usually sold directly to the industrial user; some manufacturers of consumer products such as Avon sell directly to the consumer. Longer distribution channels include brokers. Wholesalers, and retailers, which provide such important marketing functions as product promotion, credit support,

storage, and post-sale service. With longer channels, there is a need for more information processing in the place subsystem.

The use of information technology has dramatically increased the availability of information on product movement in the distribution channel. The bar-coded Universal product code (UPC) combined with Point of sale (POS) scanning makes it possible to track every unit of merchandise. Electronic Data interchange (EDI) is increasingly used to transmit price and promotion data, along with the electronic orders and invoices.

Customized delivery has become possible with the use of information systems. As customers increasingly demand just-in-time product delivery, the place subsystem has to support precise deliveries against a pre-agreed schedule. However, it is also necessary to accommodate variations from that schedule, as requested by the customer. Specialized distribution companies relying on sophisticated information technology, such as FedEX and UPS, have become virtual partners of many manufacturing and merchandizing firms. FedEx is also becoming an aggressive distributor of products acquired

over the internet. In some industries, such as retail, suppliers have to manage customers' inventories, and the suppliers' information systems have to be integrated with those of their customers.

3.1.4.3 Promotion Subsystem:

Promotion subsystem is often the most elaborate in the marketing information system, since it supports both personal selling and advertising. Media selection packages assist in selecting a mix of avenues to persuade the potential purchaser, including direct mail, television, print media, and the electronic media such as the internet and the World wide web in particular. The effectiveness of the selected media mix is monitored and its composition is continually adjusted. Point of sale (POS) systems bring timely and detailed data on sales, which are employed to direct advertising spending. For example, Kraft General Foods uses the POS data to analyze annual spending of a sample 12000 households and to direct its $1.6 billion in advertising so as to reach the most promising prospects. Further up the supply chain, the POS data are used to pull in the appropriate products from manufacturing and the appropriate input goods from the firm's suppliers.

Database marketing relies on the accumulation and use of extensive databases to segment potential customers and reach them with personalized promotional information. The frequent-flier database of British Airways, combined with the airline's data warehouse, helps it ward off competition from discount air carriers by pampering the best customers. Airline representatives throughout the world, as well as flight attendants, have access to information about each of the customer's preferences in order to provide superior service.

A customer information system has furnished competitive advantage to Williams-Sonoma, a direct marketer and retailer of cooking and gardening equipment. Relying on its database if over 4.5 million customers that tracks up to 150 data items per customer, the company's two full-time statisticians can project the sales from each direct-mail catalog with 95% accuracy. The database also helps the company locate the most promising sites for new stores. Thanks to its customer information system, Fingerhut, one of the largest Mail-order Company in the world succeeded where many others have failed is able to sell merchandise on credit to families with low annual income.

The role of telemarketing, marketing over the telephone, has increased. A telephone call costs about one-hundredth of the cost of an in-person sales call. Telemarketing calls are well supported by information technology. Better uses of telemarketing include careful selection of prospects based on marketing database and automatic displays on the telemarketer's screen of the data regarding the prospect whose number has been successfully dialed. Telemarketing techniques offensive to many include automatic dialing followed by a computerized voice message.

Sales management is thoroughly supported with information technology. Customer profitability analyses help identify high-profit and high-growth customers and target marketing efforts in order to retain and develop these accounts. On the tactical level, plans are developed for the servicing of these key accounts and for general sales-call coverage and development of sales territory. Variances from these plans are monitored, analyzed, and become a stimulus for action. Operational planning involves, for example, weekly analysis of regional sales volume. By collecting the daily on the sales of its products store by store, and combining these with the data on its

competitor's sales, Frito-lay is able to react rapidly to demand changes in the salty-snack market segment and has generated competitive advantage.

Salesforce automation, equipping salespeople with portable computers tied into the corporate information systems, gives the salespeople instantaneous access to information and frees them from the reporting paperwork. This increased selling time and the lev of performance. Access to corporate databases is sometimes accompanied by access to corporate expertise, either by being able to contact the experts or by using expert systems that help specify the product meeting customer requirements. Computerized ordering systems in healthcare and other industries, with the vendor's software for ordering installed on customer sites, reduce the need for sales-force.

3.1.4.4 Price Subsystem

Pr ing decisions find a degree of support from decision support systems and access to databases that contain industry prices. These highly unstructured decisions are make in pursuit of the company's pricing objectives. General strategies range from profit

maximization to forgoing a part of the profit in order to increase market share. Discounting and promotional devices, such as coupons, complicate the pricing task. Manufacturers often use promotions by lowering prices to retailers for a specific period of in a specific region. This sometimes results in investment buying by brokers, who stock up the goods for future sale or divert them to regions where no discount is available. Information technology is deployed by brokers in this arbitrage, which defeats the manufacturer's pricing purpose.

Information systems provide an opportunity to finely segment customer groups and charge different prices depending on the combination of product and service provided, as well as the circumstances of the sale transaction. Because of yield management systems, passengers in neighboring seats on the same airplane pay different prices, depending on such circumstances as advance purchase, length of stay, applicability of special rates, and qualification for such promotions as frequent flier. When you buy M&M candy, you may pay very different prices for the same weight. Indeed, its vendor, Mars, offers 76 different packaging formats and prices for its product.

3.1.5 Sales Forecasting

Based on the planned marketing mix and outstanding orders, sales are forecast and a full marketing plan is developed. Sales forecasting is an area where any quantitative methods employed must be tempered with human insight and experience. The actual sales will depend to a large degree on the dynamics of the environment.

Qualitative techniques are generally used for environmental forecasting an attempt to predict the social, economic, legal, and technological environment in which the company will try to realize its plans. These forecasts play a broader role in the overall corporate planning than just supporting sales planning. Group decision-making techniques, such as the Delphi method are used to elicit broad expert opinion. The use of these techniques may be supported by a GDSS. Another off-employed qualitative forecasting techniques is scenario analysis. Each scenario in this process is a plausible future environment. Royal Dutch/Shell, an oil company renowned for its preparedness when unfavorable market conditions occur, works out two four scenarios, each reflecting a plausible

combination of favorable and unfavorable future circumstances. Decision support systems may be used to develop models for the scenarios.

The sales volume has to be forecast quantitatively, of course. Among quantitative forecasting techniques is the extrapolation or trends and cycles through a time-series analysis. Many phenomena are cyclic, with the cycles repeating themselves over periods of a few years as well as seasonally. If the sales growth rate can be charted in this fashion, we can extend such a chart into the future.

The projection is based on the fact that the time series for the earlier years shows both an upward trend and seasonal cycles.

Sales forecast is the foundation of a marketing plan. It must be stressed that any long-range planning in an environment fraught with uncertainties is not a blueprint. It is rather a continual process through which the company integrates its activities, devices targets to focus on, and learns to improve its performance. Once the marketing plan has been developed, managerial control can be performed by tracking variances from the key indicators. For example, managers might ask, "Which division was

responsible for the large negative sales variance in the second quarter?" or "What should be done to narrow the gap between planned sales for the current year and possible projections considering the results we have so far?"

The marketing information system may be integrated with other organizational information systems. For example, corporate plans for various time horizons are an important input to the system, while the sales forecasts are vital output from the marketing to the manufacturing information systems.

3.1.6 A marketing Information System Example

An example of output from the produt subsystem is of sales analysis reports that are produced from data provided by the data process- analysis reports that are produced from data provided by the data processing system. The records that the billing system, uses to prepare the invoices can be sorted into various sequences to provide management with information describing the firm's sales in the terms of its products, customers, and salespersons.

According to Sales By Product Report Format the products are listed in a descending sequence based on year-to-date sales so that the highest selling products are listed first. This technique calls the manager's attention to the items that are contributing the most revenue. It is an example of how management by exception can be incorporated into a report design. The same technique is used in the sales By Customers Report, which call the manager's attention to the best customers.

Marketing management determined that reports such as these would be valued in solving problems relating to product sales. Software was developed and incorporated into the product subsystem to produce the reports on a periodic basis

3.2 Manufacturing Information Systems

3.2.1 Introduction

Managers in the manufacturing area probably have made wider use of the computer than have mangers in the other areas. Liberal use is also made of computers as information systems in scheduling production, controlling inventory, controlling production quality, and reporting on production costs. These separate information system applications have been integrated in the model of a manufacturing information system as follows.

3.2.2 The New manufacturing Environment

As the need for goods and for their customer-driven quality attributes is established by marketing, they have to be produced by manufacturing. Even though in this section we concentrate on manufacturing firms, all organizations deliver goods or services that must be produced in an organized fashion, using similar concepts, and with the operations supported by information systems.

Global competitive pressures of the information society have been highly pronounced in manufacturing

and have radically changed it. The new marketplace calls for manufacturing that is:

- Lean- highly efficient, using fewer input resources (materials, human effort, energy, and plant space) in production through better engineering and through production processes that relies on low inventories and result in less waste. In particular, "green" products are designed for easy disassembly and recycling.
- Agile- fit for time based competition, both the new product design and order fulfillment are drastically shortened. Product design cycle (time to- market) are cut by concurrent engineering that supports parallel development of different aspects of the product. Moreover, products are expressly designed for easy manufacturer and assembly. Customer-oriented manufacturing systems enable a firm to fill a manufacturing order almost immediately. For example, thanks to a computer-integrated manufacturing (CIM) system, Copperweld Corporation of Pittsburgh, a manufacturer of metal tubing, produces and ships a customer order within two hours.

- Flexible- able to adjust the product to a customer's preferences rapidly and cost-effectively. At the Allen Bradley plant in Milwaukee, Wisconsin, electrical contractors are efficiently produced in a lot size of one, with a six-second changeover time from one type of product to another. Similarly, Motorola's plant in Boynton Beach, Florida produces pagers in lots of one. By varying the styles and colors of its pagers, the firm has been able to reach a very broad consumer market. This is known as mass customization- producing varied often individually customized products at the cost of standardized, mass-produced goods.

- Managed for quality- by measuring quality throughout the production process and following world standards (such as ISO 900), manufacturers treat quality as a necessity and not a high-price option. The so- called six-signs technique, pioneered by Motorola, permits no more than 3.4 defects per million units of a product.

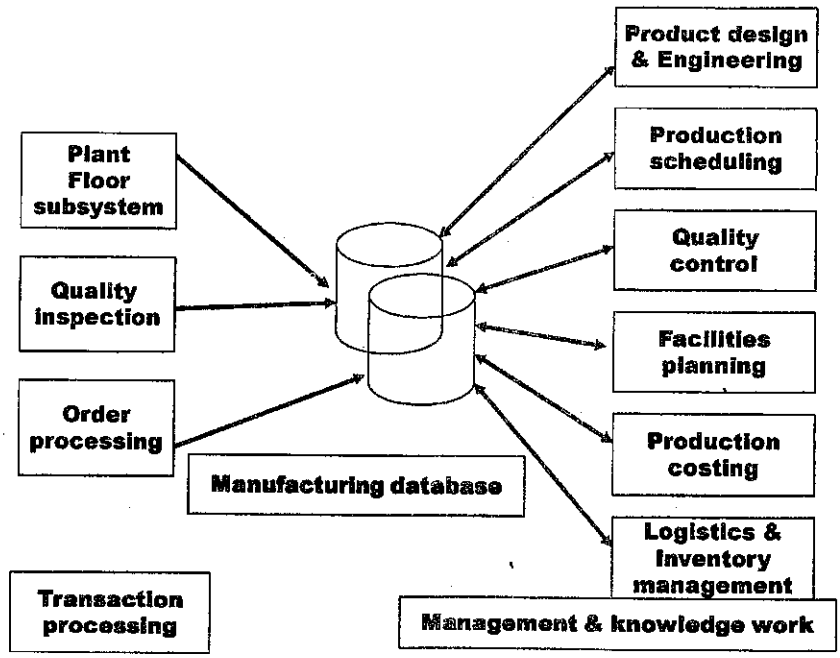
We will proceed to discuss manufacturing information systems that can contribute significantly to this manufacturing environment.

3.2.3 Structure of manufacturing Information Systems

To achieve the results we have just described; information technology must play a vital role in the design and manufacturing processes. Virtually all the capabilities of information technology are called upon. Indeed, manufacturing information systems are among the most difficult both to develop and to implement. The general structure of manufacturing information systems are among the most difficult to implement. The general structure of a manufacturing information system is shown in figure (3.4).

Transaction processing systems are embedded in the production process (such as plant floor systems and quality inspection systems) or in other company processes (such as order processing). The data provided by the transaction processing systems are used by management support subsystems, which are tightly integrated and interdependent. Let us consider these subsystems of the manufacturing information system.

Figure 3.4
Manufacturing Information System



3.2.4 Subsystems of Manufacturing Information Systems:

3.2.4.1 Product Design and Engineering

Product design and engineering are widely supported today by computer-aided design (CAD) and computer-aided engineering (CAE) systems. A variety of products, from semiconductor chips to airplanes, are

designed using similar principles of constructing geometric objects. CAD systems assist the designer with automatic calculations and display of surfaces while storing the design information in databases. The produced designs are subject to processing with CAE systems to ensure their quality, safety, manaufacturability, and cost-effectiveness. If concurrent engineering is implemented, the designers develop the functionality of the product at the same time as it is engineered for ease of manufacture, assembly, testing, and repair. CAD/CAE systems increasingly eliminate paperwork from the design process, while speeding up the process itself.

The product is designed in electronic form, visualized by the workstation graphics. In many cases, design rules are prestored in a database to ensure that the design is valid. Instead of producing costly and time-consuming physical prototypes, preliminary designs can be validated in electronic form. Simulation software allows the engineers to test the virtual product under the expected conditions of its operation. The technique known as stereolitography uses laser under computer control to produce a physical prototype of a product quickly by curing a liquid polymer layer by layer, until these cross

sections stack up to the product shape. The combined techniques of CAD/CAE and rapid prototyping cut time-to-market.

With increasing frequency, product design is dome in collaboration with the customer.

3.2.4.2 Production Scheduling

Production scheduling is the heart of the manufacturing information system. This complex subsystem has to ensure that an appropriate combination of human, machinery, and material resources will be provided at an appropriate time in order to manufacture the goods. The manufacturer has to take place on an appropriate schedule in accordance with the sales forecasts, taking into account orders on hand and production for inventory.

Production scheduling and the ancillary processes are today frequently controlled with a manufacturing resource planning system (also called MRP 11 or "big MRP," since it is an advanced version of material requirements planning, or (PRP) as the main

informational tool. This elaborate software converts the sales forecast for the plant's products into a detailed production plan (usually by quarter) and further into a master schedule of production, usually segmented into weekly periods.

Instead of relying on "push" style manufacturing, driven by production schedules, some firms have converted to just-in-time (JIT) operation, driven "Pulled" by customer orders. In these cases, suppliers deliver materials just in time for production and, in turn, the production occurs just in time for delivery to customers. JIT operation helps reduce production costs by minimizing inventory of raw materials, in-process products, and finished products. The integration of value chains of several firms involved in supplier-customer relationship requires stringent coordination with information systems. Electronic data interchange (EDI) is necessary. In some cases, JIT features have been incorporated in the MRP 11 systems, which are able to accommodate both scheduled production and a sudden surge of orders. Other companies use specialized JIT manufacturing software.

Leading companies seek a total integration of their manufacturing value chain. Computer-integrated manufacturing (CIM) is a strategy through which a manufacturer takes control of the entire manufacturing process. The process starts with computer-aided design (CAD) and computer-aided engineering (CAE) and continues on the factory floor, where robots and numerically controlled machinery are installed- and thus computer -aided manufacturing (CAM) is implemented. A manufacturing system based on this concept can turn out very small batches of a particular product as cost-effectively as a traditional production line can turn out millions of identical products. A full-fledged CIM is extremely difficult to implement; indeed, many firms have failed in their attempts to do so.

The most advanced manufacturing systems are built today around the Customer Oriented Manufacturing System (COMS) model, which may be used together with CIM. With such systems, when a customer's order is being taken, the customer can choose the desired product features and be given the price and the delivery date. The order is "translated" by the information system into a virtual product that exists only in the computer's memory

and is sent to the plant floor while the customer is still on the phone. The fusion manufacturing system used by Motorola to manufacture pagers in lots of one,

It implements a COMMS model with C1M. A customer orders a pager over a telephone hotline. The order, given in plain English, is automatically translated into the data the factory needs, checked out by building the "virtual product" on a computer, and sent to plant for fabrication, while the customer may still be on the line.

3.2.4.3 Quality Control

Global competition has made product quality a necessary attribute of any product, not just of a high-priced one. The quality control subsystem of a manufacturing information systems relies on the data collected on the shop floor by the sensors embedded in the process control systems.

Total quality management (TQM) is a management technique for continuously improving the performance of all members and units of a firm to ensure customer satisfaction. In particular, the principles of TQM state that quality comes from improving the design and

manufacturing process, rather than "inspecting out" defective products.

Robust products that will function properly over a wide range of uses and environmental conditions are designed. The foundation of quality is also understanding and reducing variation in the overall manufacturing - process. Continued quality improvement, with broad training and participation of all-workers and managers - is a must. It is vital to give priority to those quality initiatives that will pay off by attracting customers.

Since one of the foundations of quality is avoiding variance from standards, statistical quality control is conducted, with continual measurement of the work-in-process as well as of finished products.

Based on these measurements, graphs, histograms, and distributions of product sizes and their other attributes are obtained. Sources of variation from standards are sought and future variations are prevented by removing their root causes. At the same time, product deigns are gradually adapted so that the products become more tolerant of minor variations. The improvements in quality are continually tracked with information systems.

Innovative use of information technology in ensuring product quality may be illustrated by the warranty system implemented at Harley-Davidson. By linking the defect surfacing database of this system with motorcycle manufacturer's engineering and manufacturing systems, engineering's and manufacturing systems, engineers are able to correct deviations from performance standards in the future designs.

3.2.5 Facilities Planning, Production Costing, Logistics, and Inventory Subsystems.

Among the higher-level decision making supported by manufacturing information systems is facilitates planning: locating the sites for manufacturing plants, deciding on their production capacities, and laying out the plant floors. Plant sites are selected primarily by considering the proximity to customers, suppliers, sources of labor, and access to transportation. The decisions are unstructured, but decision support systems can assist managers in arriving at them.

Manufacturing management requires a cost control program, relying on the information systems. Among the

informational outputs of the production costing subsystem are labor and equipment maintenance and replacement.

Managing the raw materials, packaging, and the work-in-progress inventory is a responsibility of the manufacturing function. In some cases, inventory management is combined with the general logistics systems, which plan and control the arrival of purchased goods into the firm as well as shipments to the customers. We have noted that proper management calls for low levels of inventories.

Inventory represents a temporarily frozen financial asset and is accompanied by carrying costs such as warehousing, insurance, and spoilage. On the other hand, inventory management seeks to avoid stock outs; the absence of materials needed to fulfill a customer's order. The implementation of these systems is not simple.

3.2.6 Manufacturing input Subsystem

The data collection terminals are an example of how the data processing subsystem is used in manufacturing. The terminals are located throughout the plant to record each major activity from receipt of raw

materials to shipment of finished goods. The terminals enable the computer to be an up-to-the-minute conceptual representation of the physical manufacturing system.

In addition, data describing the internal manufacturing operation is provided by the industrial engineering subsystem. This subsystem consists of the industrial engineers, or IBs who study production processes for the purpose of making them more efficient. lEs spend much of their time designing physical production systems by deciding where to locate plants, how to arrange production lines, and sequence in which processes should be performed. The LEs also are involved in conceptual systems such as scheduling and inventory. The daia and information that are provided by the lEs represents the industrial engineering subsystem.

Some of the data produced by the data processing subsystem related to the environment-specificaliy to suppliers. Other environmental data and information are provided by the manufacturing intelligence subsystem. It provides additional information about suppliers that is not contained within the data processing subsystem, and it also provides information on the labor element in the

environment. Both of these elements are especially important to manufacturing managers. The managers must obtain raw materials for the production process, and they must assemble a strong work force.

3.2.7 Manufacturing output Subsystems

The four output subsystems each measure a dimension of the production process. The production subsystem measures the process in terms of time tracking the workflow from one step to the next. The inventory subsystem measures the volume of production activity as the inventory is transformed from raw materials into work-in-process and finally into finished goods. The quality subsystem measures the quality of the material as they are transformed.

Raw materials are checked for quality when they are received from suppliers, quality -control checks are made at different points in the production process, and a final check is made of finished goods before they leave the plant. The cost subsystem measures the costs of production primarily labor and material costs.

3.2.8 A Manufacturing Information System Example

As an example of how the production subsystem tracks the flow of a job, let us assume that a company manufactures bicycle flashlights-the type that you strap on your leg so that the light bobs up and down as you -pedal. A clear lens at the rear warns the motorists behind.

3.3 Human Resource Information Systems (HIRS)

3.3.1 Introduction

When we describe how the physical resources flow through the firm, we recognized that the personnel department is involved in the personnel flow. The personnel department is a functional of area of the firm, performing a staff function. In a large firm, the personnel department might be headed by a vice-president of personnel. In smaller firm, the personnel department might be one of several staff activities assigned to the executive vice-president of administrative vice-president.

The personnel department is responsible for channeling the personnel from the environment into the firm. This involves recruiting, interviewing, and testing. Once the personnel have been hired, the personnel department maintains employee records and frequently offers various types of educational programs. The personnel database is also make available to managers throughout the firm for special analyses. When the employee leaves the company, the personnel department

changes the records to an inactive status and performs any termination routines that are necessary, such as exit interviews.

The firm's managers need information in order to mange the personnel resource. The system that provides the information is the human resources information system, or HRIS.

3.3.2 The Evolution of Human Resources Information System (HRIS)

The first HRISs were implemented on mainframes, but now many companies are using minis and micros. There is some disagreement concerning the point where a system larger than a micro is required.

In terms of software, a firm can either develop its own or purchase prewritten software.

3.3.3 Functional and Structure Information Systems

A human resource information system (HRIS) supports the human resources function of an organization with information. The name of this function reflects the recognition that people who work in a firm are frequently

considered as the most valuable resource. The complexity of human resource management has grown immensely over recent years, primarily due to the need to conform to the laws and regulations of governments in providing equal employment opportunity, and safe and healthy workplace. A firm's own efforts to ensure both equity and diversity of workforce call for enhanced information processing. The move of many companies to multinational structure, with operations conducted in several countries, has further complicated their human resource management. Flexible organizational structures, such as project-oriented teams, require extensive computerized "inventories" of human skills and experience.

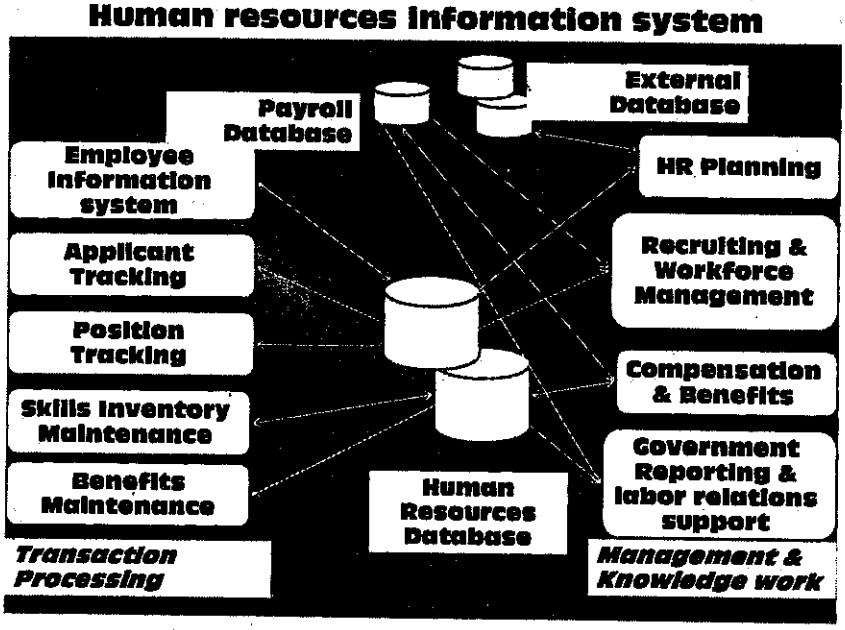
The general structure of human resource information system is shown in the following

An HRIS has to ensure the appropriate degree of access to great variety of internal stakeholders, including:

- The employees of the human resources department in performance of their duties.
- All the employees of the firm seeking information regarding open positions or available benefit plans.

- All the employees of the firm wishing to inspect their own records.
- Employees availing themselves of the computer-assisted training and evaluation opportunities.
- Managers throughout the firm in the process of evaluating their subordinates and making personal decisions.
- Corporate executives involved in tactical and strategic planning and control.

Figure (3.5) : Human Resource Information System



3.3.4 Transaction Processing Subsystems and Databases of Human Resource Information Systems.

At the heart of HRIS are its databases, which are in some cases integrated into a single human resource database. The record of each employee in a sophisticated employee database may contain 150 to 200 data items, including the personal data, educational history and skills, occupational background, and the history of occupied positions, salary, and performance in the firm. Richer multimedia databases are now assembled by some firms in order to facilitate fast formation of compatible teams of people with complementary skills. Such databases include employee photographs and even brief interviews stored in voice form.

Many HRISs maintain other databases contain resumes and other data regarding applicants for positions within the firm, both filled and unfilled. Skills inventory that describe-job -related skills of the firm's personnel have become vital in proper staffing, including team assignments. Benefit databases describe the variety of available employee benefits, including health, insurance, vacation, stock-option, and retirement benefits. In addition

to internal databases, HRISs rely on access to external ones, such as those Census Bureau or local employment agencies.

The databases are maintained by the transaction processing systems, which include:

- Employee Information System, which maintains the employee, database.
- Applicant Tracking subsystem, which processes resumes and results of interviews. Many firms maintain the received resumes with specialized text - retrieval software. Now, larger companies are able to create central databases of applications received from, across the country, with many of these coming over the Internet.
- Position Tracking maintains the inventory of open positions along with the job descriptions of these positions. For example, the inventory may tell us that an open position of systems analyst has to be filled by a person with a master's degree in information systems and three years experience.
- Skills Inventory Maintenance is necessary to keep

track of the employees' skills as turnover, education, and training change the skill pool.

- Benefits Maintenance is needed to keep updating the ever-growing variety of benefits available to employees.

In addition, transactions relating to payments of wages and salaries are handled by the payroll subsystem, which is generally a part of the accounting and financial information system.

3.3.5 Information Subsystems for Human Resource Management

The information subsystems of HRIS reflect the flow of human resources through the firm, from planning and recruitment to termination. A sophisticated HRIS includes the following subsystems:

3.3.5.1 Human Resource Planning

To identify the human resources necessary to accomplish the long-term objectives of a firm, we need to project the skills, knowledge, and experience of the future employees. The geographical distribution of this future workforce has to be developed. Computerized workforce

planning models are often employed. After considering the current workforce and the level of turnover, the number of positions that will need to be staffed in various job categories can be determined. This information can then be matched with the forecasts on the availability of human resources in the locales of projected company operations, which can be made based on external databases.

3.3.5.2 Recruiting and Workforce Management

Based on the long-term human resources plan, a recruitment plan is developed. The plan lists the currently unfilled positions and those expected to become vacant due to turnover. Internal sources, such as promotions and transfers, for filling these positions are considered. Resumes maintained by the Applicant Tracking subsystem are considered as well. Recruitment programs are drawn up in conformance with the applicable Equal Employment Opportunity/affirmative Action laws and regulations. In order to enrich the external search, HR1S may maintain data on alternative sources of candidates with the ratings of their effectiveness: schools and

colleges, the Internet, achievement media, employment offices, and so forth.

The life-cycle transitions of the firm's workforce hiring, promotion and transfer, and termination-have to be supported with the appropriate information's system components. The results of employee performance appraisal are maintained as part of their records. Partly based on the analysis of these transitions and appraisals, job analysis and design is performed. The objective is to develop job descriptions-requisite skills, experience, and knowledge-that would create a demanding yet satisfying workforce, thus leading to lower turnover and higher performance.

Employee training (skill development) and education (knowledge .acquisition) are planned and supported. Many companies conduct their own internal training and education programs. Increasingly, computer-based training is employed, with a cycle of computer-assisted instruction and evaluation offered to the employees who wish to advance themselves in the firm. Multimedia just-in-time training is sometimes done right at the assembly line.

3.3.5.3 Compensation and Benefits

Information systems are used to develop and administer the firm's compensation plan. This plan specifies salaries, hourly wages, incentive pay, and profit sharing that go with a specific position in firm's workforce. An increasing variety of benefits is available to employees. In firms that offer flexible benefits, employees can design their own benefit package. Employees may be offered on-line access with electronic kiosks.

In designing a compensation package, decision support systems may be used by human resource specialists to compare various combinations of compensation and benefits in terms of the total cost per employee. With the use of external database, these costs can be compared with the averages for the industry and for geographical region.

3.3.6 Government Reporting and Labor Relations Support

Two principal external stakeholders have an abiding interest in the human resource policies of organizations. These are government and Labor unions.

Provision of equitable and healthy workplaces is of concern to various levels of government. A variety of laws and regulations require reporting to establish that equal opportunity is provided to minorities, women, handicapped, and older employees. Occupational Safety and Health Administration require that information is available regarding employee health and safety, and that each work accident and work-related illness is reported.

Where appropriate, HRIS should support management negotiations with labor unions. Information necessary for this is based on the data provided by the compensation system. To put the firm's compensation in perspective figures have to accessed. During the actual negotiations, a variety of ad hoc reports may be needed by the negotiating team on short notice. Negotiation support systems are currently being developed as a form of

electronic meeting systems and have been used experimentally to facilitate the process.

3.3.7 The Potential Contribution of the HRIS

The computer has always been able to provide more support for the management functions of planning and controlling than for organizing, staffing, and directing. These later three functions relate primarily to personnel, and that is where the HRIS comes into play. If the computer is going to do a better job in supporting those functions, the HRIS is the vehicle to do it.

Firms are currently in a state of transition in terms of their HRIS. Computer -based systems are being implemented in companies of all sizes. In many cases the personnel departments have taken the bull by the horns and are doing all the work themselves- acquiring the hardware and software, and often assembling their own staffs of systems analysts and programmers. While such enthusiasm is eood. it opens the door for the HRIS to become a separate entity. This has a negative effect on the other CBIS subsystems. They cannot combine the personnel flow with the other three physical resource flows.

This problem does not exit when a firm embraces the information resources management (IRM) concept. In that case, top management establishes polices concerning all computing in the firm, and all of the parts work together as a system.

It is necessary that firms include the HRIS in their long-range planning for the GDIS and view the HRIS as a resource for all managers, not just those in the personnel department

3.3.8 Behavioral Influences on System Design

Each organizational information system is used primarily by the managers on that level or in that functional area. However in some cases other functional managers as well as the firm's executives also use the system's output.

At times the managers in one functional area do not want to share their information with others.

Their reasoning is that they have gone to the expense of gathering the information and they should be able to control its use. While such attitudes are clearly not

in the best interests of the firm as a whole, they are a reality of human nature.

The designers of information systems must be aware of how such behavioral influences can affect the success or failure of a system. Very often fear is the underlying cause of resistance to the implementation of computer system. The functional managers fear interference by the other functions.

The employees of the firms that installed the first computers experienced fear. Even when management had no intention of replacing employees with the computer the employees were still distrustful and expected the worst.

When employees are afraid of the computer they can react in various ways. The greatest response is when the employees express their fears to management. That gives management the opportunity to respond and put the fears to rest.

Many times, however, the employees will keep their fears to themselves and take action to sabotage the system. They will not cooperate with the designers during the implementation period or perhaps will attempt to

inflict damage on the system once it becomes operational. Such cases are extremely rare, but the system designers should be alert to any signals that a problem or potential problem might exist.

The firm's management, assisted by the information specialists, can prevent or reduce fear by taking the following steps;

1. Use the computer as a means of achieving job enhancement by letting the computer do the redundant, boring work and letting the employees use their skills to their fullest in addressing the more challenging tasks. This is in contrast to projects intended to produce a reduction in job content, or even job elimination.
2. Use formal communication to keep the employees aware of the firm's intentions. Top management can make announcements at the beginning of each phase of the system life cycle. This announcement can be as simple as a group meeting or as elaborate as videotape.
3. Build a relationship of trust between the employees, the information specialists, and management. Such a

relationship is not difficult to achieve when the parties must work shoulder- to-shoulder for a period of many months.

4. Align the individual employee's needs with the objectives of the firm through. First, identify the employees needs. Second, motivate the employees by showing them that work toward the firm's objectives also helps them to meet their own needs. Third, the employees work toward achievement of the firm's objectives, and fourth, the firm's objectives are met.

This an area where information specialists can make a big contribution. The specialists often observe resistance that the employees keep hidden from management. Information specialists, especially systems analysts, DBAs, and network managers who work closely with users, should be trained to recognize and respond to resistance. These behavioral skills are just as important as technical skills.

3.3.9 The Role of the MIS in Problem Solving

The MIS contributes to problem solving in two basic ways: It provides an organization-wide information

resource, and it contributes primarily to problem identification and understanding.

Provides an organization-Wide Information Resource MIS is an organization-wide effort to provide problem-solving information. The MIS is a formal commitment by top management to make the computer available to all managers in the firm as an information resource. The MIS sets the stage for accomplishments in the other area-DSS, OAf and expert systems.

The main idea behind the MIS is to keep a continuous supply of information flowing to the manager. When the computer was first applied in marketing as an information system, there are confusion concerning the distinction between the marketing information system and marketing research, with its surveys designed to gather timely data about specific activities to a flash bulb. The surveys shine a bright light on a topic, exposing all of the features, but the information is current for only a short time. The information system, on the other hand, is like a candle. It does not provide as much information, but the information continues for a long time.

The light from the MIS is intended to provide the manager with signals of problems or impending problems. The manager then uses the MIS to gain a basic understanding of the problem, determining where it is located and what is causing it. In some cases, the MIS can support the manager through the remaining steps of the solution process.

The main weakness of MIS is that it is not aimed at the specific needs of the individual problem solvers. Very often the MIS does not provide exactly the information that is needed. The decision support system concept was created in response to that need.

Review Questions

1- Describe the principal business functions? (Use graphs).

2- What are the areas covered by marketing information support systems?

3- Explain the marketing information system? (use graphs)

4- What are the various sources of data and information for marketing?

5- Explain the marketing subsystems both input and output subsystems?

6- Explain the marketing mix subsystems?

7- What are the requirements of manufacturing as a response for new market place?

8- Explain a model of manufacturing information system?

9- Describe the subsystems of manufacturing information systems?

10- How can manufacturing information system facilitate planning, production costing, logistics, and inventory subsystems?

11- Describe both the manufacturing input and output subsystems?

12- What are the functional and structure information systems?

13- Describe the transaction processing subsystems and databases of human resource information system?

14- Explain the information subsystems for human resource management?

15- What are the behavioral influences system design?

16- Explain the role of the human information system in problem solving?

Chapter (4)

Computer Applications (2)

4.1 Purchasing information system.

4.2 Financial Information Systems.

4.1 Purchasing Information System

4.1.1 Introduction:

The significance of computerization for purchasing and materials management is readily understood when one considers the amount of purely administrative work involved in the procurement cycle of the average company. Thousands of requisitions, requests for quotation, purchase orders, change orders, status reports, receiving records, invoices, and other documents must be processed and recorded. Today, a computer-based for handling these activities is a necessity.

Effective use of a computer offers a purchasing or materials manager number of important advantages. Because of its ability to process huge volumes. of data rapidly, a computer can do much of the routine clerical work, thus freeing departmental personal from many dull repetitive tasks. This means that a department can operate with fewer clerical people, or that existing personnel can spend their time on more creative purchasing work.

Most managers agree that the primary advantage a computer offers a buyer or a materials planner is the

immediate availability of much more complete data for use in making cost-effective materials-related decisions. Because of its speed, a computer can supply virtually instantaneous reports which otherwise might take a huge amount of time and efforts to prepare and update. The timeliness of such reports enables a materials executive to mange by exception and to do a more effective and more profitable job of purchasing and managing the flow of materials throughout the operation.

4.1.2 A computerized Materials Management System

When a system is computerized, the basic activities of the procurement process remain essentially the same as when the system was operated manually. What changes is the way in which the activities are performed.

In a computer-based system, for the most part, the same records that are maintained in a manual system are stored in disc or tape files that are readily accessible to the computer's central processing unit (CPU). Although the specific format and data contents vary among systems, the records readily available to the computer for display or processing typically are:

- Open-order file.
- Order/parts behind schedule file.
- Supplier record file.
- Material (commodity) record file.
- Inventory record file.

These computer files usually contain the same detailed data. Every company that automates its materials activities utilized the computer in a slightly different manner. The data inputs vary from firm to firm, as do the desired data outputs. The form and timing of various reports depends to a great extent on the operating needs of each particular firm. Generally speaking, however, the basic materials activities which can be performed well by a computer-based system are the same in all cases. They are:

1- Maintenance of inventory records.
2- Computation of order quantities.
3- Preparation of purchase requisitions for inventory items.
4- Preparation of requests for quotation.
5- Preparation of purchase orders.
6- Maintenance of order status records.
7- Distribution of accounting charges.

8- Automatic preparation of follow-up memos.
9- Posting of delivery and quality records, by part and by supplier.
10- Preparation of numerous operating reports for management.
11- Provision of decision support system information.
12- Auditing of invoices and preparation of checks for payment.
13- Electronic data interchange communications.

Three types of hardware, are used today in computer-based purchasing operations. The first is a large mainframe system that purchasing shares with most other operating units in the organization. In most cases, the input terminals are located at the appropriate purchasing work stations and are linked to the processing hardware, which is usually located elsewhere in a centralized computer center. The second type of system frequently found in purchasing departments today is built around the use of a minicomputer. As its name implies, the mini is simply a miniature version of larger mainframe units. This type of system frequently is dedicated for use in the purchasing and materials management activities of the firm. Operationally, this system functions much like a

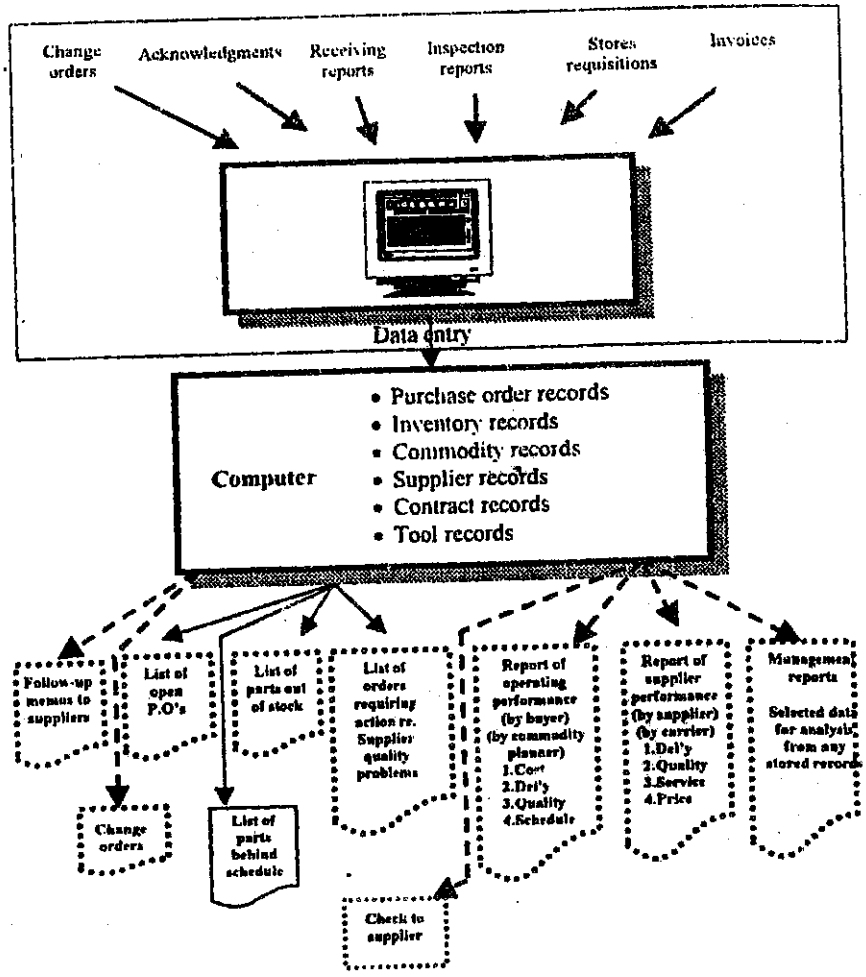
mainframe system, usually with better accessibility but with reduced memory and capacity. Finally, purchasing and supply operating systems in some firms, particularly smaller companies, are often handled adequately by a network of microcomputers (PCs) that constitutes purchasing's own freestanding system. Some of these units may have the capability to access larger corporate wide databases that are part of the firm's mainframe system. In any case, in recent years the growth in capacity and speed of PCs has been phenomenal.

In all these systems, authorized personnel communicate directly with the computer database through the terminal for purpose of entering and recalling data, as well as performing calculations and other machine processing activities. Through the use of computer security codes, each individual's data access is usually restricted to that portion of the database he needs to use in performing his job.

Figures (4.1) shows in schematic form the general operation of an online computerized materials management system.

Figure (4.1)

Schematic diagram of the activities subsequent to placement of the purchase order in a computerized materials management system



4.1.3 Inventory Control and Purchase Requisitions

In an automated materials system, all inventory and part records are filed in memory accessible to the CPU. For each part either one record or several different records can be maintained. In either case, certain standard information is included, such as the part number, its name, required descriptive data from recent purchases as well as price quotation information as 'supplier names and addresses, shipping terms, quality and delivery performance data, purchase history, and open orders.

Each time the machine posts a stores withdrawal requisition for a particular part, it updates the balance on hand and compares this figure with a specified reorder point figure. When the balance falls below this level, the computer prints out a purchase requisition. The quantity that the machine orders may be a predetermined order quantity or the quantity required by a planned period production schedule.

In the case of items controlled by an "order point" inventory control system, software is available to compute the most economical quantity, just as a buyer might do

manually. Quantity calculations are based on predetennined figures for inventory carrying costs and acquisition costs, and on current figures for part usage and price, these data are filed in memory.

Thus, the computer automatically produces printed purchase requisitions which contain most of the information (including the appropriate accounting charge) that normally would appear on a manually prepared requisition. For the buyer's use, the requisition also can contain monthly usage data for the past year, a listing of past purchase orders and prices, and a summary of the most recent price quotations from different suppliers.

The computer, however, cannot determine the urgency or a firm's need for apart. Consequently, for other than normal delivery requirements, exact shipping dates, order follow-up dates, and the buyer must specify carrier designations. For this reason and for purposes of control, an automated system usually provides for a review of all purchase requisitions by the material planner and by the buyer. In the event that production needs fluctuate, the planner changes the requisition accordingly before sending it to the buyer. The buyer analyzes the requisition

in terms of potential suppliers' performances under current conditions. The buyer also considers future quantity and quality requirements, as well as other intangible factors, and makes any changes deemed appropriate. At this point, a purchase order number is also assigned.

Note that all purchase requisitions for parts whose inventory is not controlled by the computer must be finalized manually by the buyer. From this point on, however, a purchase order can be created and handled in the automated materials system without difficulty.

4.1.4 Purchase Orders and Change Orders.

For computer-generated requisitions, if the buyer makes no changes, the purchase order can be prepared simply by adding the name of the desired supplier and a purchase order number and instructing the computer to print out the requisition in the form of a purchase order. When data are added and changes are made to requisition, or in the case of manually generated requisitions, all new data are keyed directly into the computer through a terminal with the instruction to print out the corresponding purchase order.

At the same time the computer prepares the purchase order to be mailed to the supplier, it can produce an acknowledgement form for the supplier, copies of the purchase order for internal distribution, and forms to be used as the receiving and inspection reports. While producing purchase orders, the computer also produces and files in memory a cumulative list of all outstanding purchase orders. This becomes the major "working" order file.

In the event of order is changed after it has been issued, a change order form is prepared by the buyer and processed by the machine in the same way as the original purchase order. With accompanying documents, they simply replace the original order.

4.1.5 Follow-Up and Expediting

The file of open purchase orders can be processed as frequently as desired to produce current information for purchasing personnel. Today most firms update open orders once a day to provide purchasing with up-to- the-minute status reports.

One of the most important outputs of the open-order processing operation is the follow-up communication. At the time a purchase requisition is converted into an order, the buyer instructs the computer to print out a follow-up memo at specified dates prior to the scheduled delivery date. Such a system assures periodic review of every purchase order, regardless of departmental workload or employee absenteeism,

The computer, as instructed, faithfully reproduces follow-up memos, according to a predetermined format; hence, mailing these communications is the only clerical effort required of purchasing personnel. Upon receipt of a supplier's response, the buyer or expediter gives attention only to those orders requiring further follow-up work.

Orders whose delivery is behind schedule are brought to the attention of the buyer by a 'behind schedule' report.

4.1.6 Receiving, Inspection, and Stores Requisitions

When an order is received, the receiving clerk utilizes a remote terminal to enter the conventional receiving information directly into the computer's order

record. This activity often facilitated with a bar code scanning operation, simultaneously, the machine produces the printed reports required for the use of other company personnel Receiving reports thus can be generated in multiple copies for the buyer, the materials planner, and other using departments. For those orders requiring technical inspection, inspection reports are produced in conventional form and are processed periodically by the computer to update the open-order file and the inventory record file.

As previously indicated, stores requisitions that are prepared in conventional form are entered through a terminal and processed periodically to update inventory records.

Daily updating of the open-order records and the parts inventory records, coupled with the computer's speed, permits the preparation of numerous daily operating reports to facilitate the buyer's job. Four commonly used reports are:

- List of open purchase orders.
- List of orders or parts that are behind schedule.
- List of parts that are out of stock.

- List of orders or parts that require action because of supplier quality or related problems.

Such reports are of tremendous value to individual buyers. They provide a buyer with a summary of critical, up-to-the-minute information about his orders that is virtually impossible to obtain manually. These summary reports also permit the buyer to manage by exception- that is, to concentrate efforts on those orders requiring attention in time to prevent the development of serious purchasing problems.

4.1.7 Invoices and Payment

When an invoice for an order is received, it is keyed directly into the computer through a terminal.

The computer then audits the invoice by comparing the item, the quantity, and the price with corresponding information recorded in the updated purchase order and receiving files. The computer also verifies the price extension. Any discrepancies are noted on an output error list. If no discrepancies are found, the unit signals a printer to write a check to the supplier for the amount of the invoice less any applicable discounts.

Accounting charges for the order can be distributed in the conventional manner from a printed copy of the purchase order, or they can be distributed by the computer. If the accounting system is computerized, distributions can be made by the machine during the processing of the accounting records.

4.1.8 Management Reports

In its initial design, an automated materials management system can be developed to accumulate various data useful to managerial personnel for decision making and control purposes. The computer's speed permits monthly or weekly analysis and summary of much information is outside the realm of feasibility in an annually operated system. While managers in different firms may desire different types of reports, most supply executives want to evaluate the performance of suppliers, carriers, and commodities, as well as their own individual personnel and departments.

It is entirely possible to purchase or develop computer software to provide periodic reports of each supplier's and carrier's performance with respect to such things as volume of business, late deliveries, rejected

shipments, transit damage, or price trends. Such reports can even be broken down by product lines, in the case of multi-product suppliers. Likewise, the computer can prepare repots on the performance of individual buyers, materials planners, and departments. Such reports can include figures on number of orders, blanket orders and materials handled, volume of orders by commodity, percentage of open orders, prices paid versus target prices, percentage of late deliveries, percentage of rejected shipments, percentage of schedules missed, etc. Some companies even develop formulas for determining performance indexes for suppliers and buyers and have the computer automatically compute the indexes monthly, The computer offers materials executives an endless number of possibilities for developing data to improve management decisions and control.

4.1.9 The Impact of a Computer-Based System on Daily Operations

The first observable change a computer-based system makes in the traditional purchasing office routine is in the generation and processing of purchase requisitions. As a rule, a majority of the form's purchase

requisitions are prepared be the computer, including virtually all the requisitions for materials carried in inventory. Items whose inventory cannot be controlled effectively by a computer on a continuing basis are primarily those with extremely unstable usage patterns. Requisitions for these items as well as for "new buys" normal one-time purchases, and certain emergency and critical items usually continue to be generated manually.

A Second, and related, change produced by an automated system focuses on the utilization of people. A computer-based system frees buyers and other professional personnel from a vast amount of routine work associated with the initiating and processing of requisitions. One company found that prior to the installation of an automated system, the average buyer spent nearly 50 percent of his time processing purchase requisitions. After installation of the system, requisition processing required only a fraction of this time. Automation thus permitted the typical buyer to devote a majority of the time to creative buying activities such as supplier investigation, negotiation and problem solving, value analysis, and various types of purchasing research.

Another difference, with significant managerial implications, is that the system regularly provides buyers and mangers with a large variety of new and valuable detailed control data. The use of report data enables the company to reduce delays in manufacturing by effectively controlling late shipments. It also reduces inventory investment, reduce average material costs do a better job of planning cash flows, improve cost accounting control, and increase the speed and effectiveness of the total procurement operation.

Still another changes seem in the relationships developed between purchasing and other materials activities. These relationships, particularly with production control, are somewhat closer under an automated system. The computer is the common bond, which draws all materials activities into an integrated system. This situation promotes the development of a materials management type of organization. Even where the traditional forms of organization persist, buyers find themselves working more closely with their counterparts in the production control department, The design of the system and the speed with which it functions minimize buck-passing between the two and tend to make specific

materials problems company problems, rather than departmental problems.

Finally, compared with a traditional purchasing operation, the general tenor of activities in an automated department is upgraded and focuses more sharply on the managerial and creative responsibilities of the purchasing junction. Fewer clerks and expediters are required. The buyer's role, if developed as a logical extension of the old one, involves more analytical work and more purchasing research.

4.1.10 Impact on Decision Making and Productivity

Microcomputers (PCs) are found in virtually all business offices today, including purchasing and supply management offices. In the latter case, micros are used primarily to increase the productivity and effectiveness of procurement personnel. The increase is accomplished in two ways:

1- By making it possible for individuals to do more through analytical work that leads to more effective materials decisions.

2- By making it possible simply to increase the volume of work that can be handled- hence, increasing the individual's productivity.

Three types of microcomputer applications are found most frequently in the materials environment- analytical, database, and communications.

4.1.11 Analytical Applications

The most common techniques used in the various analytical applications are "Spreadsheet" analysis. A spreadsheet is simply a matrix of rows and columns into which relevant data elements are inserted for different operational alternatives (e.g., suppliers, operating plans, and soon). Many of the data elements for each alternative are related mathematically, and it is the PCs ability to make such calculations quickly that makes it so useful for this type of analysis.

Spreadsheet analysis is used most commonly in purchasing offices for activities such as:

1- The evaluation of competitive bids.
2- The analysis of .various quantity discounts purchase alternatives.

3- Cost price analysis for different potential suppliers.

4- Make-or-buy analysis.

5- The quantifiable aspects of value analysis.

In all these various analysis, many of the data elements are variable as they relate to each other (different quantities, different service, different costs and prices, and so on), and they typically vary among alternative suppliers, plans, and so on. So the job of the analyst is to make the calculations, develop comparable data among the alternatives (compare apples to apples), and then analyze the findings to determine the best course of action. The value of a PC based spreadsheet analysis in this work is obvious.

What if analysis is a similar type of spreadsheet application that can give management extremely useful data for planning purposes. This approach, in effect, simulates the operation of a total system under different operating conditions. For example, a materials manager might conduct an inventory system simulation. Suppose he wants to know the effects on costs and service of reducing the inventory levels of certain commodity classifications, or of developing various supplier stocking

arrangements for certain materials, or of developing a JIT purchasing plan with selected suppliers- "What if we did such and such? Once the system is modeled on the spreadsheet, the manager can change a given variable, and within seconds the computer will show the impact of the modification on the entire system.

4.1.12 Data Base Applications

When the data records maintained in the computerized operating system are originally designed, practical considerations typically limit the amount of information to be contained in each record. In the course of their work, however, certain buyers or buying groups may have unique needs for more detailed or refined information about certain suppliers, operations, data needed for forecasting, and so on. A microcomputer or networked micro system in the department can be used to expand selected operating data files for such purposes.

Records that frequently are enhanced in this way include those dealing with materials and market variables, suppliers, services, quotations, and contracts. When such records are expanded by using a PC, it is important to integrate the system carefully with the purchasing

operating system and to provide adequate data security so that unauthorized individuals cannot modify' the basic record.

4.1.13 Expert Systems Applications

A fledgling technology is emerging that utilizes both the analytical and database PC applications- "Purchasing expert systems" Expert systems are computer programs that solve problems by emulating the problem-solving behavior of human experts. These systems are developed by knowledge engineers who conduct interviews with one or more experts to capture their knowledge and problem-solving logic regarding a specific problem. The engineers then construct a computer model using artificial intelligence programming language.

An expert system consists of a knowledge base and an "inference engine" the knowledge base contains program goals, facts generally agreed upon by the experts, and "rules of thumb" that an expert's problem-solving approach and uses the contents of the knowledge base to reach conclusions. Expert systems then provide decision support to managers by means of a computer-based question and answer session. Thus, an expert system uses

information obtained from consultation with experts, the department's own database, and possibly external databases to make recommendations to purchasing and supply management.

This technology is still embryonic from as far as purchasing use I concerned. Although it appears to hold promise for improving the effectiveness of purchasing decisions in the future, only a few large firms use it at the present time. IBM; for example, is reported to save $1.5 million per year through its use of an expert system program in buying injection moldings.

4.1.14 Communications Applications

PC software is commonly available to provide "electronic mailbox" and "electronic bulletin board" capabilities, as well as word processing capability. Many purchasing departments use electronic mail communications among personnel within the department, as well as with users in operating departments. The bulletin board feature can be used to communicate material lead-time changes, price changes, information about supplier problems, and similar types of information

that purchasing and other individuals throughout the organization need to know.

As in all departments, word processing capability can be real time-saver in purchasing. The repetitive preparation of various reports, requests for quotation, and so on, in which some data remain constant from one preparation to the next while other data change, represents and excellent opportunity to increase productivity by using this PC capability.

4.1.15 Electronic Dada Interchange (EDI)

Once a firm has an effective computer-based purchasing system in operation, a logical extension of that system is to link it, in one way or another, with the order-handling computer system of selected suppliers. The term generally given this type of buyer-supplier communications operation is electronic data interchange. EDI simply is an advanced step in the continuing drive toward the development of a "paperless" purchasing operation that began with techniques such as the blanket order, systems contracting, consignment purchasing, and various data-phone techniques. Therefore we can define EDI as:

"EDI is the direct electronic transmission, computer, of standard business forms, such as purchase orders, shipping notices, invoices, and the like, between two organization. In a purchasing environment, documents are transmitted "over the wire", eliminating the need to generate hard copies and to distribute them manually. By utilizing EDI, a buyer and a supplier are operating in a near real-time environment, which can reduce material delays by shortening procurement lead times".

4.1.16 Types of Operations

In practice, applications based on the EDI concept take several forms. The first step in many firms is the transmission of data from a dedicated terminal in the buyer's operation to a terminal in the supplier's operation. Technically, this is not a pure EDI operation because a terminal operator is required to input data generated by the buyer's automated purchasing system, and an operator frequently is required to receive the data at the supplier's location. Nevertheless, in this type of proprietary system transmission is instantaneous and most of the key benefits accrue to both organizations.

Another similar application, terminal to computer, involves transmission from the buyer's terminal to the supplier's electronic mailbox at its computer site. In this case, operation is about the same as in the preceding example, except no operator is required at the receiving site. However, it is necessary to ensure that the supplier's system is ready to receive the communications before transmission is begun. The last stage is computer-to-computer communication. Both the buyer and the supplier have electronic mailboxes into which the other party can deposit purchase orders, acknowledgments, invoices, and related communications. Because neither party has access to the internal files of the other, the integrity of proprietary data is maintained. This system represents operational development of the concept to its fullest extent; the two firms' computers literally talk with each other in a standardized language.

Diagrams (4.2) and (4.3) show in simplified schematic form the flow of communications in this system, as compared with a traditional hard copy system.

Figure (4.2)

Traditional Transmission of Document

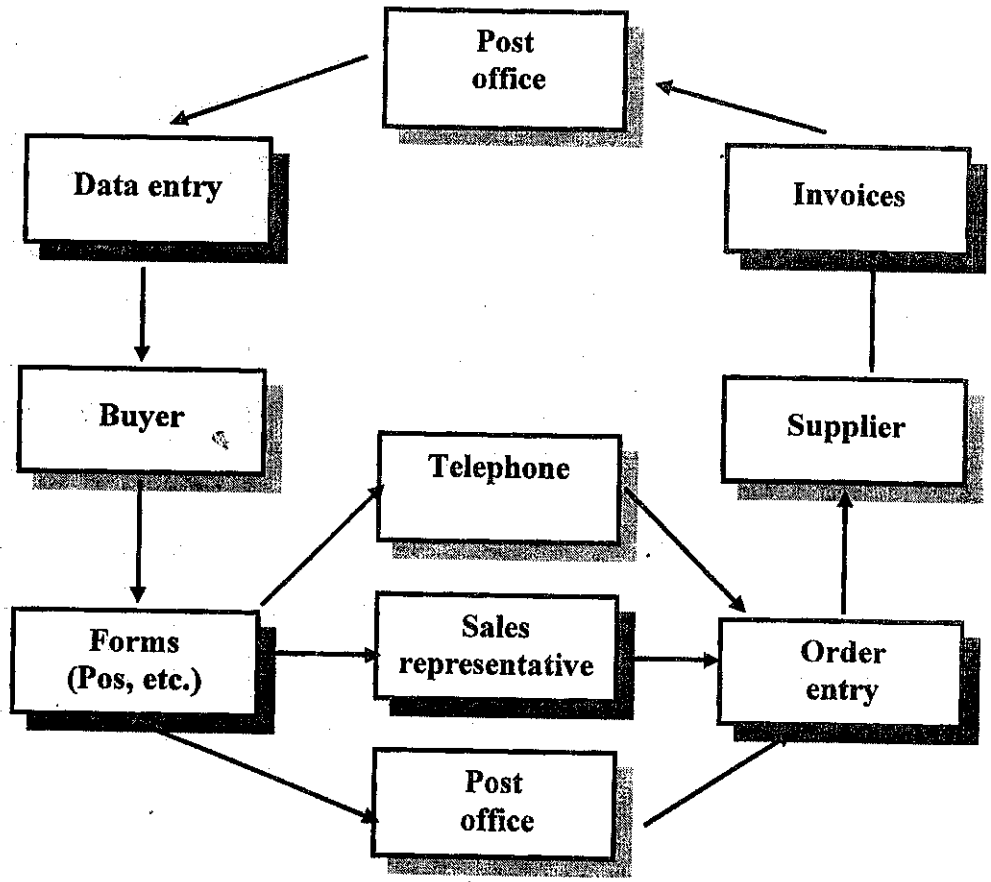
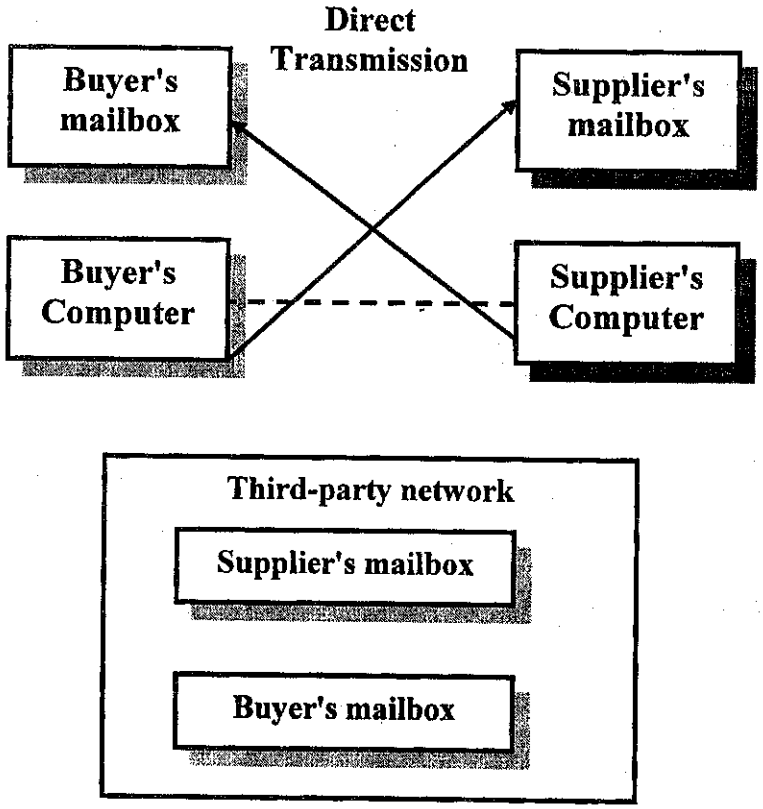


Figure (4.3)

Electronic transmission of purchasing documentation



4.1.17 Standards Requirements

For the two firms' computers to communicate with each other effectively, they must "talk the same language". To accomplish this requirement operationally. It is necessary for both firms to use certain standard procedures. These technically based requirements involve two types of procedures-communication standards and message standards.

4.1.17.1 Communication standards:

They provide guidelines for the transmission of electronic data. These standards help to ensure that the message is received and can be processed by the receiver. Issues covered include:

- The speed at which the data can be transmitted.
- The timing of the placement or retrieval of information to or from the mailbox.
- The requirement for passwords and the coding of data.
- The matching of equipment to be used.

4.1.17.2 Message standards:

Message standards provide guidelines for the content of the data to be transmitted. These standards help to ensure that the meaning of the data is clear to both parties. The standards conniver;

- Definition of words and codes.
- Meaning for specific terms of trade.
- Methods of identifying specific products and terms.
- Essential elements to be included in the transmission.

To permit the development of EDI relationships among large numbers of different buying and supplying firms, it is important that essentially the same message standards be used by all firms. Consequently, a variety of industry groups have developed standards for their industries.

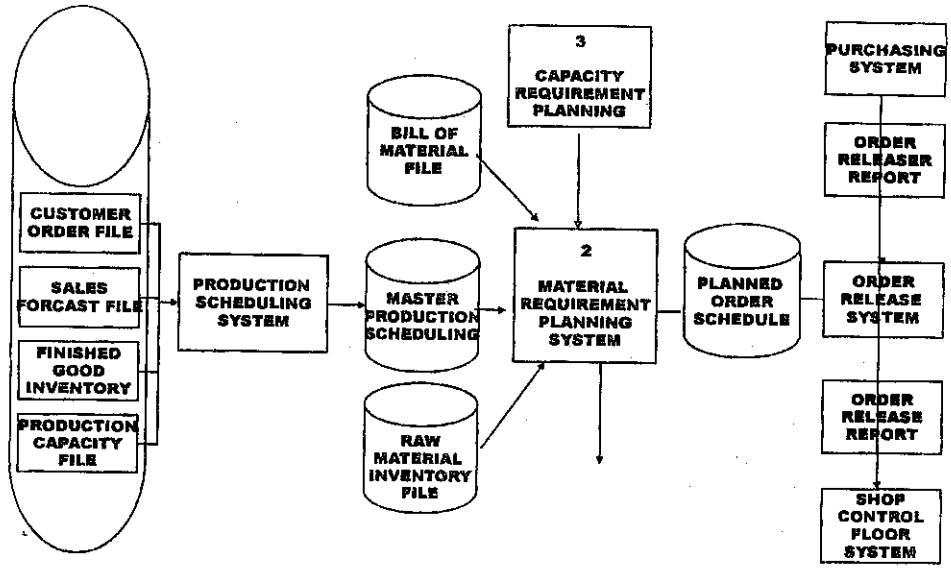
4.1.18 Material Requirements Planning (MRP)

Material requirement planning (MRP) is a proactive materials strategy. Rather than wait until it is time to order, MRP looks into the future and anticipates future materials needs. The MRP program analyzes the schedule

of future production and identifies the materials that will be needed, their quantities, and the dates that they will be needed.

Figure (4.4)

Material Requirement Planning System "MRP"



The numbered systems below correspond to the numbers in the figure.

1- The production scheduling system uses four data files in preparing the master production schedules. The

input data includes the customer order file, the sales forecast file, the finished-goods inventory file, and the production capacity file. The master production schedule projects the production far enough into the future to accommodate the production process that accounts for the longest combination for production schedules to look more than a year into the future.

2- The material requirements planning system uses the Bill of Material file to explode the bill of material for each item scheduled for production. The purpose of the explosion is to determine the total material requirements called the gross requirements that will be needed to produce the scheduled products. Next, the Raw Materials Inventory file is used to determine which of the materials are already on hand. The materials on hand are subtracted from the gross requirements to identify the net requirements- the items that must be purchased in order to meet the production schedule.

3- The material requirements planning system works in conjunction with the capacity requirements planning system to ensure that the scheduled production will fit within the plant capacity. After that determination has been made, the material requirements planning

systems produces several outputs. The main output is the planned order schedule, which lists the needed quantities of each material by time period. Other outputs include:

- Changes to planned orders-that reflects canceled orders, expedited orders, and modified order quantities.
- Exception reports- that flag items requiring management attention.
- Performance reports- that indicates how well the system is performing in terms of stockouts and other measures.
- Planning reports- that can be used by manufacturing management for future inventory planning.

4- The order release system users the planned order schedule for input and prints two order release reports. One is for the buyers in the purchasing department to use in negotiating with suppliers, and the other is for shop floor managers to use in controlling the production process.

It is easy to see the appeal that MRP had over the Reorder Point (ROP) method. The firm could do a better

job of managing its materials. It could avoid stockouts caused by waiting until the last minute and learning that replenishment stock was unavailable. Also, knowing their future materials needs, they could negotiate purchase agreements with suppliers and receive quantity disputes.

Although a larger number of firms implemented MRP, only a relative few realized the anticipated benefits, Experiences showed that MRP fit certain production environments better than others. Many firms still use MRP to mange their materials, but others have either abandoned their systems or expanded on the concept in hopes of achieving even greater benefits.

The following table shows how inventory levels are run within the material information system.

- Starting inventory (1-5-2007) 200 unit

- Number of unit issued per day= 20 units

- EOQ= 100 units

- Re-ordering point= 175 unit

- Lead-time= 3days

day	Starting stock	Incoming shipments	Quantity issued daily	End of day stock	EOQ	Date of arrival
1-5	200	-----	20	180	----	-----
2-5	180	------	20	160	100	5-5
3-5	160	-----	20	140	----	-----
4-5	140	-----	20	120	-----	-----
5-5	120	100	20	200		
6-5						
7-5						
8-5						
9-5						
10-5						
11-5						
12-5						
13-5						
14-5						
15-5						
16-5						
17-5						
18-5						
19-5						
20-5						
21-5						
22-5						
23-5						
24-5						
25-5						
26-5						
27-5						

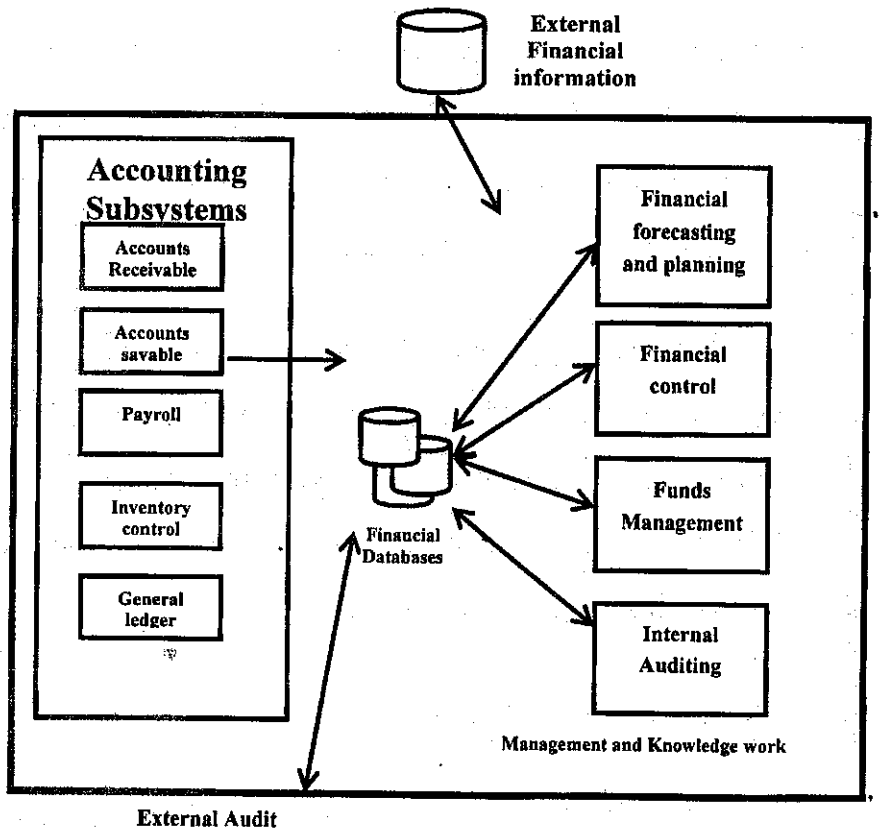
Count materials movement in light of data mentioned above

4.2 Financial Information System

4.2.1 Introduction

The financial information systems, pictured in figure (4.5) is designed to provide information relating to the money flow.

Figure (4.5)
Financial Information System



This information is useful primarily to managers in the financial function but is also shared with mangers in the other areas. An internal audit subsystem assists the data processing subsystem in providing internal data and information. Larger firms usually haveastaffof internal auditors whose responsibility it is to maintain the integrity of the firm's accounting systems. Internal auditors who have a computer expertise are called EDP auditors.

As in the other functional systems, the financial intelligence subsystem gathers information from the environment. In this case environmental elements providing the information are the financial community, stockholders, and the government.

Historically, most financial intelligence has not been stored in the computer. That situation is changing. It is possible to subscribe to computer-based financial databases and news services that make both current and historical information available.

4.2.2 Output Subsystems

The forecasting subsystem conducts long-range forecasts five to ten years into the future to provide the

basis for strategic planning. The funds management subsystem is concerned with the flow of money through the firm. Management wants to know in advance of cash surpluses and deficits so that they can plan how to handle them. The control subsystem prepares the annual operating budget and then provides feedback information to the unit mangers so that they can monitor their actual expenses compared to the budget.

4.2.3 The new financial Information System

The financial function of the enterprise consist of taking stock of the flows of money and other assets into and out of an organization, ensuring that its available resources are properly used and that the organization is financially fit The organizational use of computers originated with this function. However, their original role was limited to accounting, that is, taking stock of past performance in monetary terms. Since then, financial information financial information systems have become more forward-looking and assist. decision makers in planning and controlling the financial performance of the unit for which they are responsible.

The financial subsystems serve to record, consolidate, and report financial events in a firm; that is, events that result in the flow of money and other assets into or out of the firm. The components of the accounting system are:

- Accounts receivable records amounts owned by customers.
- Accounts payable records amounts owned to employees.
- Inventory control records changes in inventory assets.
- Payroll records amounts owned to employees.
- General ledger consolidates the data from all other accounting subsystems, which post the appropriate transactions to the ledger, and produce financial reports and statements. At the end of an accounting period, general ledger produces the balance sheet for the firm, listing its assets and liabilities and the firm's income statement, showing its revenues and expenses for the period.

In addition to the data produced by the accounting subsystems, financial information systems rely on external sources, such as on-line databases and custom-produced

reports, particularly in the areas of financial forecasting and funds management.

Let us consider the essential functions that accounting and financial information system perform.

4.2.3.1 Financial Forecasting and Planning

Financial forecasting is the process of predicting the inflow of funds into the company and the out flow of funds from it for a long term into the future. Outflows of funds must be balanced over the long term with the inflows. Since the sales of products are the principal source of funds, the inflow side of a financial forecast is based on the sales forecast generated by marketing. Aside from the cost of sales, major investment projects-for example, building a new plant or developing a new market in Hungary-will be considered in the financial forecast as outflows With the globalization of business, the function of financial forecasting has become more complex, since the activities in multiple national markets have to be consolidated, taking into consideration the vagaries of multiple national currencies. Scenario analysis is frequently employed in order to prepare the firm for various contingencies.

Financial forecasts are based on computerized models known as cash-flow models. They range from rather simple spreadsheet templates to sophisticated models developed for the given industry (known as vertical models) and customized for the firm or; in the case of large corporations, to ;pecific modeling of their financial operations.

Financial forecasting serves to identify the need for funds and their sources. Among possible funds sources are bank loans, debt financing (issuing bonds), equity financing (issuing stock), and merger with another firm, or being acquired by a firm.

Specialized expertise of investment bankers is generally employed when funds other than bank bans are sought.

Based on the long -term financial forecasts, financial plans are drawn up, generally for one year. Financial plans rely on planning models, which show the dependence of projected financial results on the values of input variables. Financial plans obtained with these models include a projected income statement and a balance sheet.

4.2.3.2 Financial Control

The primary tools of financial control are budgets. Budgets are a powerful means of expressing financial control are budgets are powerful means of expressing financial plans on tactical and operational levels. A budget specifies the resources committed to a plan for a given project or time period. For example, we may need to draw up a budget for converting a plant to a new manufacturing process for the operations of the marketing department for the nest six months. Fixed budgets are independent of the level of activity of the unit for which the budget is drawn up. Flexible budgets commit resources depending on t level of activity envisaged by a plan may be classified into three categories, depending on the success ofthe product, and three budget levels may be drawn up, depending on this activity.

Spreadsheet programs are the main budgeting tool- and budgeting is what made spreadsheets the leading personal productivity tool they are today. An example of a flexible budget for a small company, obtained with a spreadsheet program, is shown in the following figure, costs are budgeted for four possible level of sales.

General Development Corporation
Monthly sales volume for March 2000
(In thousands of dollars)

Sale / Cost	$100	$120	$140	$160
Expense items				
Materials cost	40	48	56	62
Labor cost	15	18	21	24
Overhead cost	8	9	10	11
Production costs	63	75	87	97
R&D cost	5	5	5	5
Engineering cost	1	1	1	1
Marketing and sales cost	15	16	18	20
Administration cost	10	10	10	10
Non production cost	31	32	34	36
Total cost	94	107	121	133
Profit	6	13	19	27
Profit sales Ratio	6.0 %	10.8 %	13.6 %	1 6.9 %

In the systems-theoretic view, budgets serve as the standard against which managers can compare the actual results by using information systems.

Performance reports are used to monitor budgets of various managerial levels. A performance report states the

actual financial results achieved by the unit and compares them with the planned results.

This monitoring may be done with management reporting systems. Senior managers increasingly use executive information systems to monitor budgets.

Along with budgets and performance reports, financial control employs a number of financial ratios indicating the performance of the business unit. A widely employed financial ratio is return on investment (ROI). ROI shows how well a business unit uses its resources: Its value is obtained by dividing the earnings of the business unit by its total assets. Innovative companies are prepared to assume appropriate risk and suspend using the ROI indicator for a certain period with respect to a promising project. In particular, the use of ROI may be suspended when considering the development of a strategic information system.

4.2.3.4 Funds management

Financial information systems help to mange the organization's liquid assets, such as cash or securities, for high yields with the lowest degree of loss risk. Some firms

deploy computerized systems to manage their securities portfolios and automatically generate buy or sell orders. The globalization of business has resulted in the need to maintain positions in multiple currencies in order to conduct business in the corresponding countries. Companies do forward buying of a currency to be used in a payment to a foreign supplier in order to minimize the risk associated with the appreciation of that currency to be delivered on a future date.

4.2.3.4 Internal Auditing

How do the firm's executives know whether the financial records of various units correspond to reality? How do investors or government organizations know whether the financial statements reported by the firm are true? The audit function provides an independent appraisal of an organization's accounting, financial, and operational procedures and information. All larger firms have internal auditors, answerable only to the audit committee of the board of directors. The staff of the chief financial officer of the company performs financial and operational audits. During a financial audit, an appraisal is

made of the reliability and integrity of the company's financial information and of the means used to process it. An operational audit is an appraisal of how well management utilizes company resources and how well corporate plans are being carried out. Today, of course, it would be impossible to render an opinion on the financial state of a firm or its unit without a through audit of information systems. The professional who evaluates the effectiveness of financial information systems is known as an information systems auditor.

To certify that a firm's records and procedures are in "accordance with generally accepted accounting principles"(or find that they somehow diverge from them), external audits are performed by certified public accountants (CPAs).

Review Questions

1. What are the advantages of computer applications in purchasing functions?
2. Classify the records readily available to the computer for display or processing?
3. Describe the basic materials activities, which can be performed?
4. What are the requisitions of receiving, inspection and stores functions?
5. What are the requisitions of inventory control and purchase control?
6. Explain the impact of a computer-based system on daily purchasing operations?
7. Explain the impact of a computer based system on decision making and productivity related to purchasing activities?
8. Explain the framework of material requirement planning (MRP)?
9. Explain the framework of financial information system? (Using diagrams)
10. Describe the inputs and outputs of the financial Information systems?
11. What are the primary tools of financial control?

12. Explain how can financial information systems help to manage the organization's liquid assets?
13. Provide an example of the financial information system?
14. Explain how can computers based systems applied to fund management?

Table of Contents

Chapter (1)
Introduction to Computer

Chapter (2)
Working with Computer Applications

Chapter (3)
Computer Applications (1)

Chapter (4)
Computer Applications (2)

Bibliographical References

Part I

Bucki, Lisa A. and Judy Fischer (1999). **Learning Computer Applications: Projects and Exercises**. New York: DDC Publishing.

Denning Peter (2002). **The Invisible Future**. New York: McGraw-Hill

Elliott Geoffrey (2004). **Global Business Information Technology: An Integrated Systems Approach.** New York: Addison-Wesley.

Fox Marianne, Metzelaar Lawrence, Bird Linda Mulbery Keith, Toliver Pamela (2004). **Essentials: Getting Started with Microsoft Office 2003**. New York: Prentice Hall.

Fulton, Jennifer, Nancy Kaczmarczyk, Sue Plumley, Suzanne Weixel, and Rick Winter (1999). **Learning Microsoft Office 2000**. New York: DDC Publishing.

Jeffrey H. Moore, Larry R. Weatherford (2002). **Decision Modeling with Microsoft Excel**. New York: Prentice Hall.

Kurzweil Ray (2000). **The Age of Spiritual Machines - When Computer Exceed Human Intelligence.** New York: Penguin Books.

Senn James (2004). **Information Technology: Principles, Practices, and Opportunities**. New York: Prentice Hall

Toliver Pamela (2004). **Essentials: Microsoft Access 2003 Comprehensive**. New York: Prentice Hall.

Versha Mehta and Kumar N. (2003). **Computer Applications in Business Management**. New Delhi: Anmol Publications PVT Ltd.

Weatherwax Jo and Weatherwax Robert (1997). **Business Analysis with Computer Applications: Main Text**. USA: South-Western Education Publisher.

Part II

Ackoff, Russell) Management Misinformation Systems) Management Science 14 (December 1987): PP 147-156.

Ahituv, NIV, and Seev Neeumann (Principles of information Systems for Management), 2nd ed.

Dubuque, Iowa; WM.C. Brown, 1986.

Alter Steven) .Information Systems. A Management Perspective, Addison Wesley Publishing Company, Paris, 1992.

Anthony, R.N) .Planning and Control: A Framework for Analysis) Harvard University Press, 1992.

Buz/ell, Robert, Cox Donald, Brown Rex, Marketing Research and Information Systems), Text and Cases, McGraw-Hill Book Company, NewYorkl996.

Bonnelly James, Gibson James, Ivancevich John) .Fundamentals of Management .(Ninth ed., Irwin Chicago, 1995.

Earl, M.J) ,. Management Strategies for Information Technology), Prentice Hall, 1985.

Keen, Peter G.W. & Michael, Scott Morto (Decision Support Systems: An Organizational Perspective). Reading, MA: Addison. Wesley, 1978.

Kotler, John P) .What Effective Managers Really Do) Harvard Business, Review, Dec. 1992, PP. 156-167.

Kotler and Armstrong, (Principles of Marketing) 8th Ed. Prentice- Hall International inc. 1999.

Lucas, Henry V., JR (Utilizing Information Technology: Guidelines for Managers). Sloan Management Review 27 (Fall 1986); 39-47.

MarJign M.Parker and Robert J. Benson, (Information Economics; An introduction.) Datamation 33 (December 1, 1987)

McCosh, Andrew, Rahman, Matvdudar, and Earl Michael) .Developing Managerial information Systems .(Macmillan Press, London, 1984.

Mintzberg, Henry) The Manager's Job; Folklore or Fact.) Harvard Business Review, Jul.-Aug. 1975. PP 49-61.

O' Brien A. James, (Management Information Systems. A Study of Computer- Based Information Systems) 4th ed., Macmillan Publishing Company, New York, 1990.

Rockart, John F. and W. David Delong (Executive Support Systems), Homewood, IL; Irwin, 1988.

Schoell., Dessker., and., Reinecke;.Introduction to Business) 7th Ed., Allyn And Bacon., 1993.

Sparague, Ralph H., Jr .A Framework for the Development of decision Support Systems.) MIS Quarterly. Vol.4, No.2 June 1980.

Ward, John, Griffith Pat, Whit mo re Paul, (Strategic Planning for Information Systems), John Willey and Sons, Chichester 1990.